FCC CFR47 PART 15 SUBPART C
INDUSTRY CANADA RSS-247 ISSUE 1

CERTIFICATION TEST REPORT

FOR

RADIO TRANSCEIVER DEVICE

MODEL NUMBER: 1688

FCC ID: C3K1688
IC ID: 3048A-1688

REPORT NUMBER: 15U21746-E3V2

ISSUE DATE: DECEMBER 8, 2015

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	12/03/15	Initial issue	C. OOI
V2	12/08/15	Add Section 5.5	C. OOI

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: MICROSOFT CORP.
EUT DESCRIPTION: RADIO TRANSCEIVER DEVICE
MODEL: 1688
SERIAL NUMBER: 26653556, 28453556
DATE TESTED: SEPTEMBER 14 – OCTOBER 24, 2015

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-247 Issue 1	Pass
INDUSTRY CANADA RSS-GEN Issue 4	Pass

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

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

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LAB ENGINEER
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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, KDB 558074 D01 v03r03, ANSI C63.10-2013, RSS-GEN Issue 4, and RSS-247 Issue 1.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street
☒ Chamber A(IC: 2324B-1)	☐ Chamber D(IC: 2324B-4)
☐ Chamber B(IC: 2324B-2)	☐ Chamber E(IC: 2324B-5)
☐ Chamber C(IC: 2324B-3)	☐ Chamber F(IC: 2324B-6)
	☐ Chamber G(IC: 2324B-7)
	☐ Chamber H(IC: 2324B-8)

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

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	± 3.52 dB
Radiated Disturbance, 30 to 1000 MHz	± 4.94 dB
Radiated Disturbance, 1 to 6 GHz	± 3.86 dB
Radiated Disturbance, 6 to 18 GHz	± 4.23 dB
Radiated Disturbance, 18 to 26 GHz	± 5.30 dB
Radiated Disturbance, 26 to 40 GHz	± 5.23 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a radio transceiver device, which contains an integrated 802.11 a/b/g/n/ac and BT 4.1 radios.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2412 - 2462	802.11b	17	50.12
2412 - 2462	802.11g	18.51	70.96
2412 - 2462	802.11n HT20	18.55	71.61

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an FPCB antenna, with a maximum gain of 5.3dBi on Core 0 and 6.6dBi on Core 1.

5.4. SOFTWARE AND FIRMWARE

The software installed in the EUT during testing was Microsoft Ver. Th2_analog1_dev.150917-2108.

The EUT HW Buid Phase: EV3B

The test utility software used during testing was Microsoft WiFi Tool, Ver 3.2.1 (526/2015)

5.5. List of test reduction and modes covering other modes:

Authorized Frequency Band (Antenna port & Radiated Testing)		
Frequency Range (MHz)	**Mode**	**Covered by**
2412 - 2462	802.11b 1TX	802.11b 1TX
2412 - 2462	802.11g 1TX	802.11g 2TX CDD
2412 - 2462	802.11HT20 1TX	802.11n HT20 2TX CDD
2412 - 2462	802.11HT20 2TX STBC	802.11n HT20 2TX CDD
2412 - 2462	802.11ac VHT20 2TX STBC	802.11n HT20 2TX CDD
2412 - 2462	802.11ac VHT20 2TX CDD	802.11n HT20 2TX CDD

5.6. 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 Z orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Z orientation.

For 11 b SISO mode, chain 1 is the worst case; conducted measurement was performed on this chain.

Based on the baseline scan, the worst-case data rates were:

802.11b mode: 1 Mbps

802.11g mode: 6 Mbps

802.11n HT20mode: MCS0

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Lenovo	X1 Carbon	N/A	N/A
AC Adapter	Microsoft	1623	0D130B03GDE54	N/A

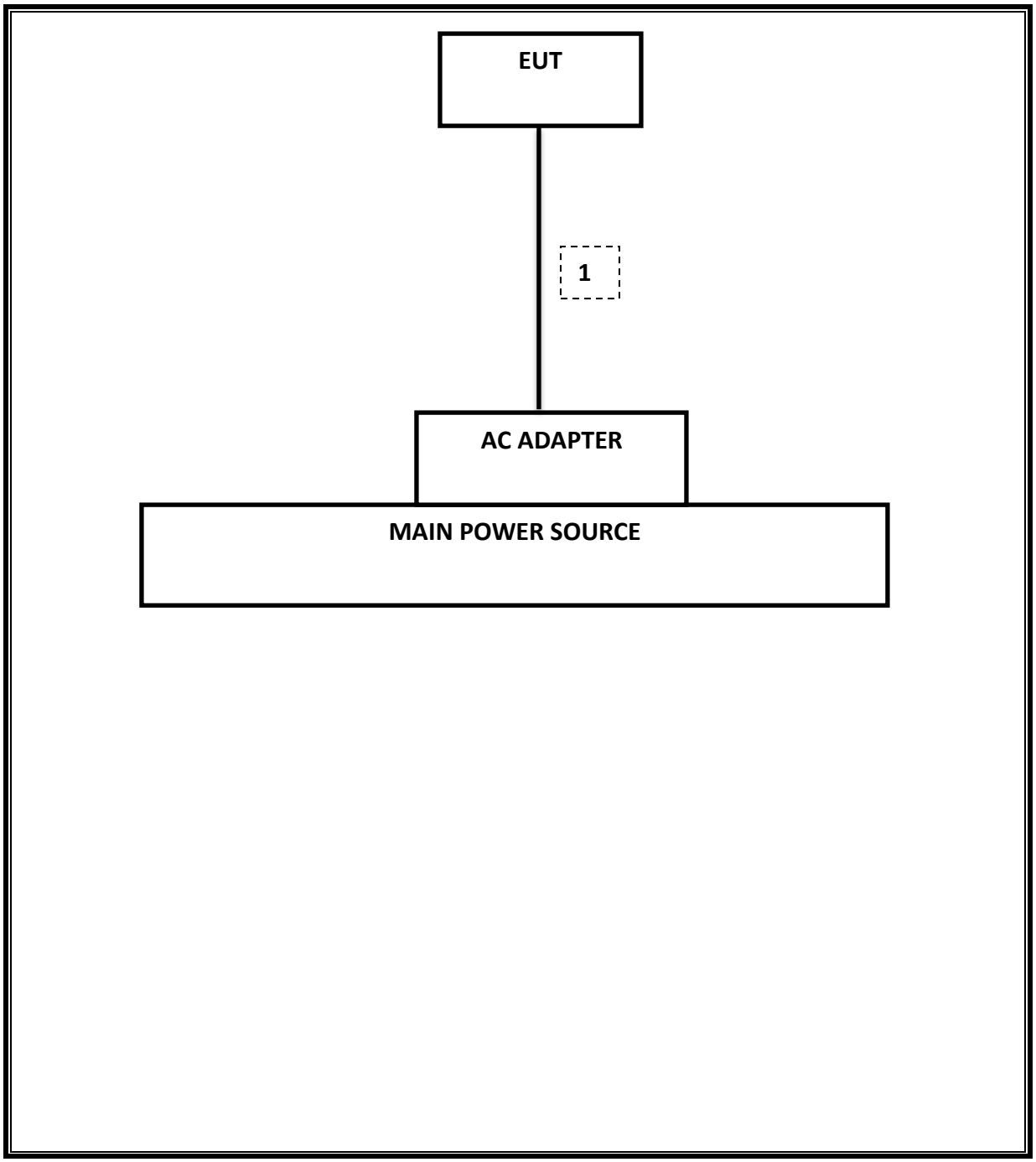
I/O CABLES

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	DC Power	1	Mini-USB	Shielded	1.2m	N/A

TEST SETUP

The EUT is a stand-alone unit during the tests. Test software exercised the radio card.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment List				
Description	**Manufacturer**	**Model**	**Asset**	**Cal Due**
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01069	12/20/15
Spectrum Analyzer,9KHz-40GHz	HP	8564E	C00986	04/01/16
EMI Test Receiver, 9 kHz-7 GHz	R & S	ESCI 7	1000741	08/13/16
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	08/18/16
Peak Power Meter	Agilent / HP	E4416A	C00963	12/13/15
Peak / Average Power Sensor	Agilent / HP	E9327A	C00964	12/13/15
Antenna, Horn, 1-18 GHz	ETS	3117	C01022	02/21/16
Antenna, Horn,18- 26 GHz	ARA	MWH-1826/B	C00946	11/12/15
Antenna, Horn, 26-40 GHz	ARA	MWH-2640	C00891	06/28/16
Antenna, Bilog, 30MHz-1 GHz	Sunol Sciences	JB1	T243	03/06/16
RF Preamplifier, 100KHz -> 1300MHz	HP	TBD	C00825	06/01/16
RF Preamplifier, 1GHz - 18GHz	Miteq	NSP4000-SP2	924343	03/23/16
RF Preamplifier, 1GHz - 26.5GHz	HP	8449B	T404	06/29/16
AC Power Supply, 2,500VA 45-500Hz	Elgar-Ametek	CW2501M	F00013	CNR
RF Preamplifier, 1GHz - 40GHz	Miteq	NSP4000-SP2	C00990	08/20/16
Attenuator / Switch driver	HP	11713A	F00204	CNR
Low Pass Filter 3GHz	Micro-Tronics	LPS17541	F00219	05/23/16
High Pass Filter 5GHz	Micro-Tronics	HPS17542	F00222	05/22/16
High Pass Filter 6GHz	Micro-Tronics	HPM17543	F00224	05/22/16
Radiated Software	UL	UL EMC	Ver 9.5, July 22, 2014	
Conducted Software	UL	UL EMC	Ver 9.5, May 17 2012	
CLT Software	UL	UL RF	Ver 1.0, Feb 2 2015	
Antenna Port Software	UL	UL RF	Ver 2.1.1.1, Jan 20 2015	

7. MEASUREMENT METHODS

KDB 558074 D01 DTS Meas Guidance v03r03: Measurement Procedure AVGPM-G is used for power and AVGPSD-3 is used for power spectral density.

Unwanted emissions within Restricted Bands are measured using traditional radiated procedures.

Band edge emissions within Restricted Bands are measured using RMS with duty cycle factor offset method.

8. SUMMARY TABLE

FCC Part Section	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Worst Case
15.247 (a)(2)	RSS-247 5.2.1	Occupied Band width (6dB)	>500KHz	Conducted	Pass	7.572MHz
2.1051, 15.247 (d)	RSS-247 5.5	Band Edge / Conducted Spurious Emission	-20dBc		Pass	-27.83dBm
15.247	RSS-247 5.4.4	TX conducted output power	<30dBm		Pass	18.37dBm
15.247	RSS-247 5.2.2	PSD	<8dBm		Pass	-4.39dBm
15.207 (a)	RSS-GEN 8.8	AC Power Line conducted emissions	Section 10	Radiated	Pass	51.03dBuV(PK)
15.205, 15.209	RSS-GEN 8.9/7	Harmonic Spurious Emission	< 54dBuV/m		Pass	46.7dBuV/m
15.205, 15.209	RSS-GEN 8.9/7	Radiated Band-Edge Emission	< 54dBuV/m		Pass	52.99dBuV/m

9. ANTENNA PORT TEST RESULTS

9.1. ON TIME, DUTY CYCLE

LIMITS

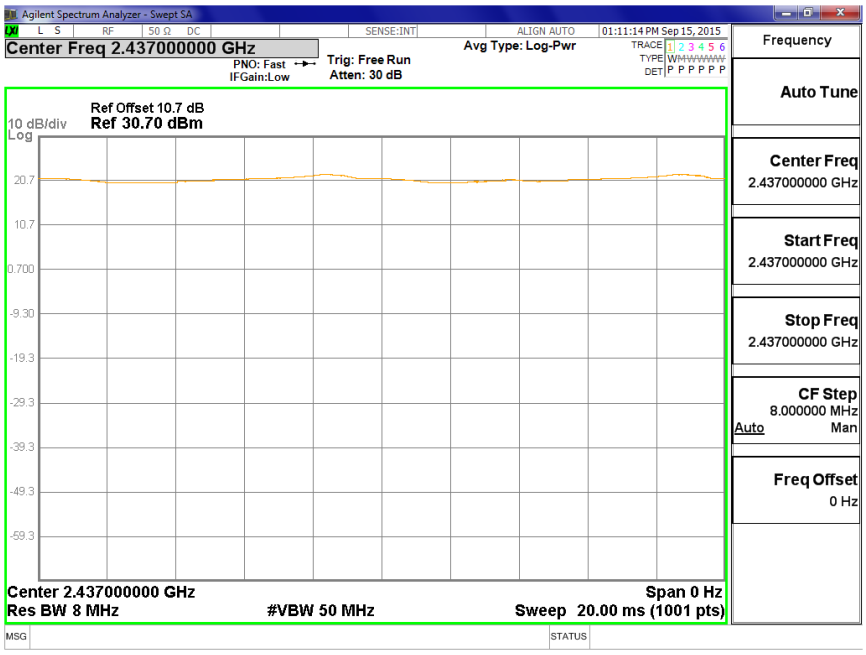
None; for reporting purposes only.

ON TIME AND DUTY CYCLE RESULTS

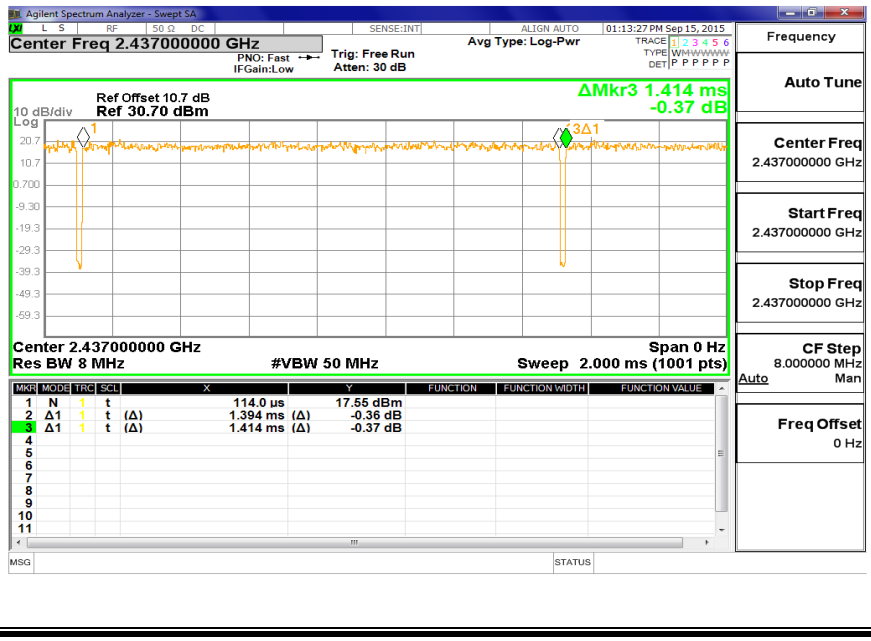
Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
2.4GHz Band						
802.11b CDD	100.000	100.000	1.000	100.00%	0.00	0.010
802.11g CDD	1.394	1.414	0.986	98.59%	0.00	0.010
802.11n HT20 CDD	0.676	0.694	0.974	97.41%	0.11	1.479

DUTY CYCLE PLOTS

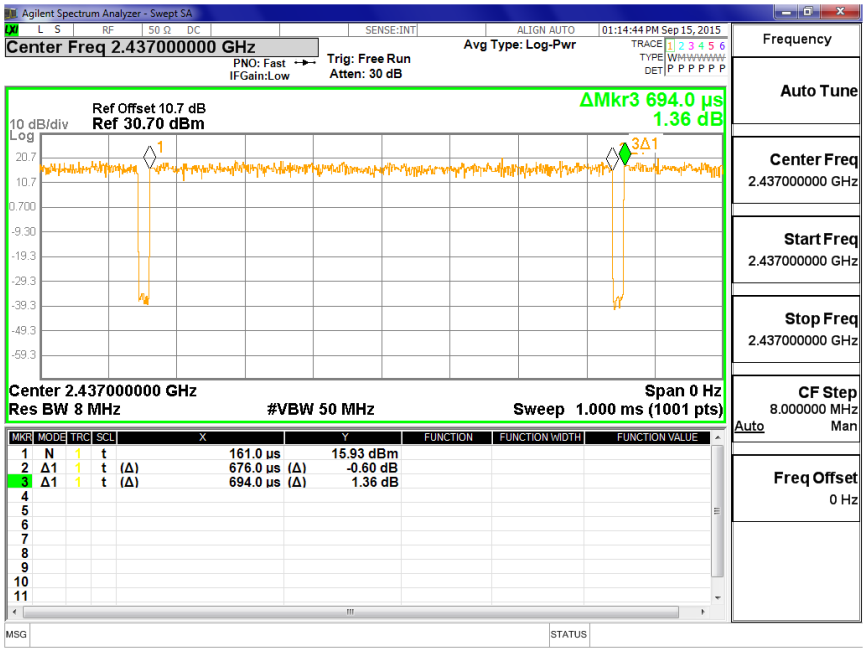
DUTY CYCLE 802.11b MODE



DUTY CYCLE 802.11g CDD MODE



DUTY CYCLE 802.11n HT20 CDD MODE



9.2. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-247 5.2.1

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

TEST PROCEDURE

Reference to KDB 558074 D01 DTS Meas Guidance v03r03: The transmitter output is connected to a spectrum analyzer with the RBW set to100KHz, the VBW >= 3 x RBW, peak detector and max hold.

RESULTS

9.2.1. 802.11b MODE IN THE 2.4 GHz BAND

Channel	Frequency (MHz)	6 dB Bandwidth (MHz) C0	Minimum Limit (MHz)
Low	2412	8.073	0.5
Mid	2437	7.572	0.5
High	2462	8.060	0.5
Worst		7.572	

9.2.2. 802.11g MODE IN THE 2.4 GHz BAND

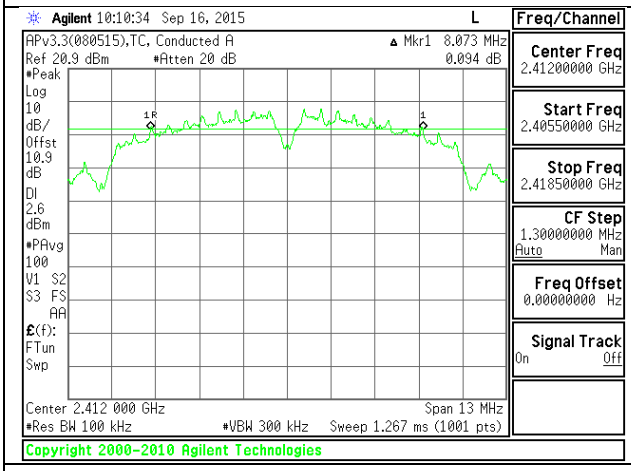
Channel	Frequency (MHz)	6 dB Bandwidth (MHz) C0	6 dB Bandwidth (MHz) C1	Minimum Limit (MHz)
Low	2412	16.350	16.375	0.5
Mid	2437	16.375	16.375	0.5
High	2462	16.375	16.375	0.5
Worst		16.350	16.375	

9.2.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

Channel	Frequency (MHz)	6 dB Bandwidth (MHz) C0	6 dB Bandwidth (MHz) C1	Minimum Limit (MHz)
Low	2412	17.577	17.604	0.5
Mid	2437	17.631	17.604	0.5
High	2462	17.604	17.604	0.5
Worst		17.577	17.604	

9.2.4. 6 dB BANDWIDTH PLOTS

11b 2412 Chain 0



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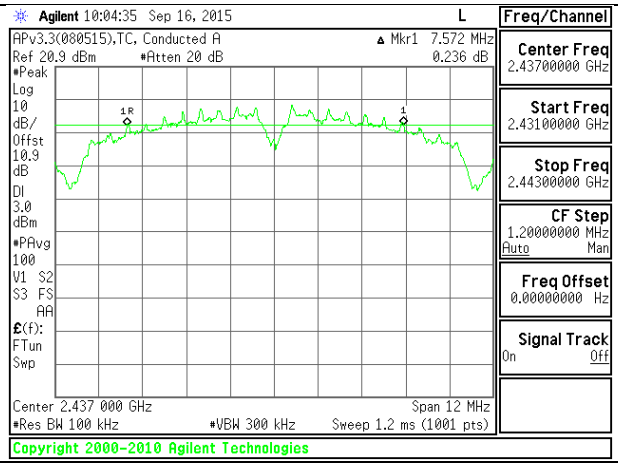

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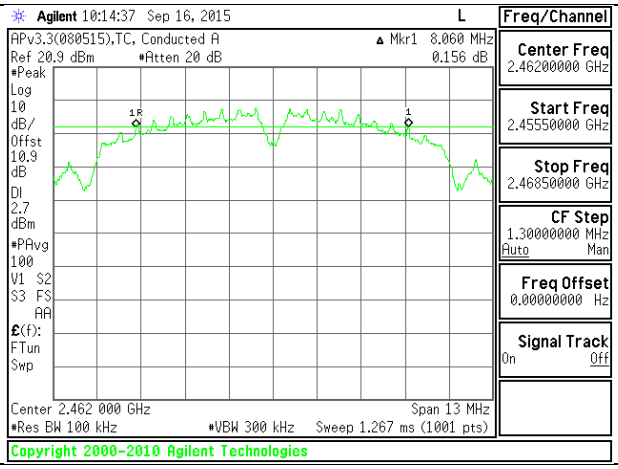

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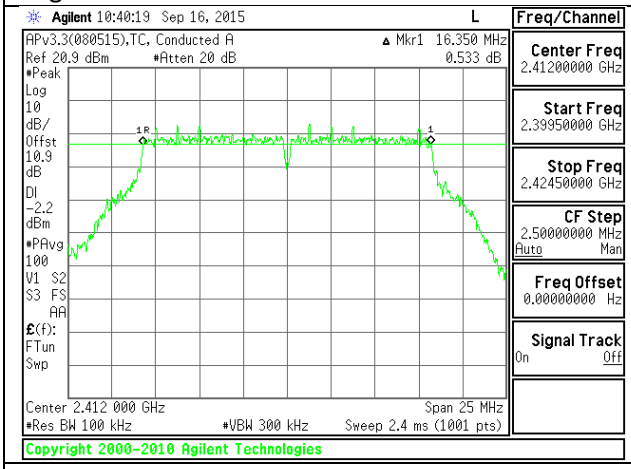

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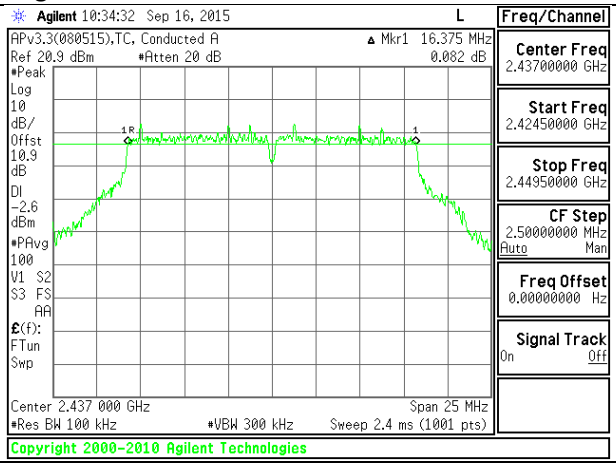

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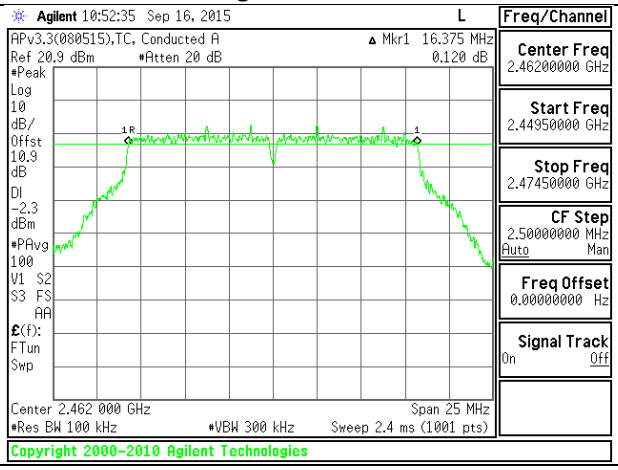

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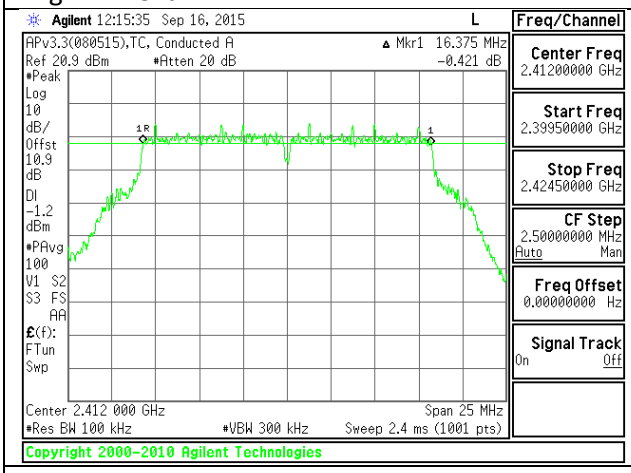

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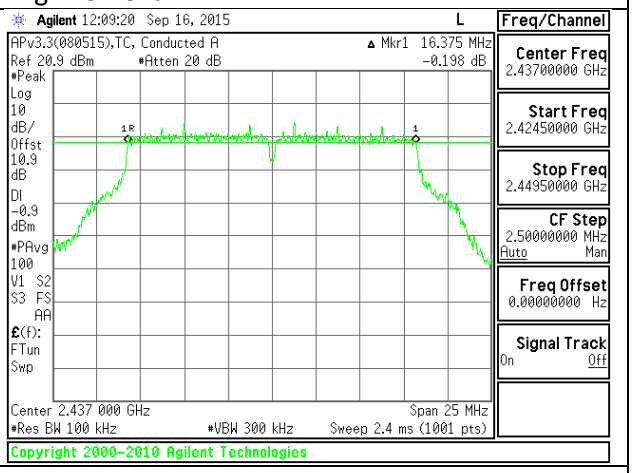

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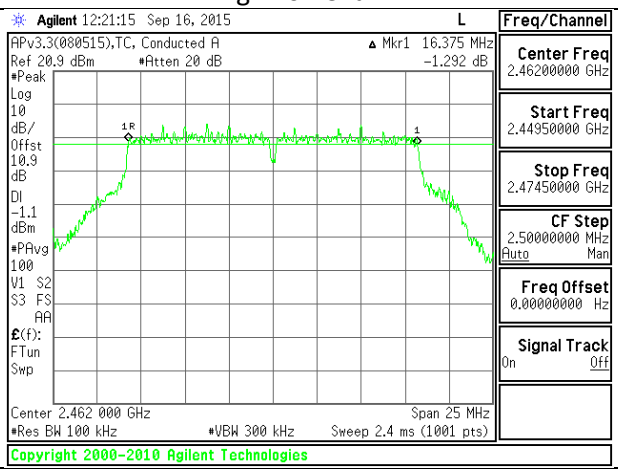

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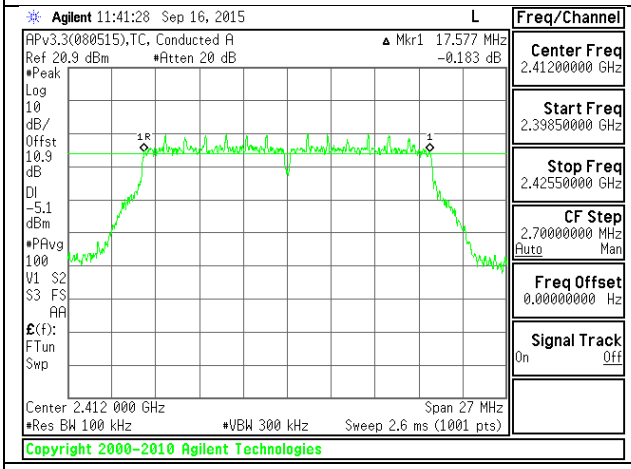

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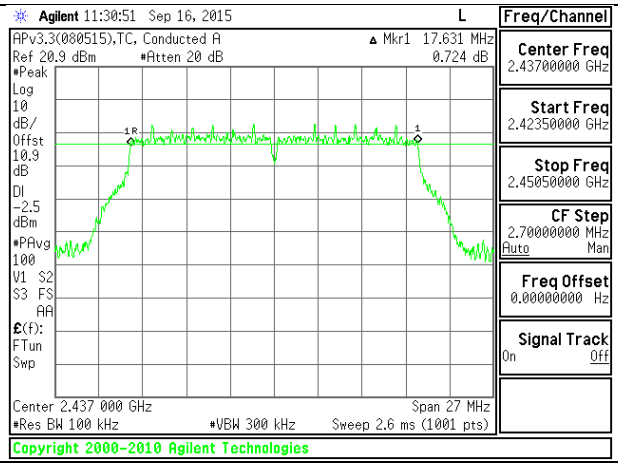

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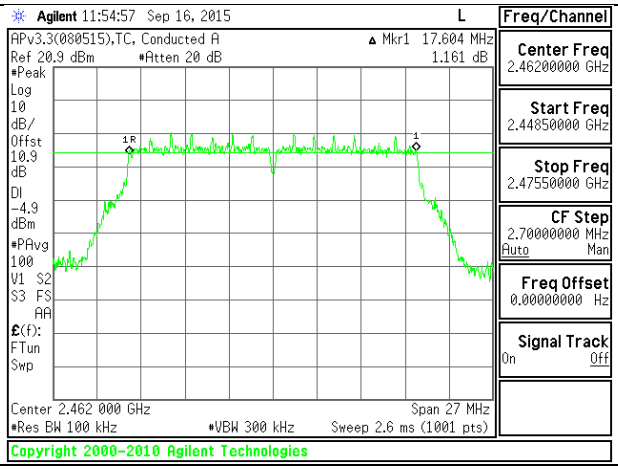

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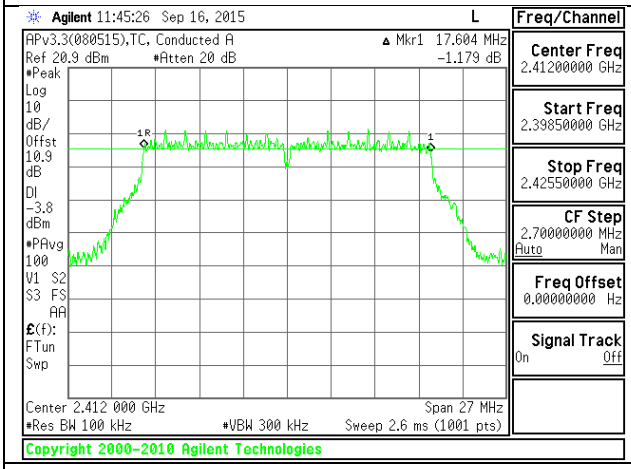
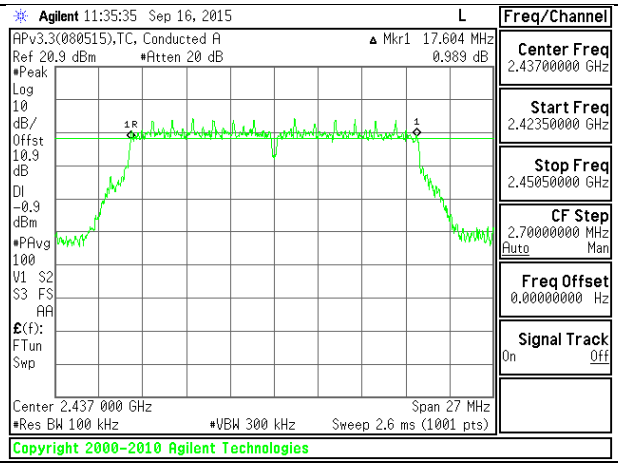
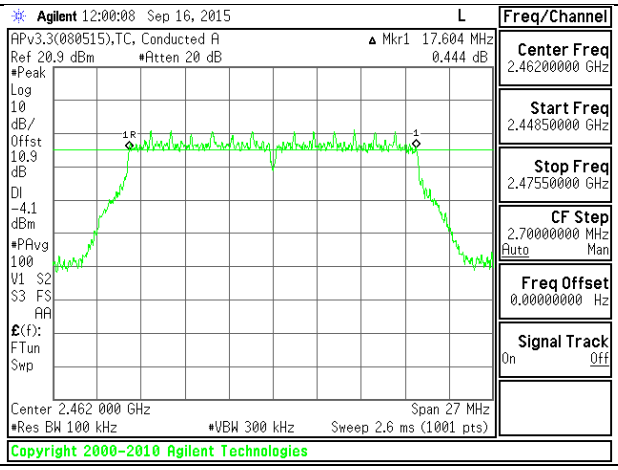


11n HT20 2437 Chain 1



11n HT20 2462 Chain 1



9.3. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

9.3.1. 802.11b MODE IN THE 2.4 GHz BAND

Channel	Frequency (MHz)	99% Bandwidth (MHz) C0
Low	2412	10.321
Mid	2437	10.247
High	2462	10.255
Worst		10.321

9.3.2. 802.11g MODE IN THE 2.4 GHz BAND

Channel	Frequency (MHz)	99% Bandwidth (MHz) C0	99% Bandwidth (MHz) C1
Low	2412	16.581	16.577
Mid	2437	16.584	15.565
High	2462	16.575	16.591
Worst		16.584	16.591

9.3.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

Channel	Frequency (MHz)	99% Bandwidth (MHz) C0	99% Bandwidth (MHz) C1
Low	2412	17.693	17.686
Mid	2437	17.669	17.731
High	2462	17.717	17.694
Worst		17.717	17.731

9.3.4. 99% BANDWIDTH PLOTS

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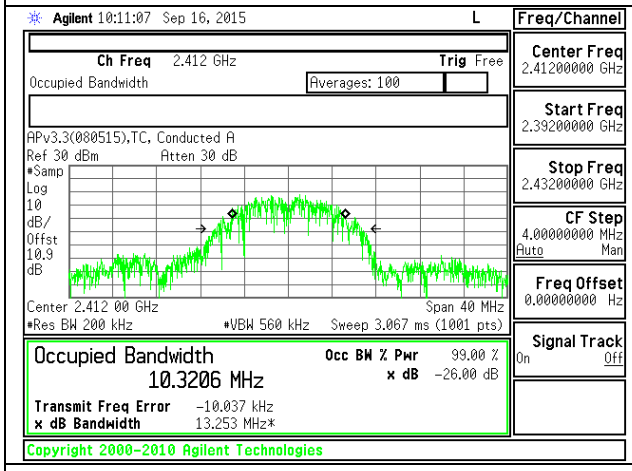

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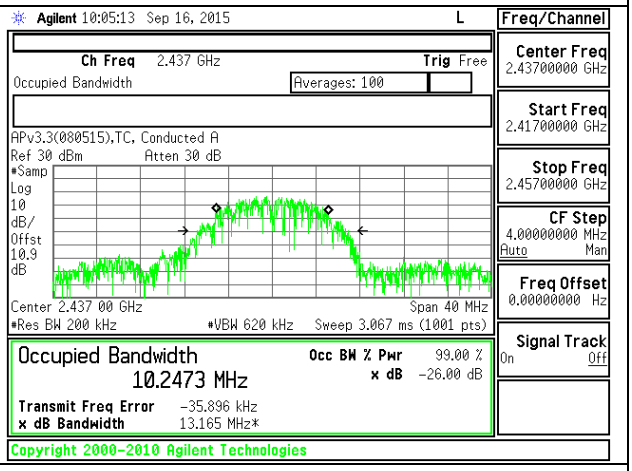

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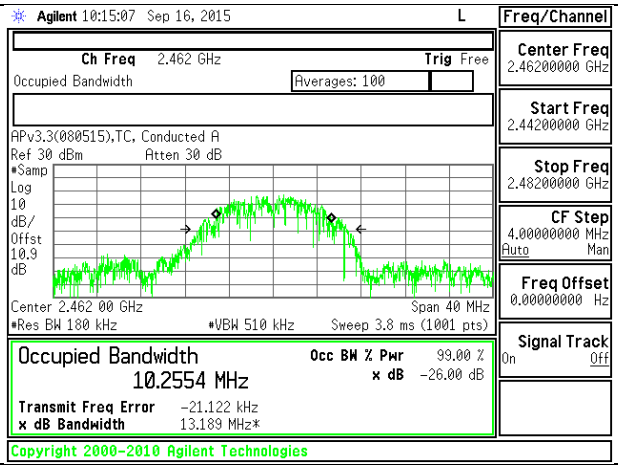

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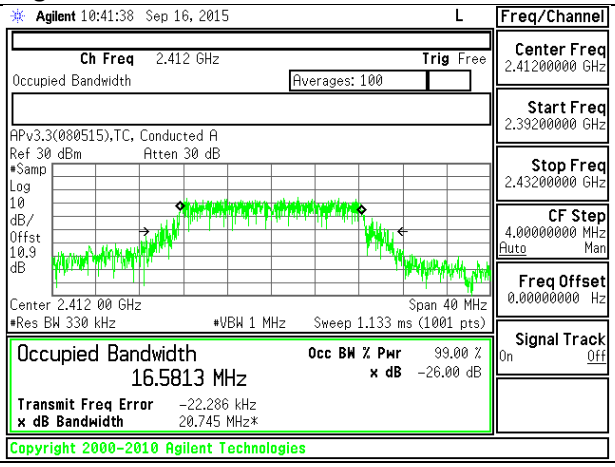

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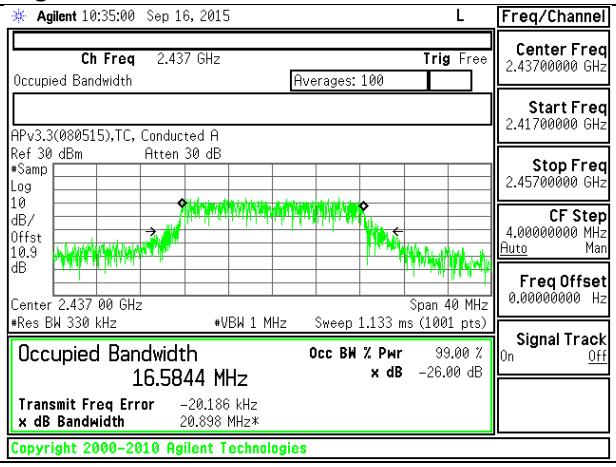

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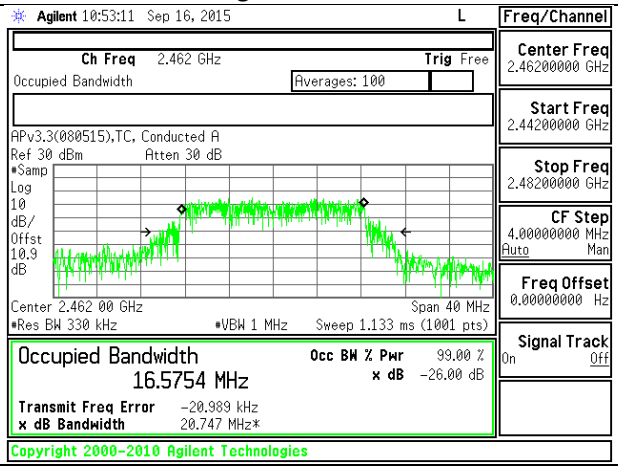

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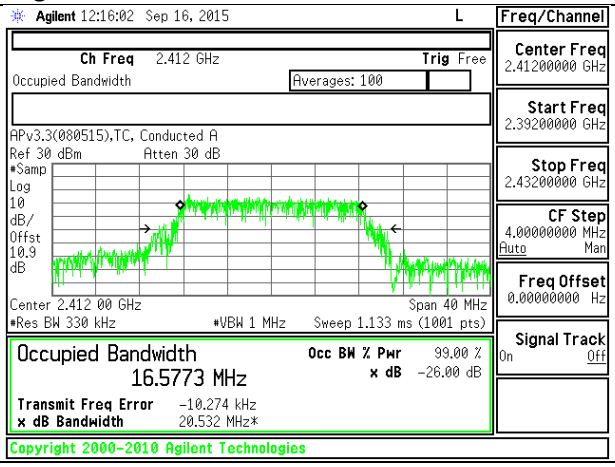
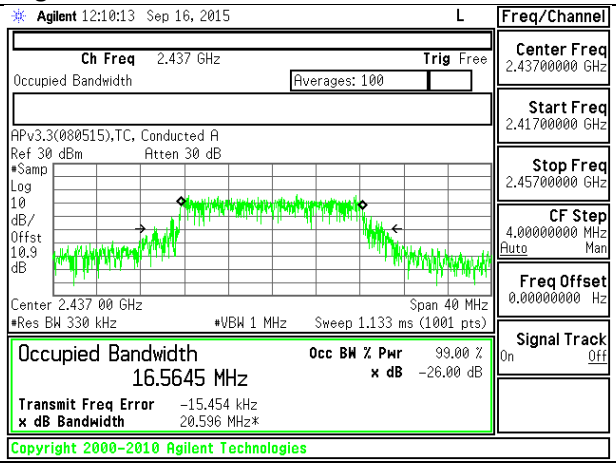
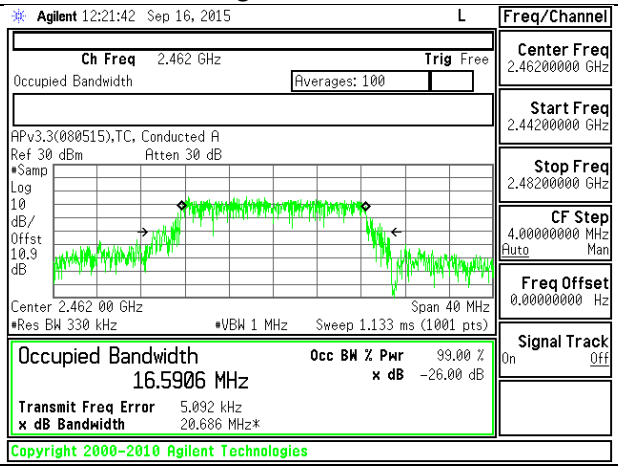


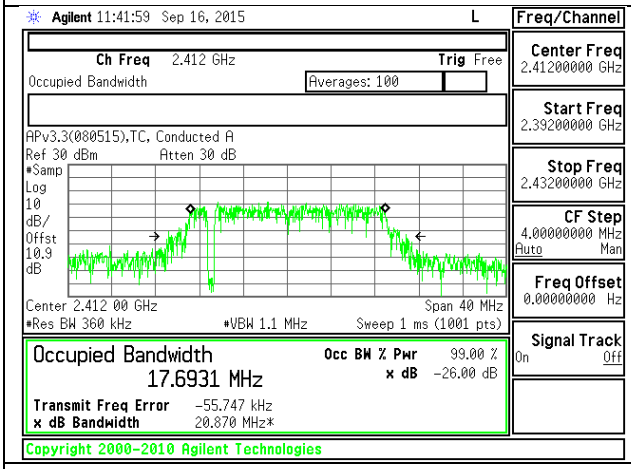
11g 2437 Chain 1



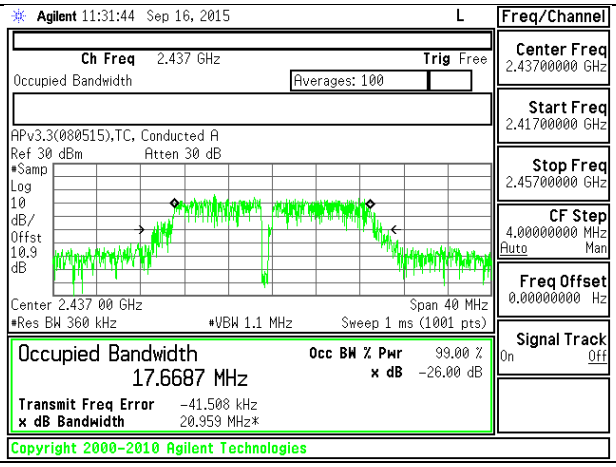
11g 2462 Chain 1



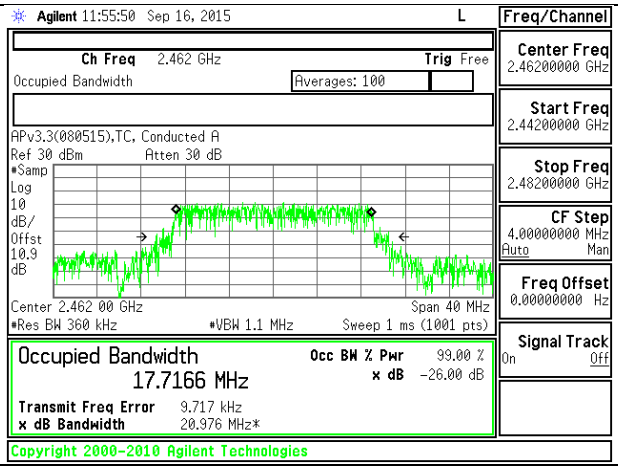
11n HT20 2412 Chain 0



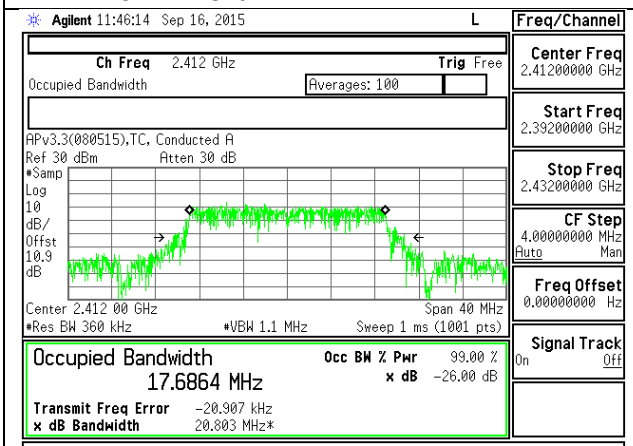
11n HT20 2437 Chain 0



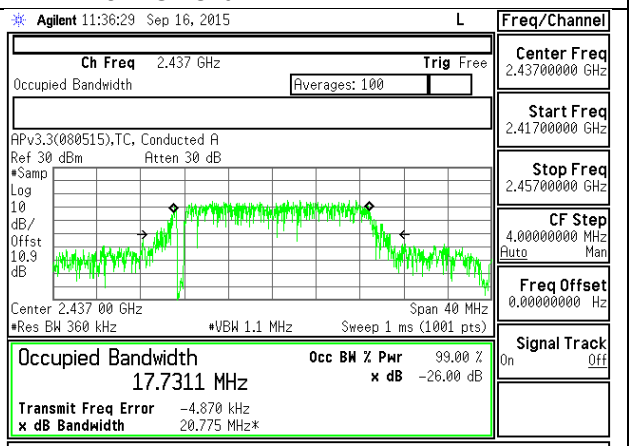
11n HT20 2462 Chain 0



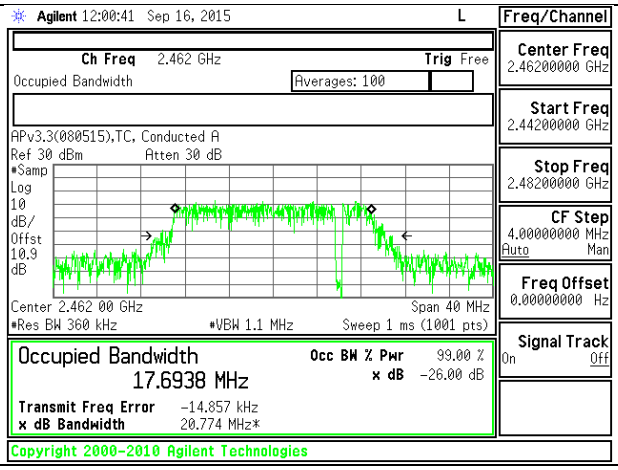
11n HT20 2412 Chain 1



11n HT20 2437 Chain 1



11n HT20 2462 Chain 1



9.4. OUTPUT POWER

LIMITS

FCC §15.247

IC RSS-247 5.4.4

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 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

SISO

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

MIMO

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

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
5.30	6.60	6.00

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

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Correlated Chains Directional Gain (dBi)
5.30	6.60	8.98

RESULTS

9.4.1. 802.11b MODE IN THE 2.4 GHz BAND

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Max Power (dBm)
Low	2412	6.60	29.40	30	36	29.40
Mid	2437	6.60	29.40	30	36	29.40
High	2462	6.60	29.40	30	36	29.40

Results

Channel	Frequency (MHz)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low	2412	17.00	17.00	29.40	-12.40
Mid	2437	17.00	17.00	29.40	-12.40
High	2462	17.00	17.00	29.40	-12.40

Note: the power readings above were measured with gated method, and the measurement was taken only during the ON time. No duty cycle correction was necessary.

9.4.2. 802.11g MODE IN THE 2.4 GHz BAND

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	IC EIRP Limit (dBm)	Max Power (dBm)
Low	2412	6.00	30.00	36	30.00
Mid	2437	6.00	30.00	36	30.00
High	2462	6.00	30.00	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	14.40	16.00	18.28	30.00	-11.72
Mid	2437	14.50	16.00	18.32	30.00	-11.68
High	2462	13.50	15.00	17.32	30.00	-12.68

Note: the power readings above were measured with gated method, and the measurement was taken only during the ON time. No duty cycle correction was necessary.

9.4.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	IC EIRP Limit (dBm)	Max Power (dBm)
Low	2412	6.00	30.00	36	30.00
Mid	2437	6.00	30.00	36	30.00
High	2462	6.00	30.00	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	11.80	13.00	15.45	30.00	-14.55
Mid	2437	14.60	16.00	18.37	30.00	-11.63
High	2462	11.70	13.00	15.41	30.00	-14.59

Note: the power readings above were measured with gated method, and the measurement was taken only during the ON time. No duty cycle correction was necessary.

9.5. PSD

LIMITS

FCC §15.247

IC RSS-247 5.2.2

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

RESULTS

9.5.1. 802.11b MODE IN THE 2.4 GHz BAND

PSD Results

Channel	Frequency (MHz)	Chain 1 Meas (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-4.61	8.0	-12.6
Mid	2437	-4.39	8.0	-12.4
High	2462	-4.52	8.0	-12.5

9.5.2. 802.11g MODE IN THE 2.4 GHz BAND

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd PSD

PSD Results

Channel	Frequency (MHz)	Chain 0 Meas (dBm)	Chain 1 Meas (dBm)	Total Corr'd PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-9.32	-7.93	-5.56	8.0	-13.6
Mid	2437	-9.02	-8.03	-5.49	8.0	-13.5
High	2462	-9.13	-7.87	-5.45	8.0	-13.4

9.5.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

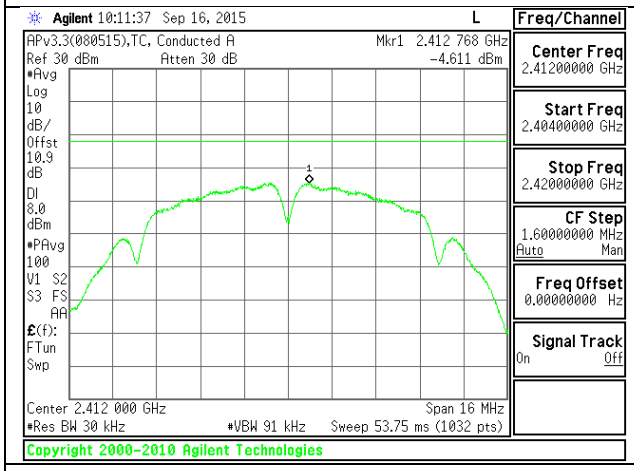
Duty Cycle CF (dB)	0.11	Included in Calculations of Corr'd PSD

PSD Results

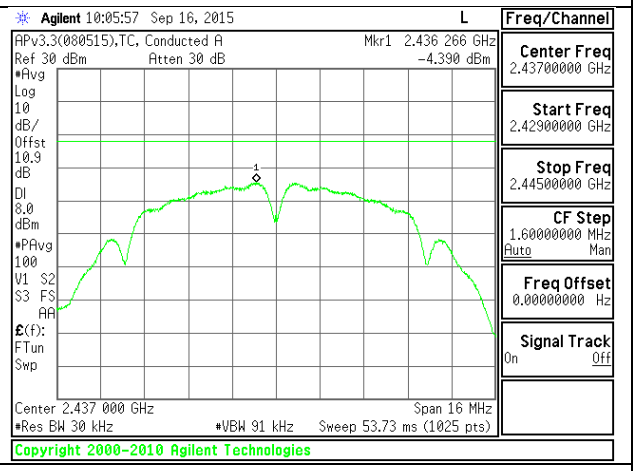
Channel	Frequency (MHz)	Chain 0 Meas (dBm)	Chain 1 Meas (dBm)	Total Corr'd PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-12.93	-11.35	-8.95	8.0	-16.9
Mid	2437	-10.29	-8.08	-5.93	8.0	-13.9
High	2462	-13.05	-11.65	-9.17	8.0	-17.2

9.5.4. PSD PLOTS

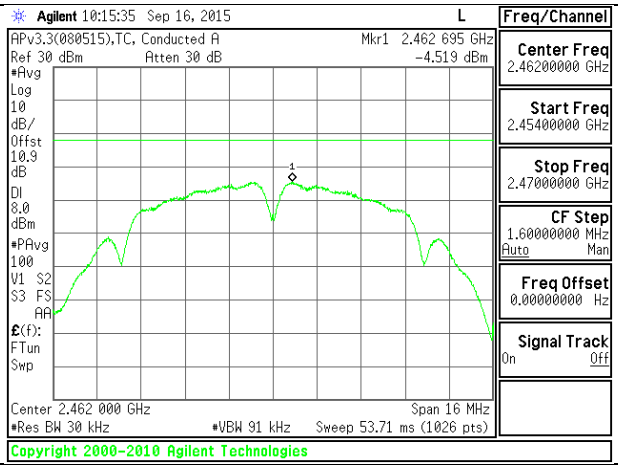
11b 2412 Chain 0



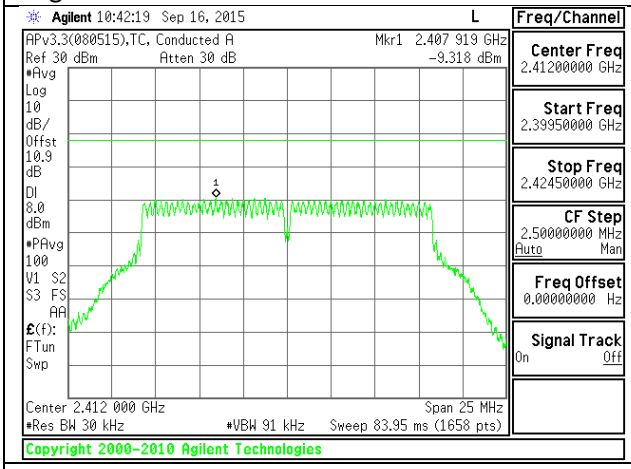
11b 2437 Chain 0



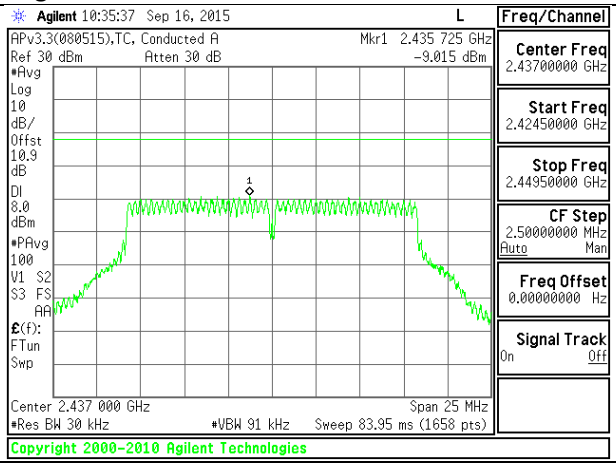
11b 2462 Chain 0



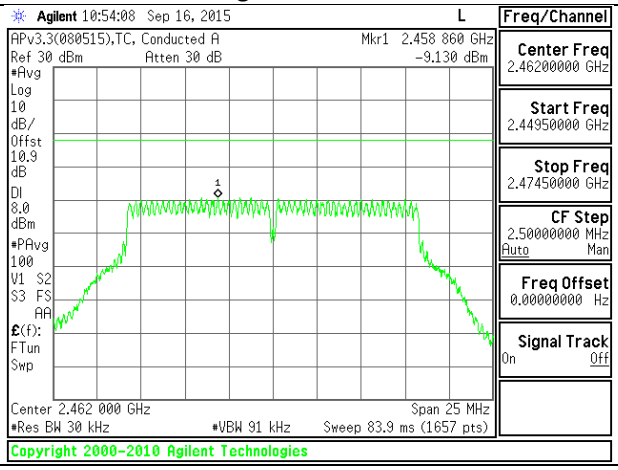
11g 2412 Chain 0



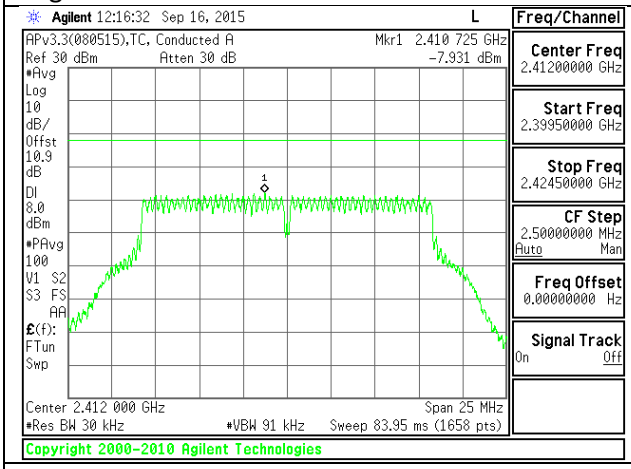
11g 2437 Chain 0



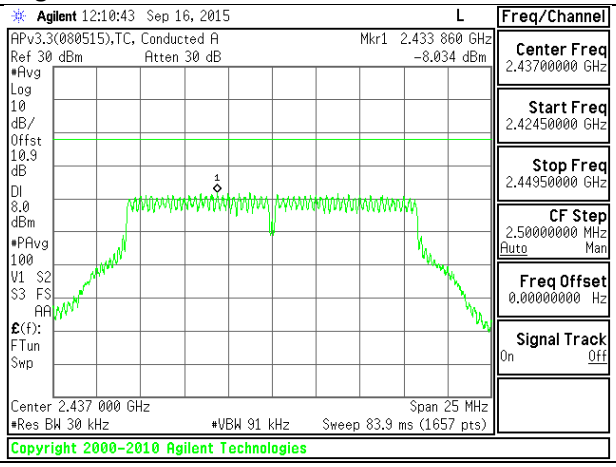
11g 2462 Chain 0



11g 2412 Chain 1



11g 2437 Chain 1



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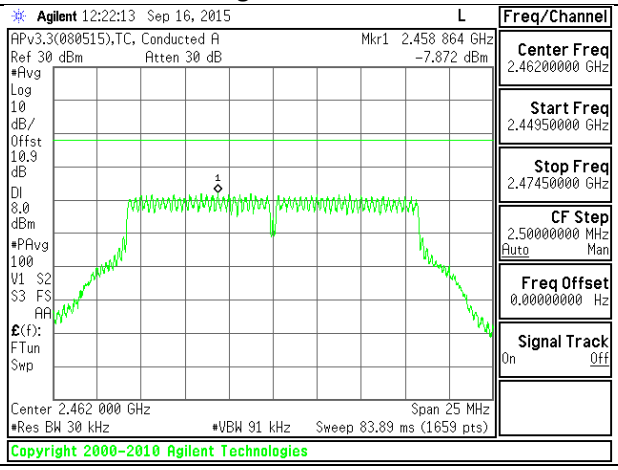
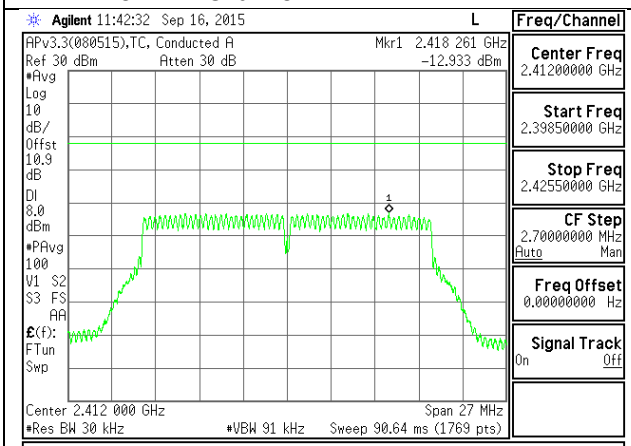


11n HT20 2412 Chain 0



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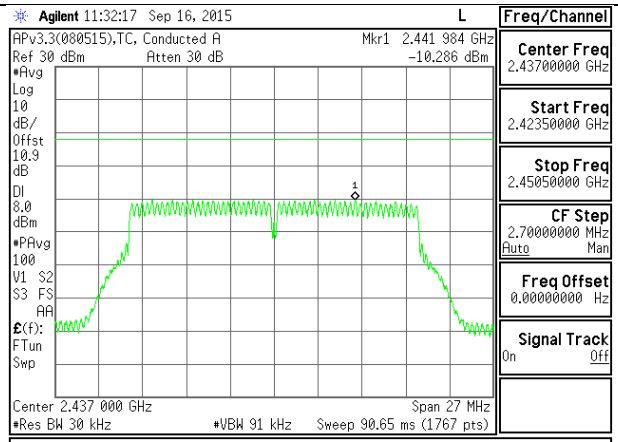

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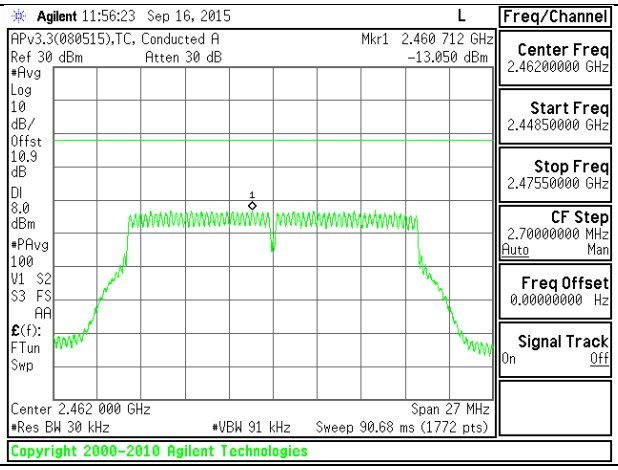

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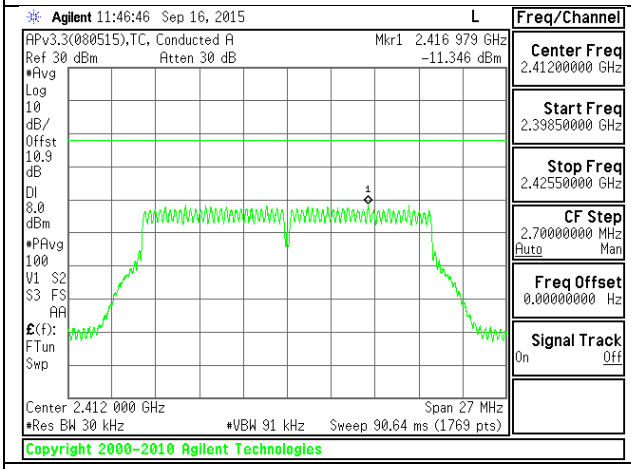
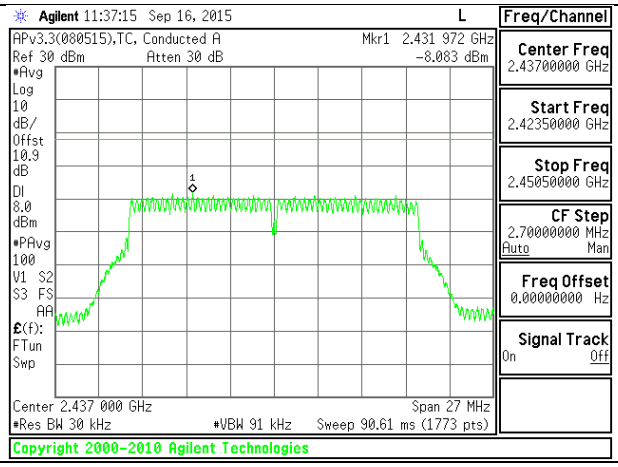


11n HT20 2437 Chain 1



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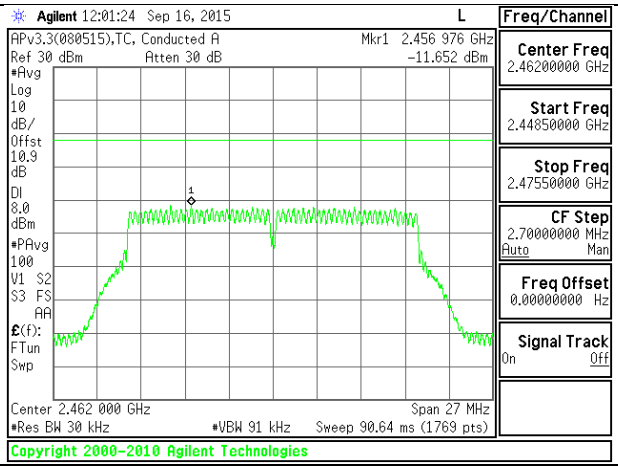


9.6. OUT-OF-BAND EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-247 5.5

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.

TEST PROCEDURE

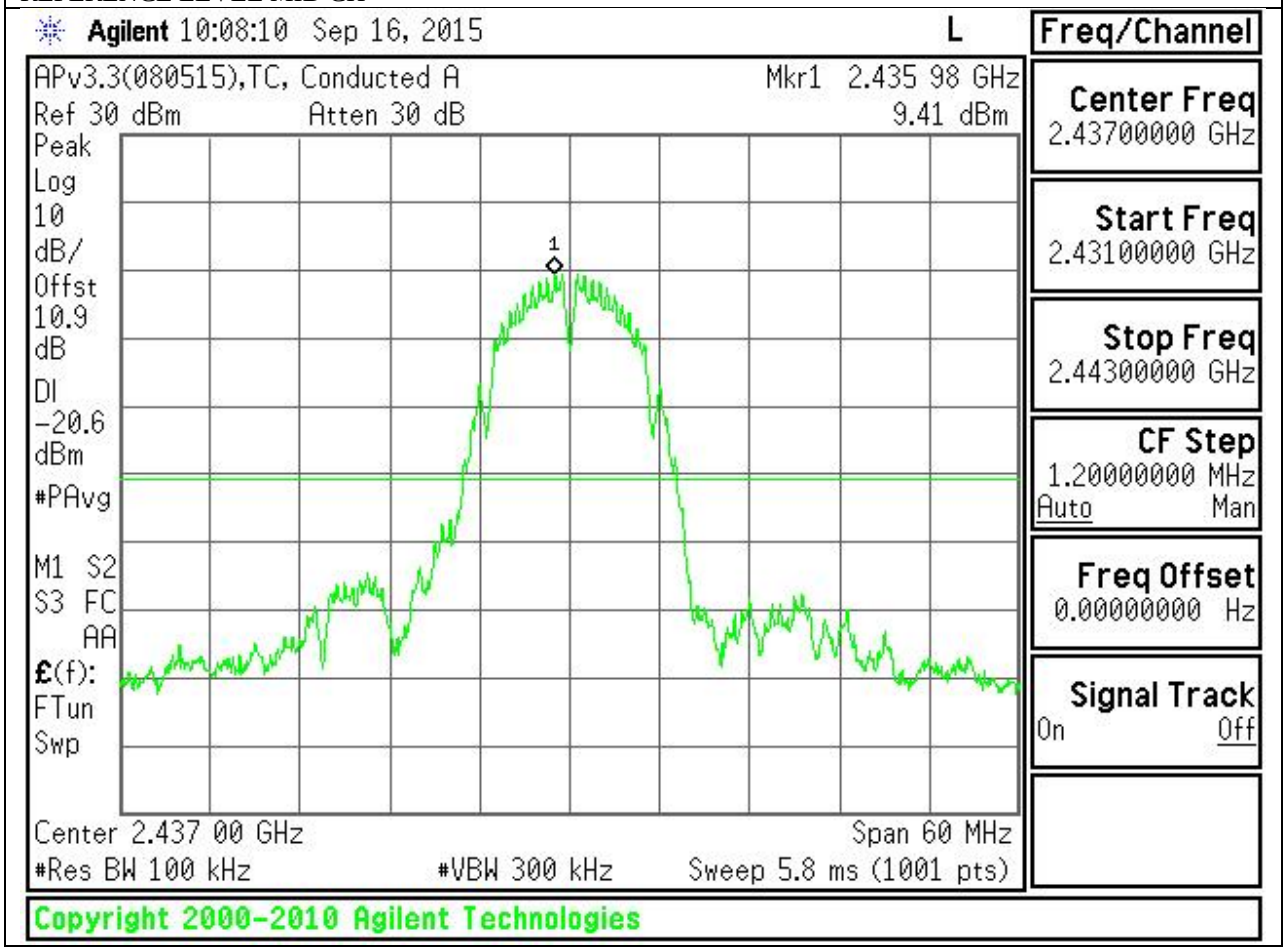
The transmitter output is connected to a spectrum analyzer with RBW = 100 kHz, VBW = 300 kHz, peak detector, and max hold. Measurements utilizing these settings are made of the in-band reference level, bandedge (where measurements to the general radiated limits will not be made) and out-of-band emissions.

RESULTS

9.6.1. 802.11b MODE IN THE 2.4 GHz BAND (CHAIN 1)

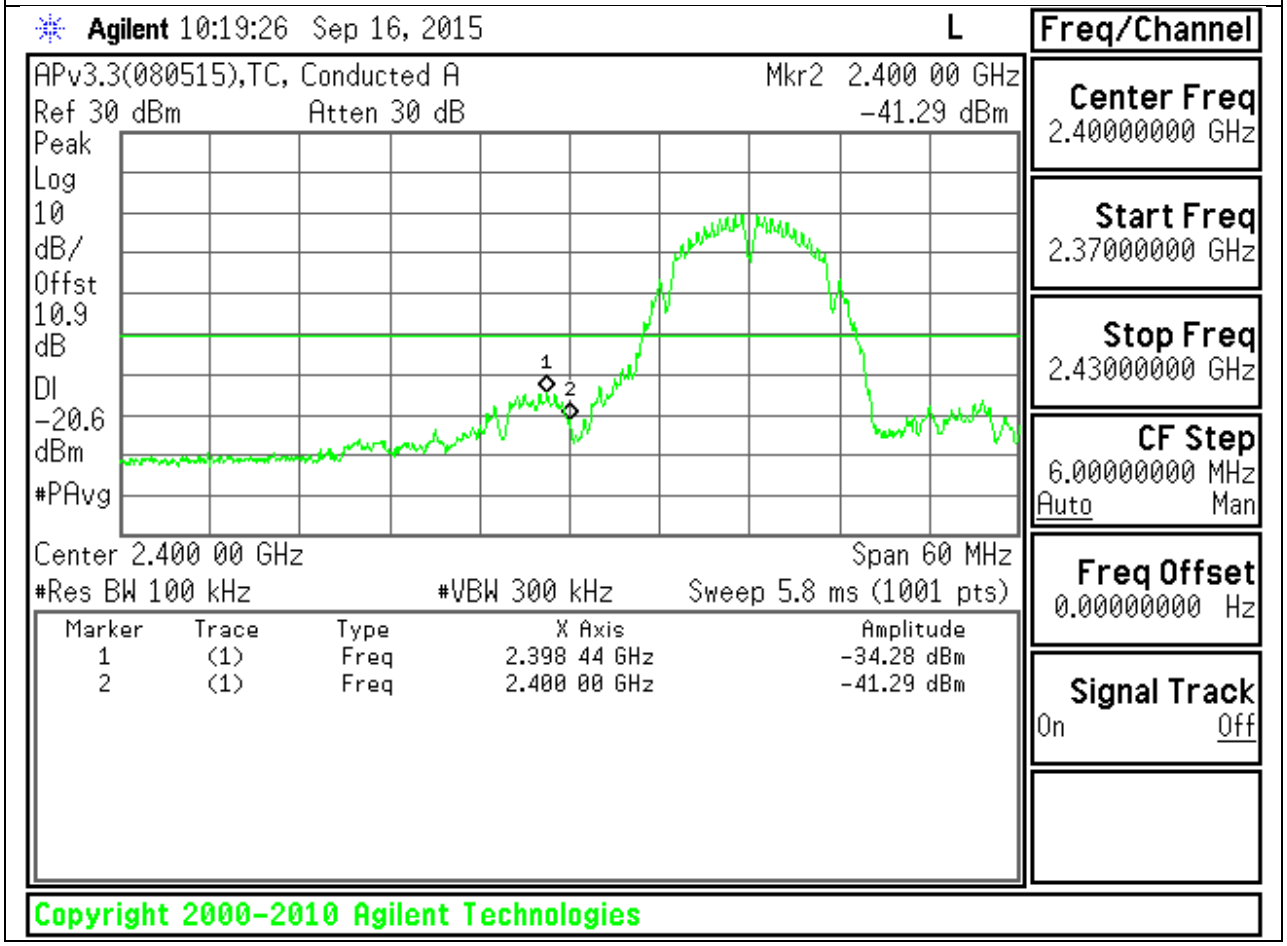
IN-BAND REFERENCE LEVEL

REFERENCE LEVEL MID CH



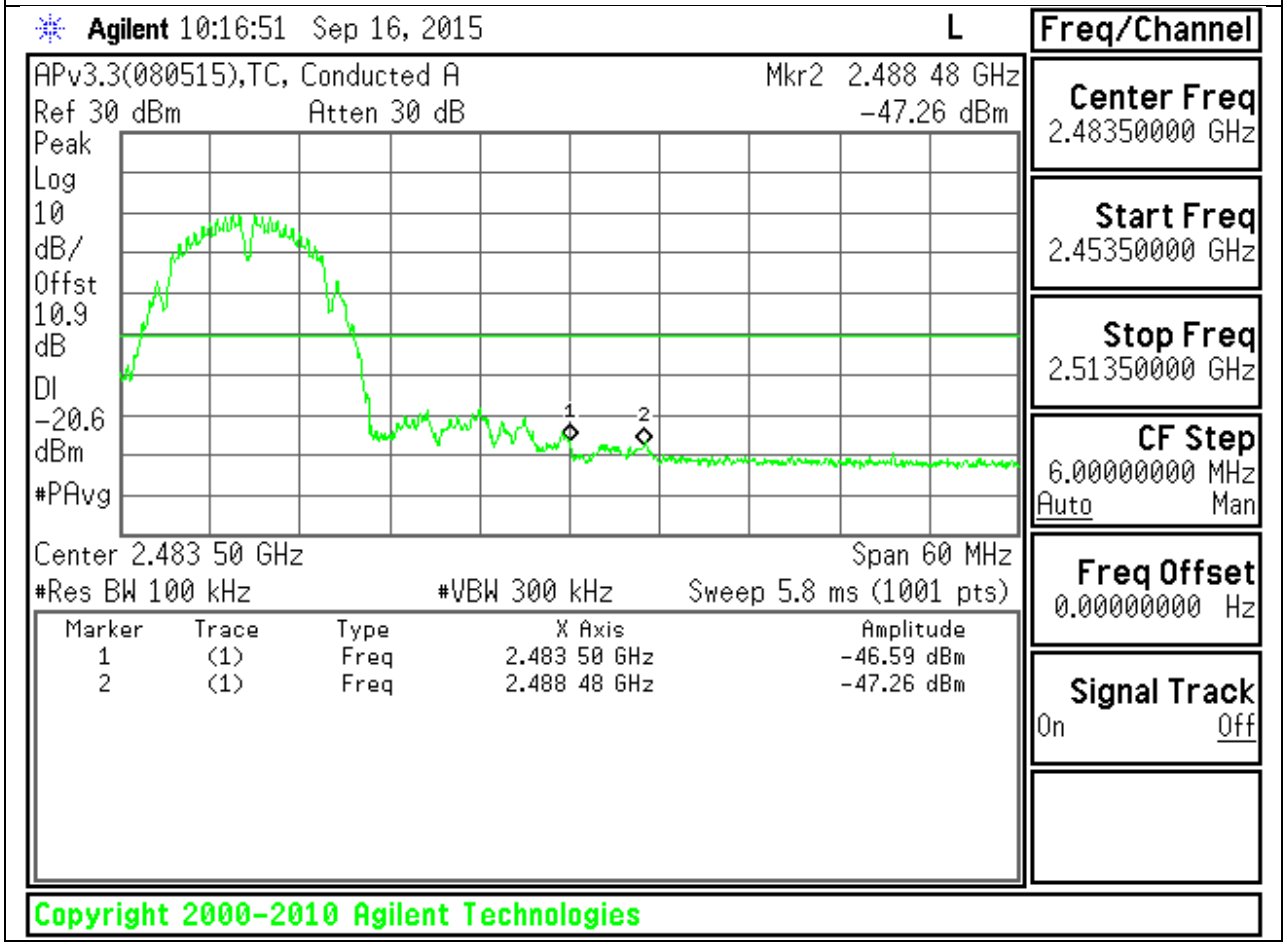
LOW CHANNEL BANDEDGE

AUTHORIZED BAND EDGE LOW CH



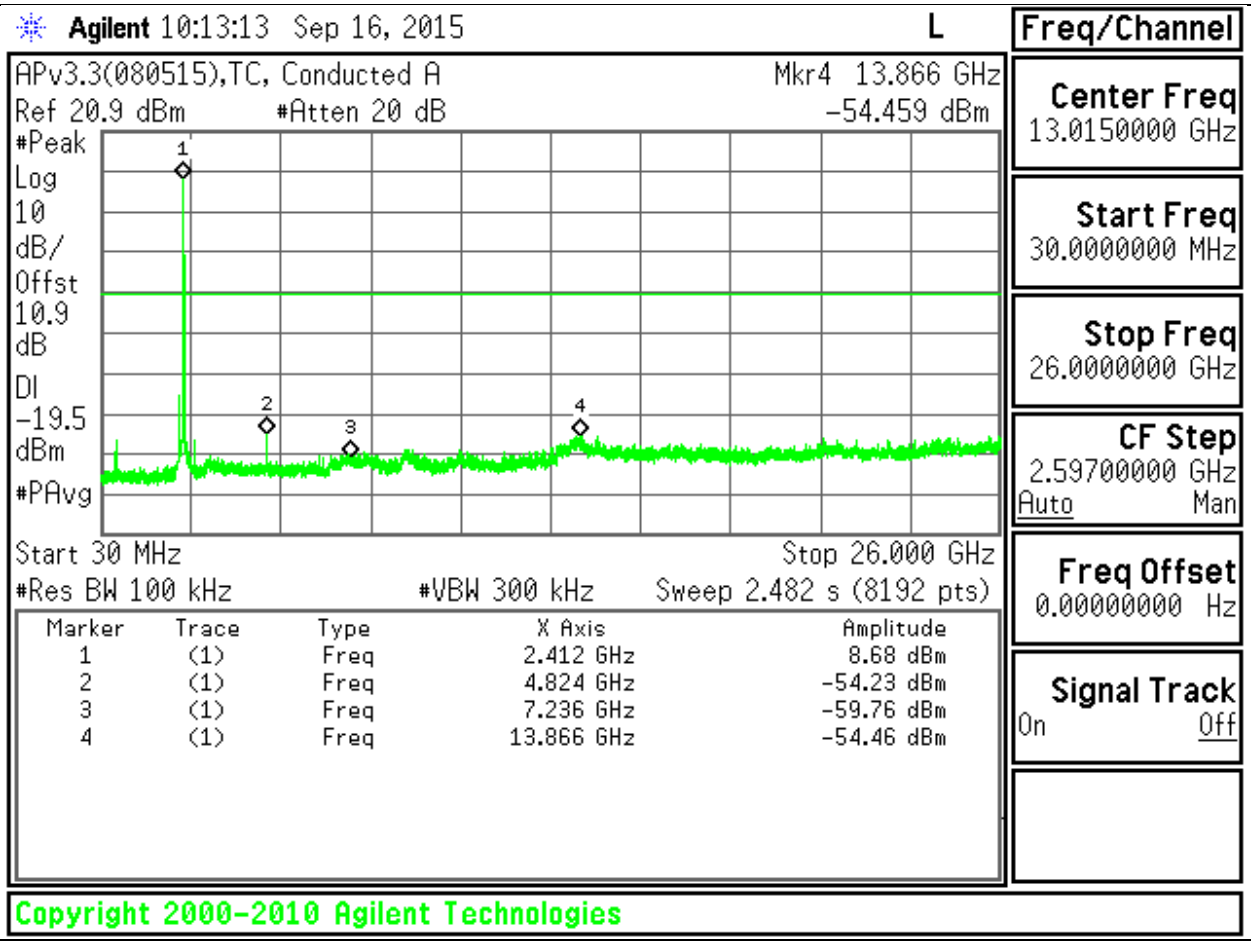
HIGH CHANNEL BANDEDGE

AUTHORIZED BAND EDGE HIGH CH

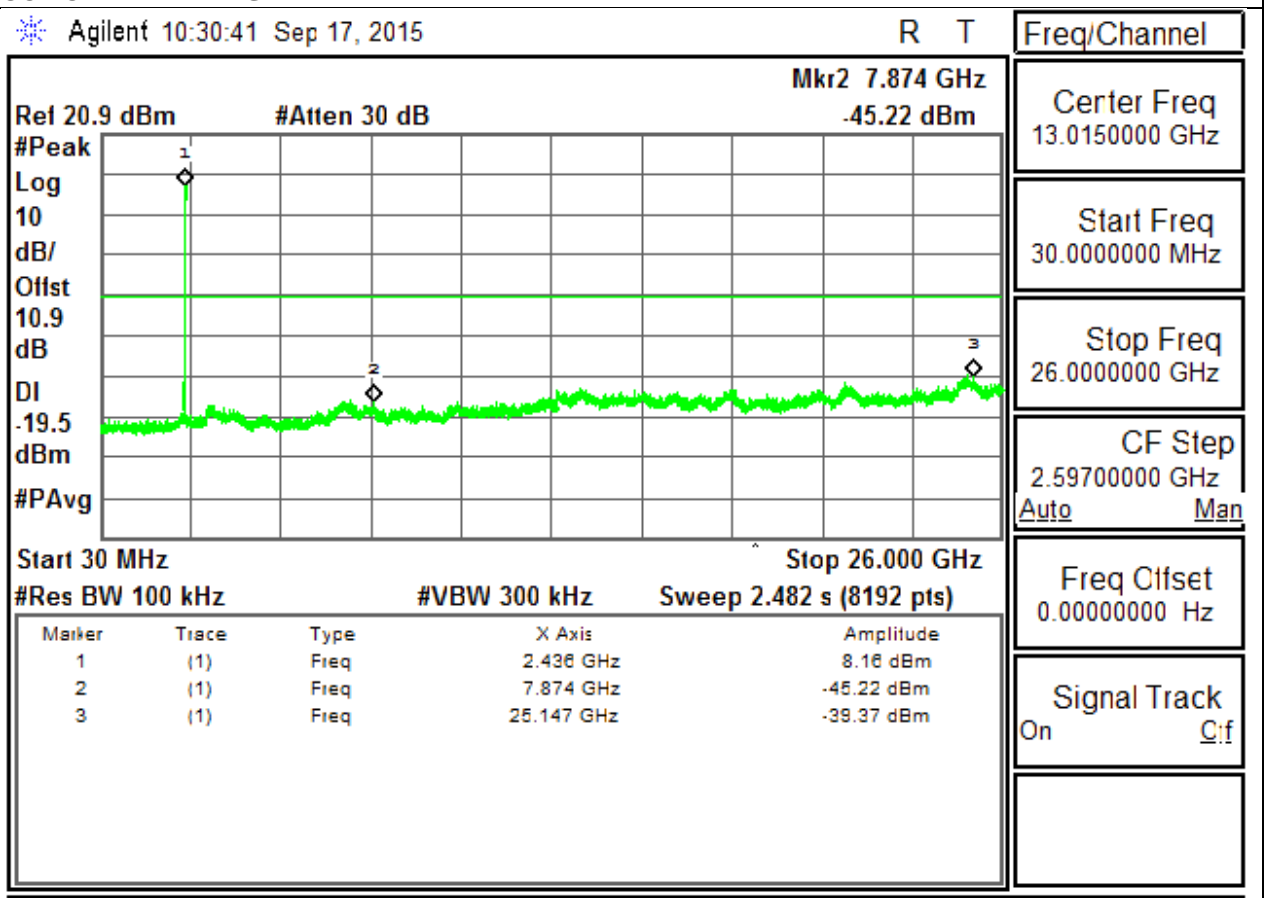


OUT-OF-BAND EMISSIONS

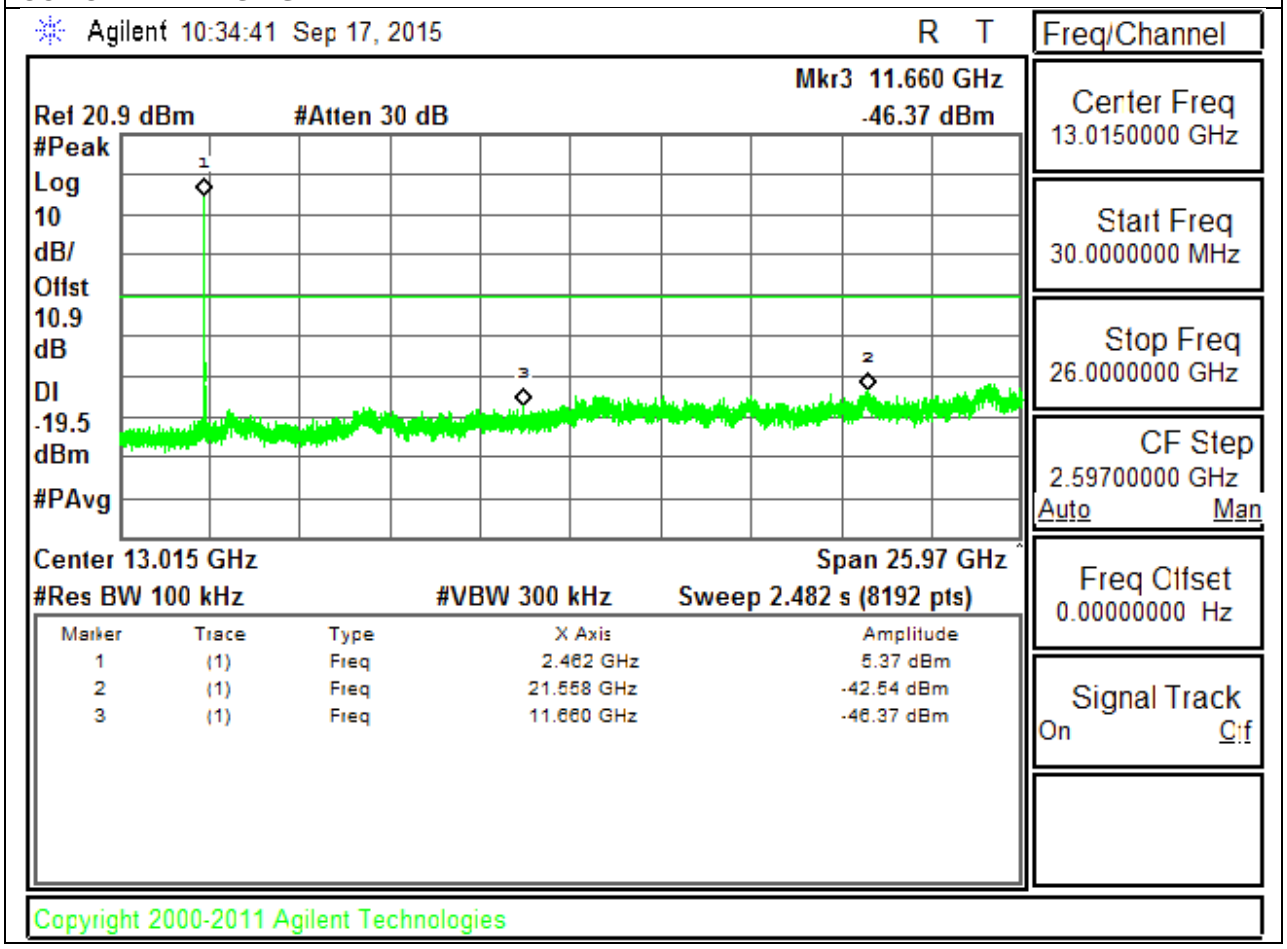
OUT OF BAND LOW CH



OUT OF BAND MID CH



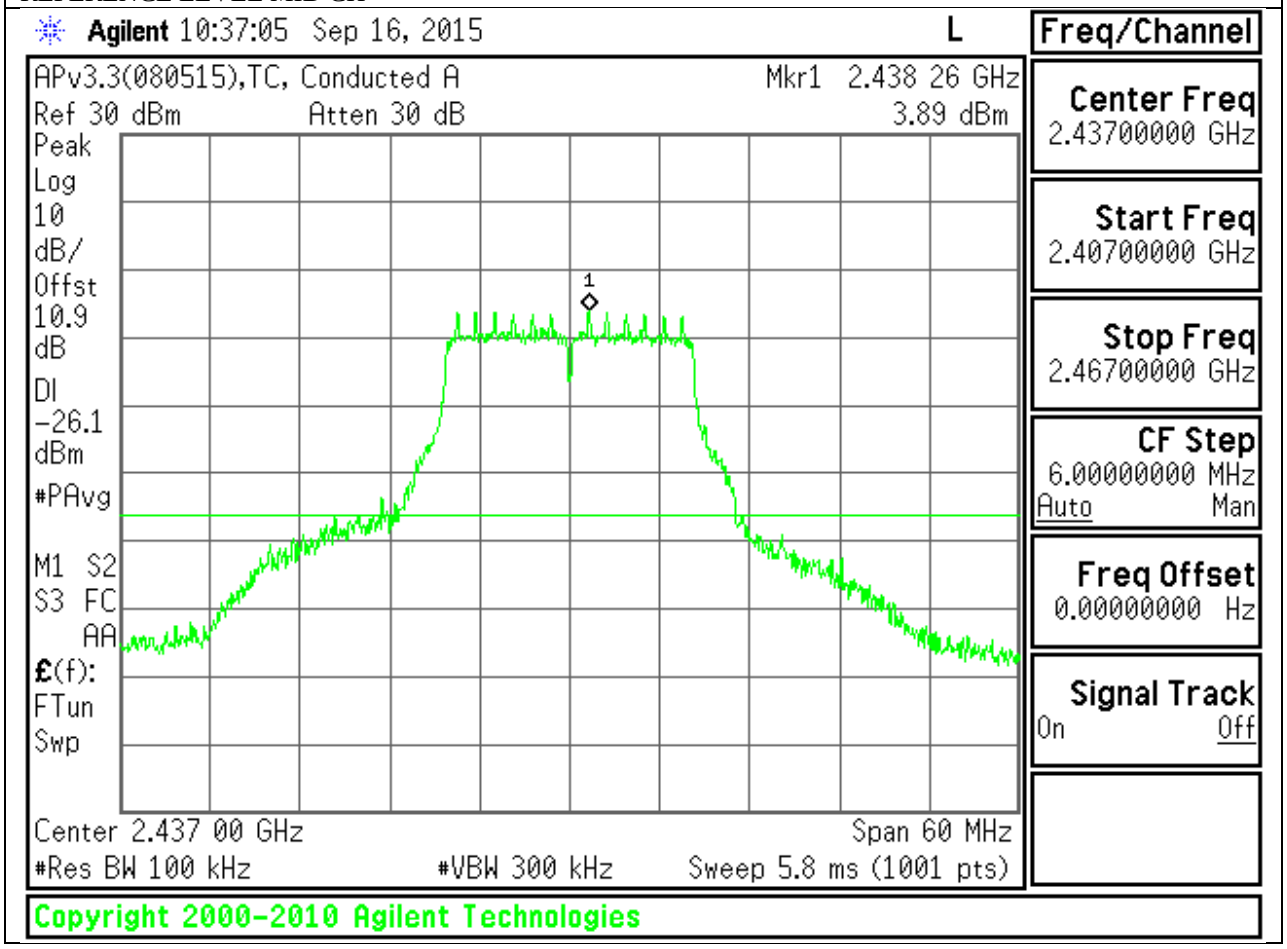
OUT OF BAND HIGH CH



9.6.3. 802.11g MODE IN THE 2.4 GHz BAND (CHAIN 0)

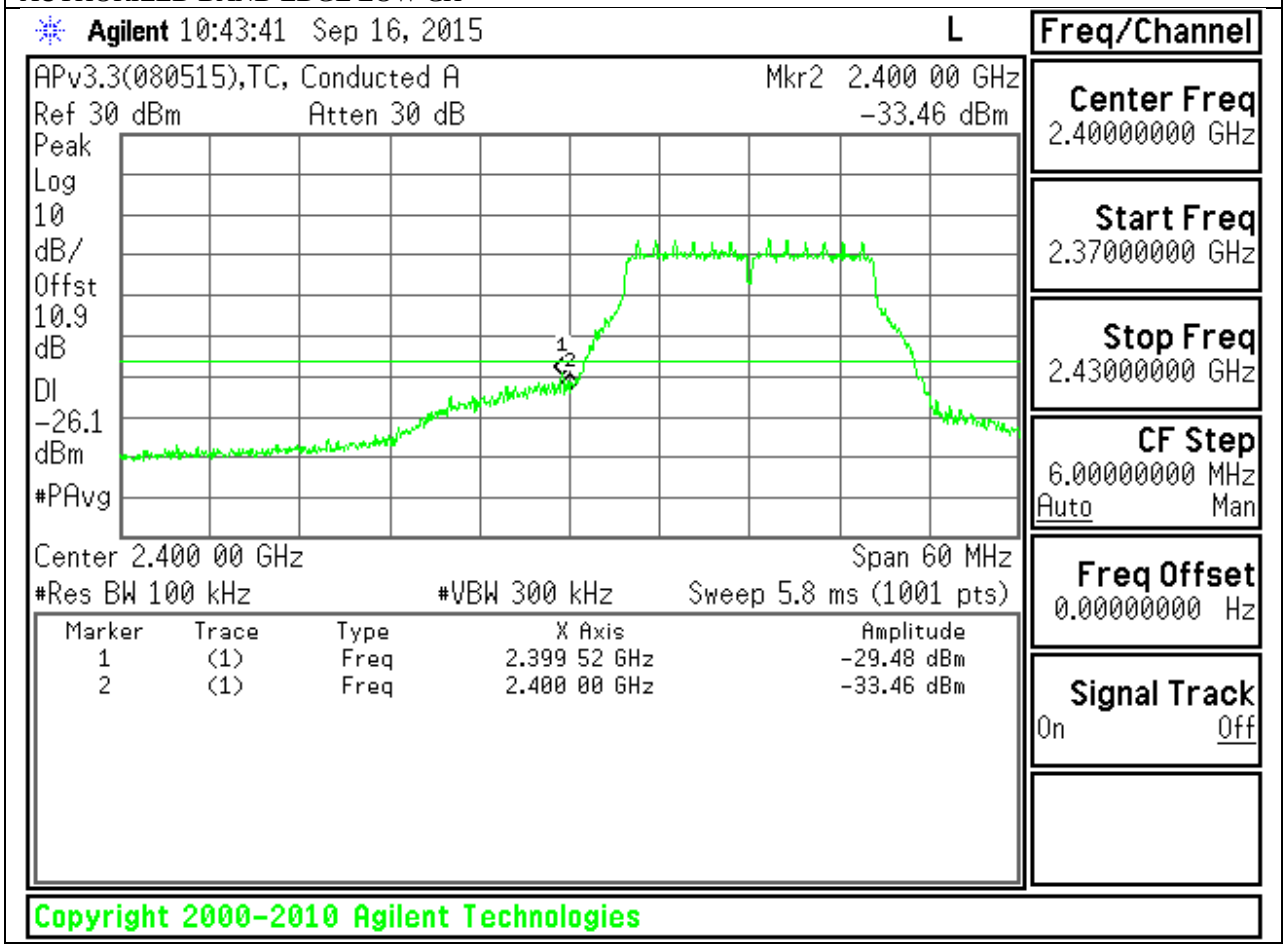
IN-BAND REFERENCE LEVEL

REFERENCE LEVEL MID CH



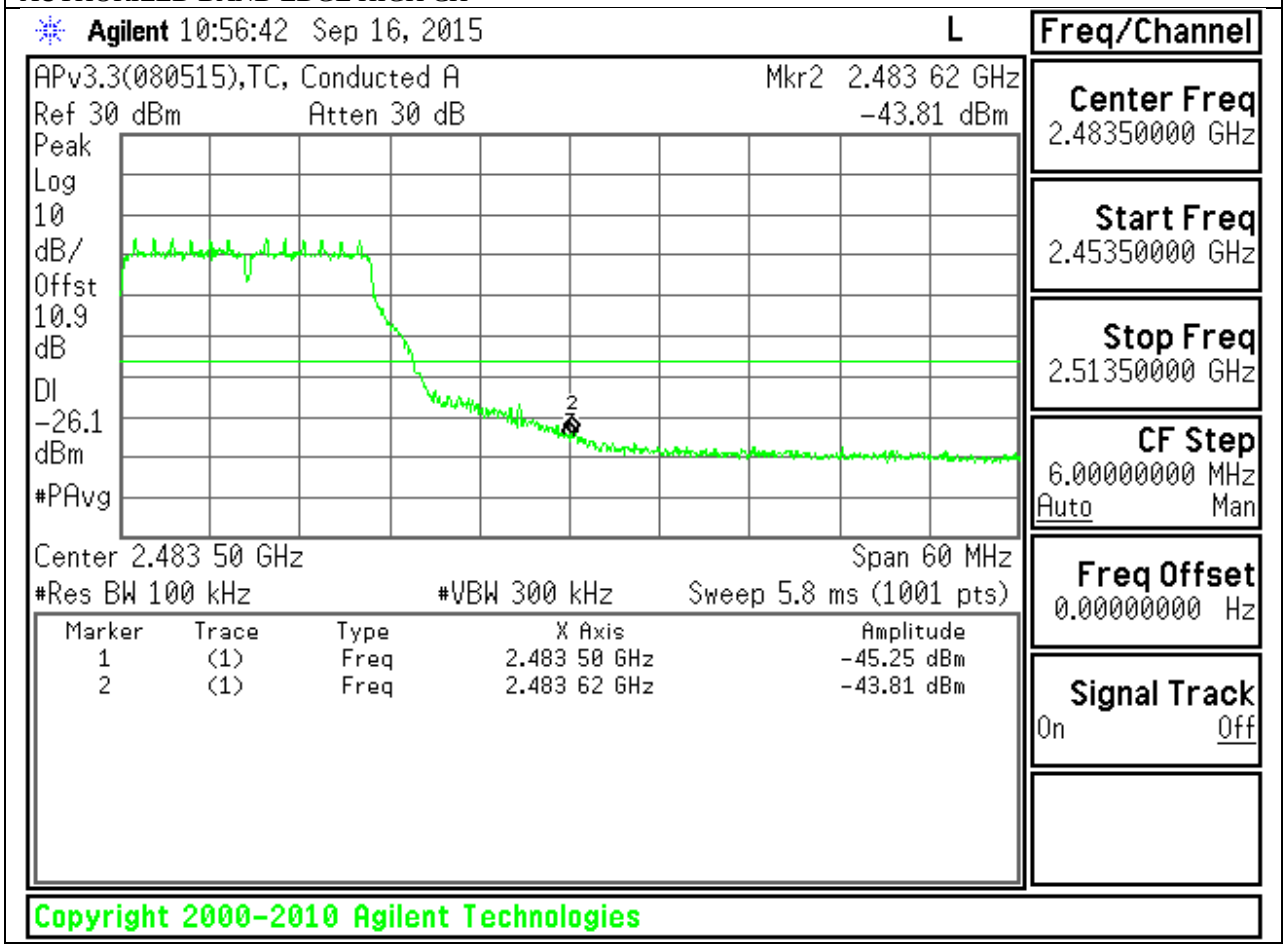
LOW CHANNEL BANDEDGE

AUTHORIZED BAND EDGE LOW CH



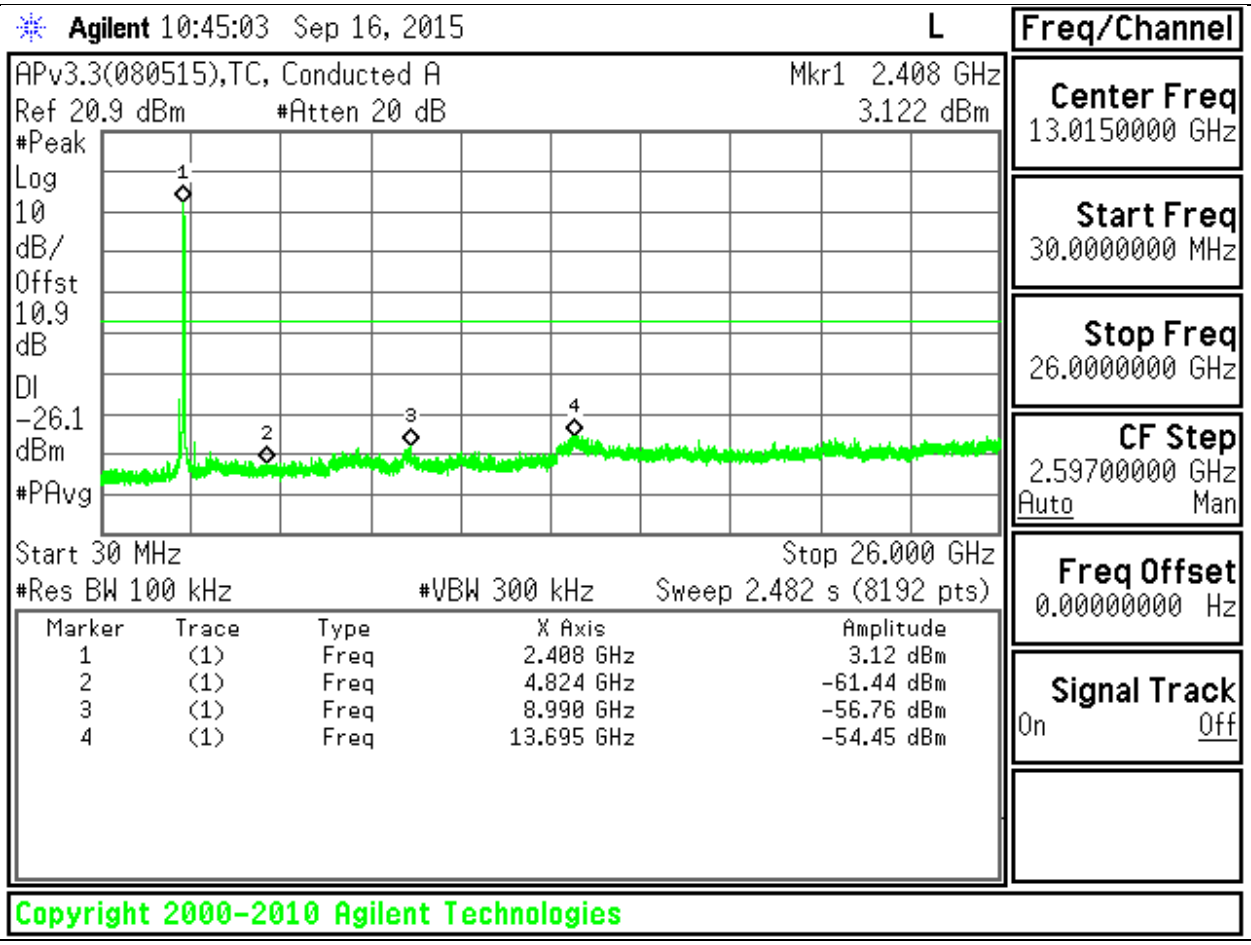
HIGH CHANNEL BANDEDGE

AUTHORIZED BAND EDGE HIGH CH

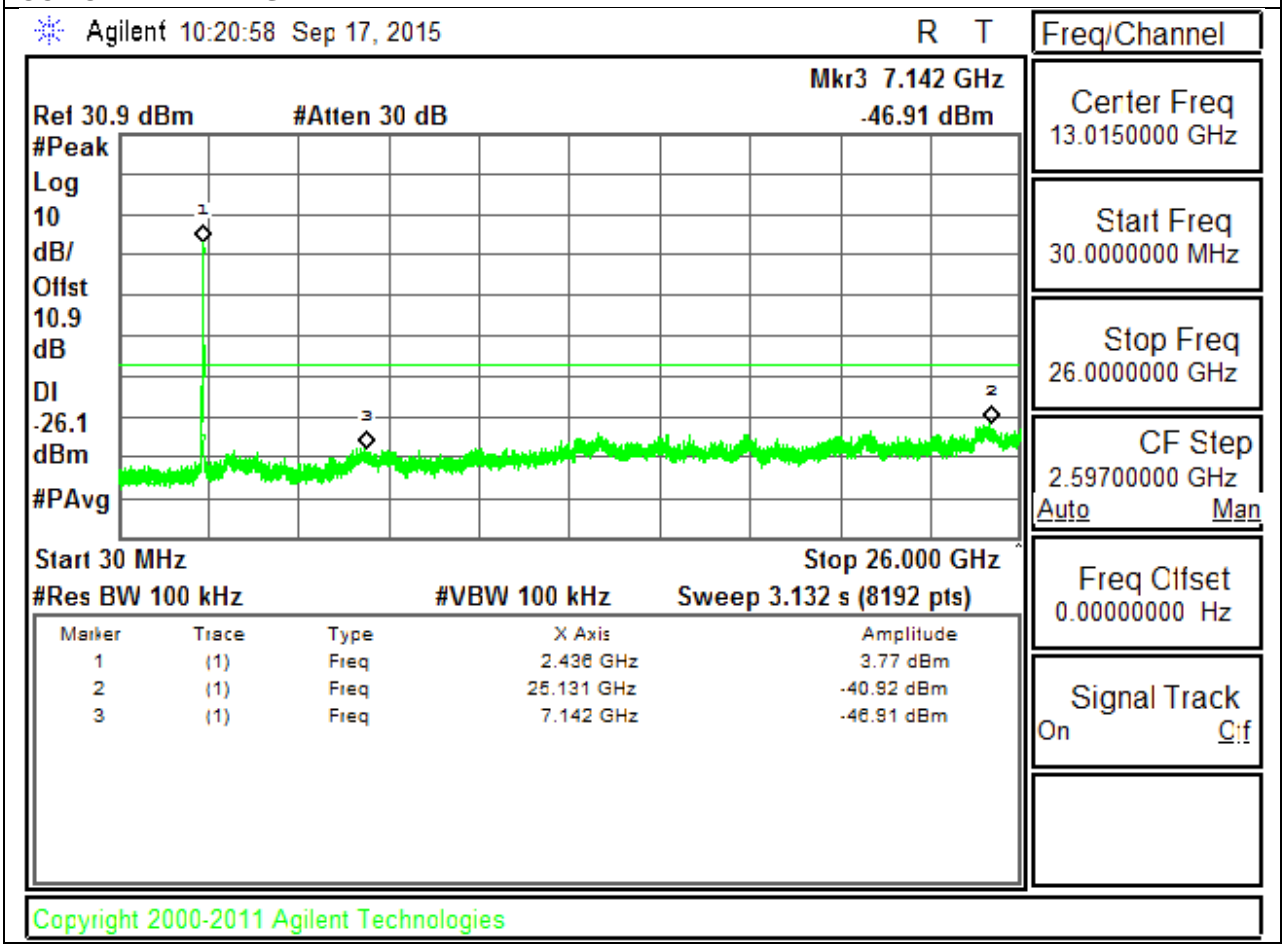


OUT-OF-BAND EMISSIONS

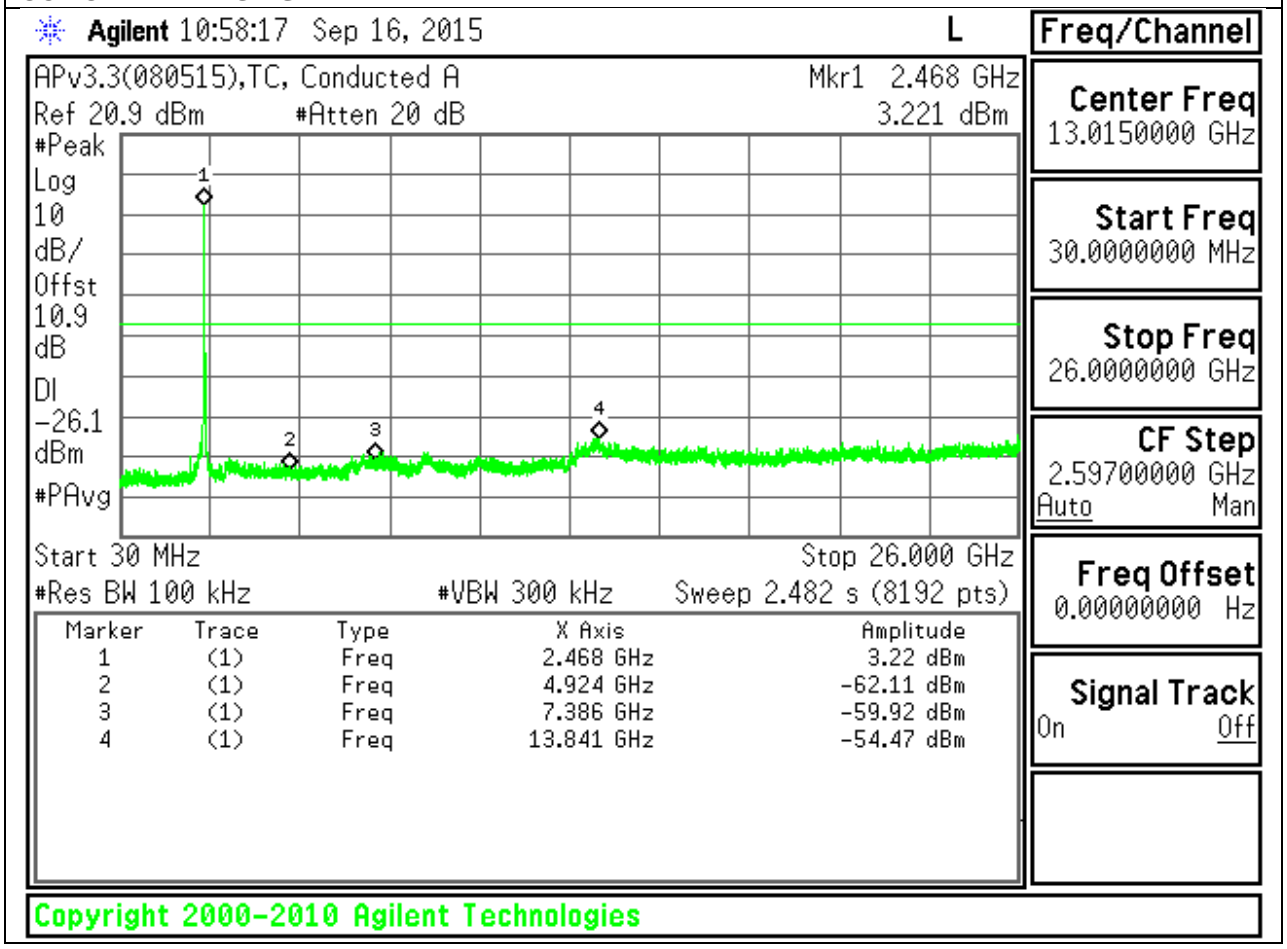
OUT OF BAND LOW CH



OUT OF BAND MID CH



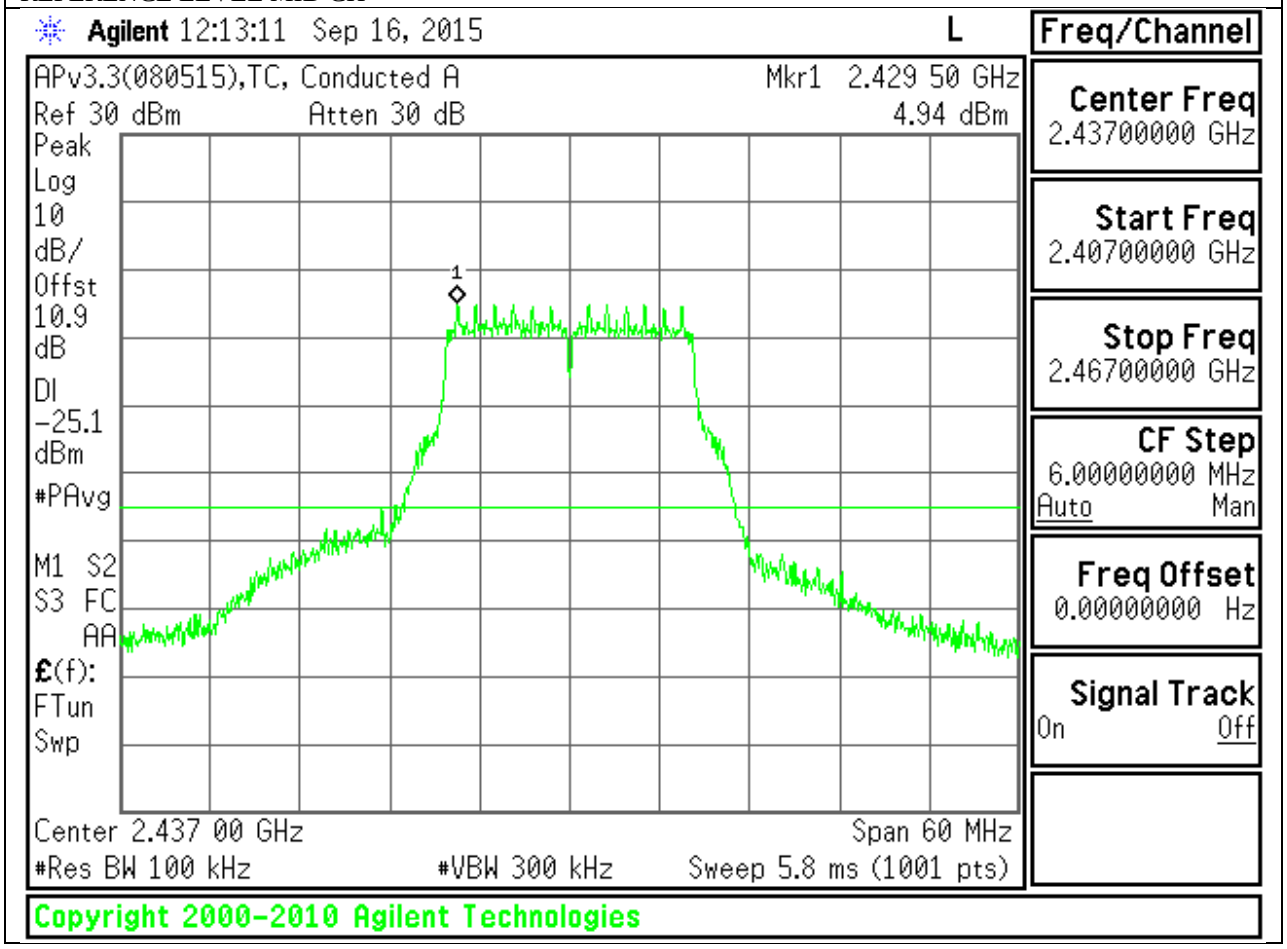
OUT OF BAND HIGH CH



9.6.4. 802.11g MODE IN THE 2.4 GHz BAND (CHAIN 1)

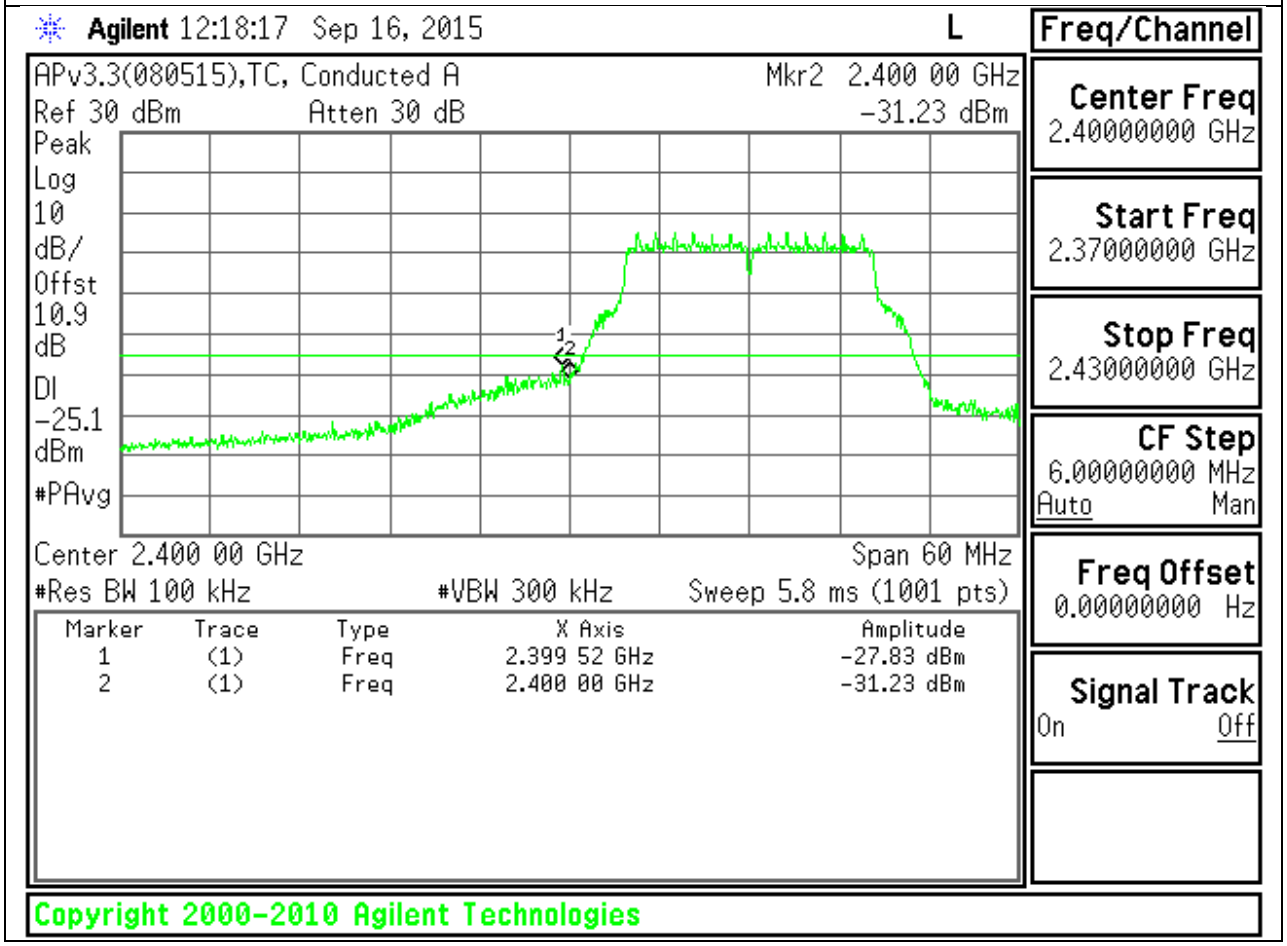
IN-BAND REFERENCE LEVEL

REFERENCE LEVEL MID CH



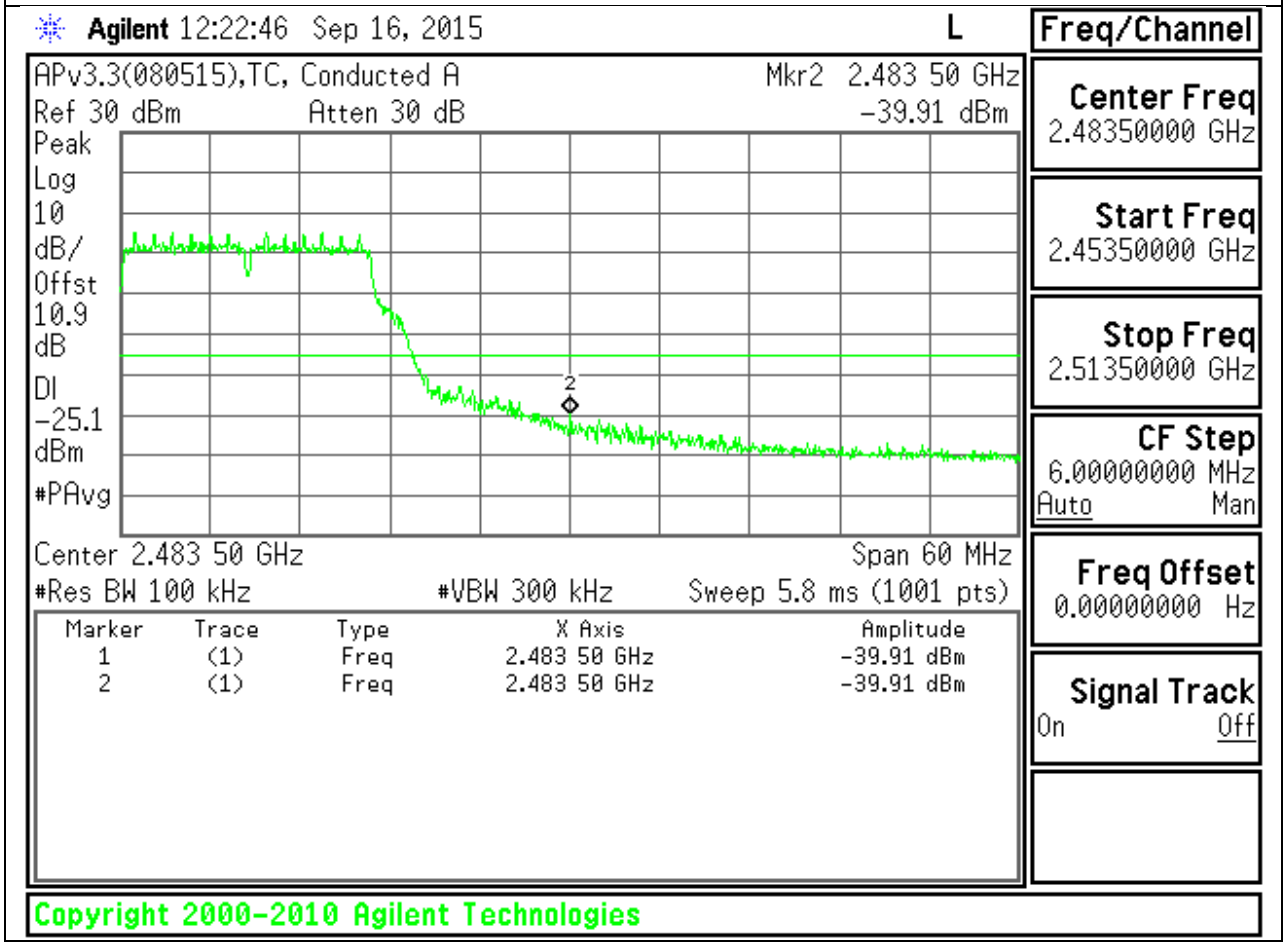
LOW CHANNEL BANDEDGE

AUTHORIZED BAND EDGE LOW CH



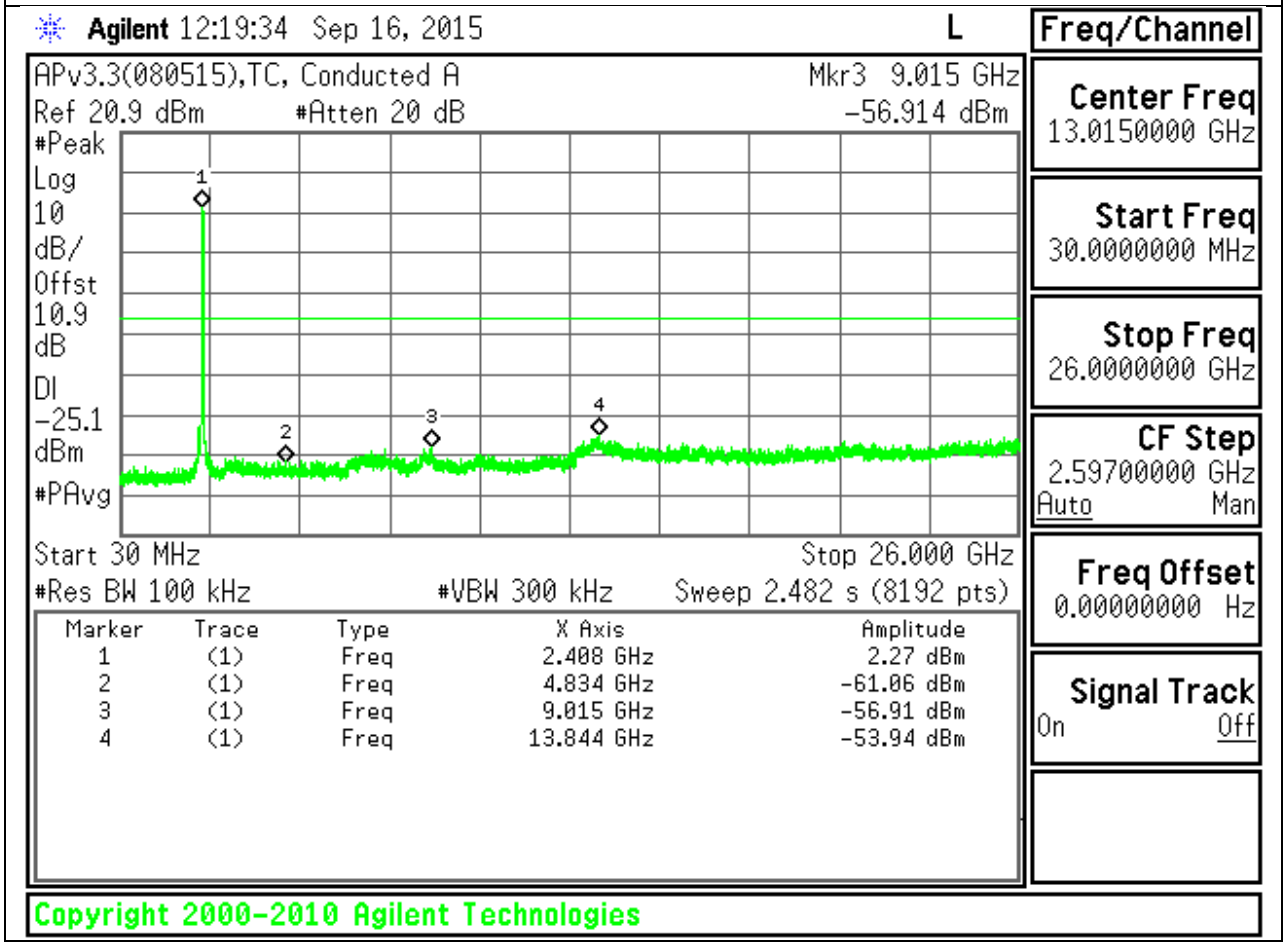
HIGH CHANNEL BANDEDGE

AUTHORIZED BAND EDGE HIGH CH

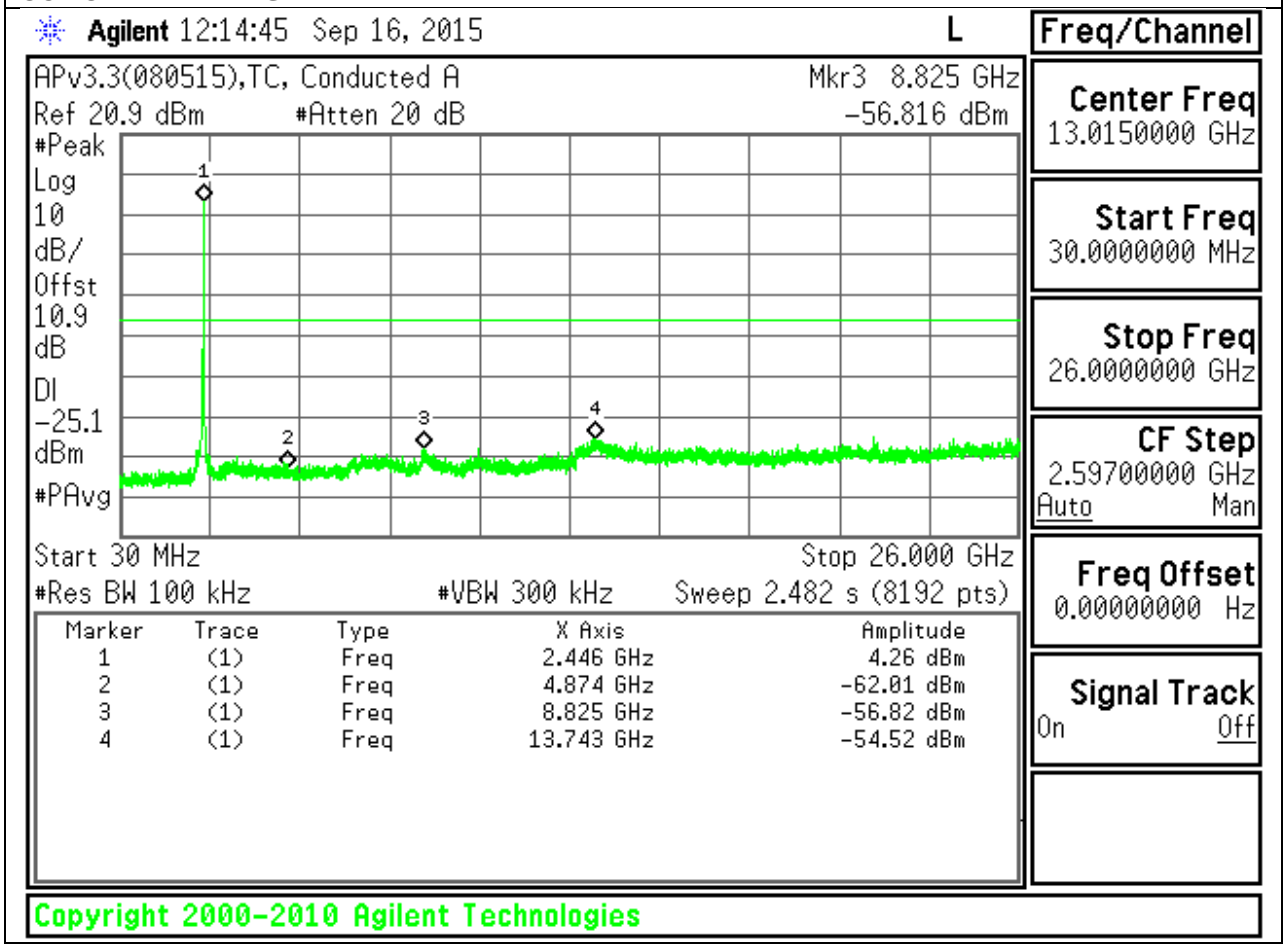


OUT-OF-BAND EMISSIONS

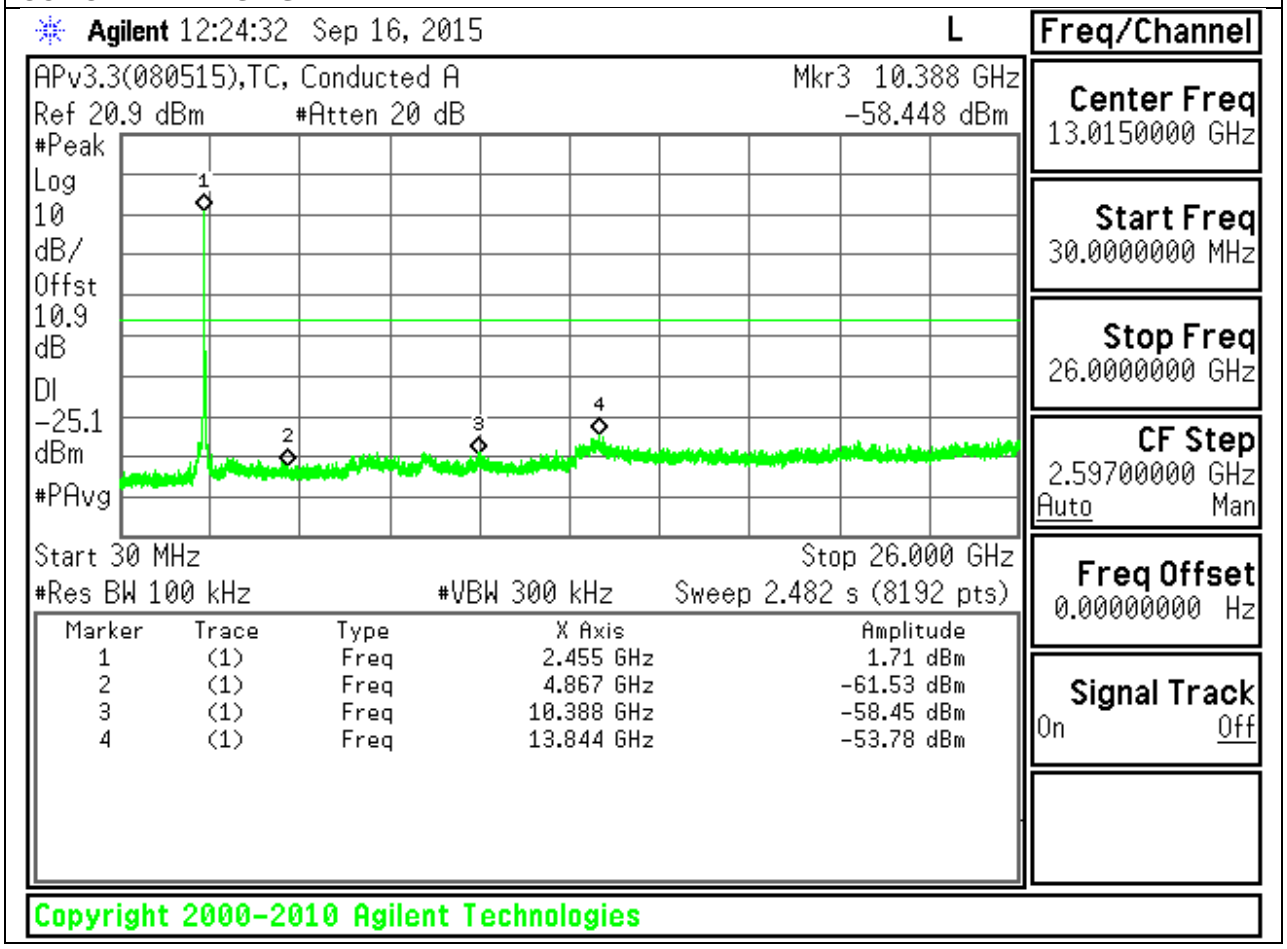
OUT OF BAND LOW CH



OUT OF BAND MID CH



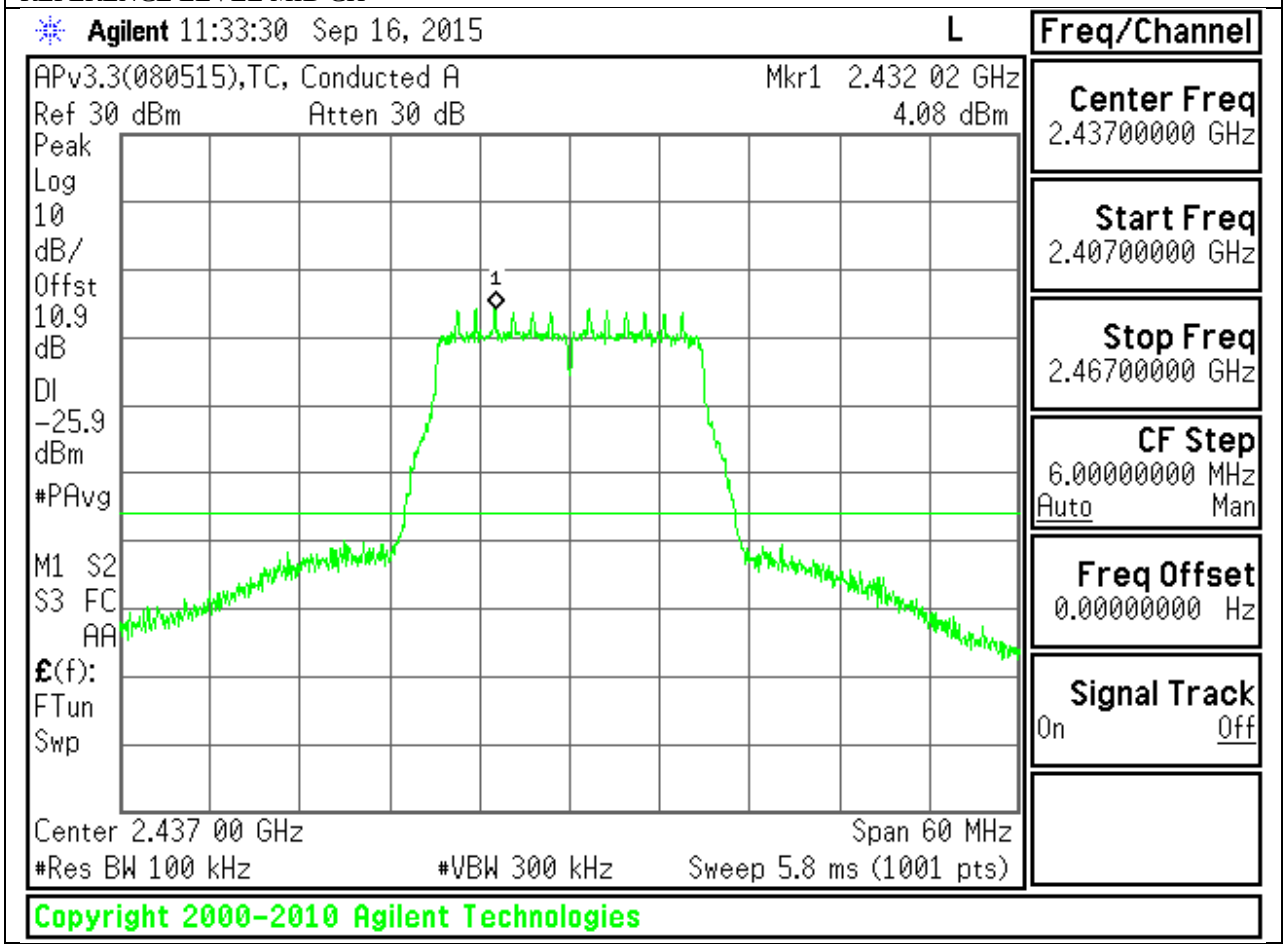
OUT OF BAND HIGH CH



9.6.5. 802.11n HT20 MODE IN THE 2.4 GHz BAND (CHAIN 0)

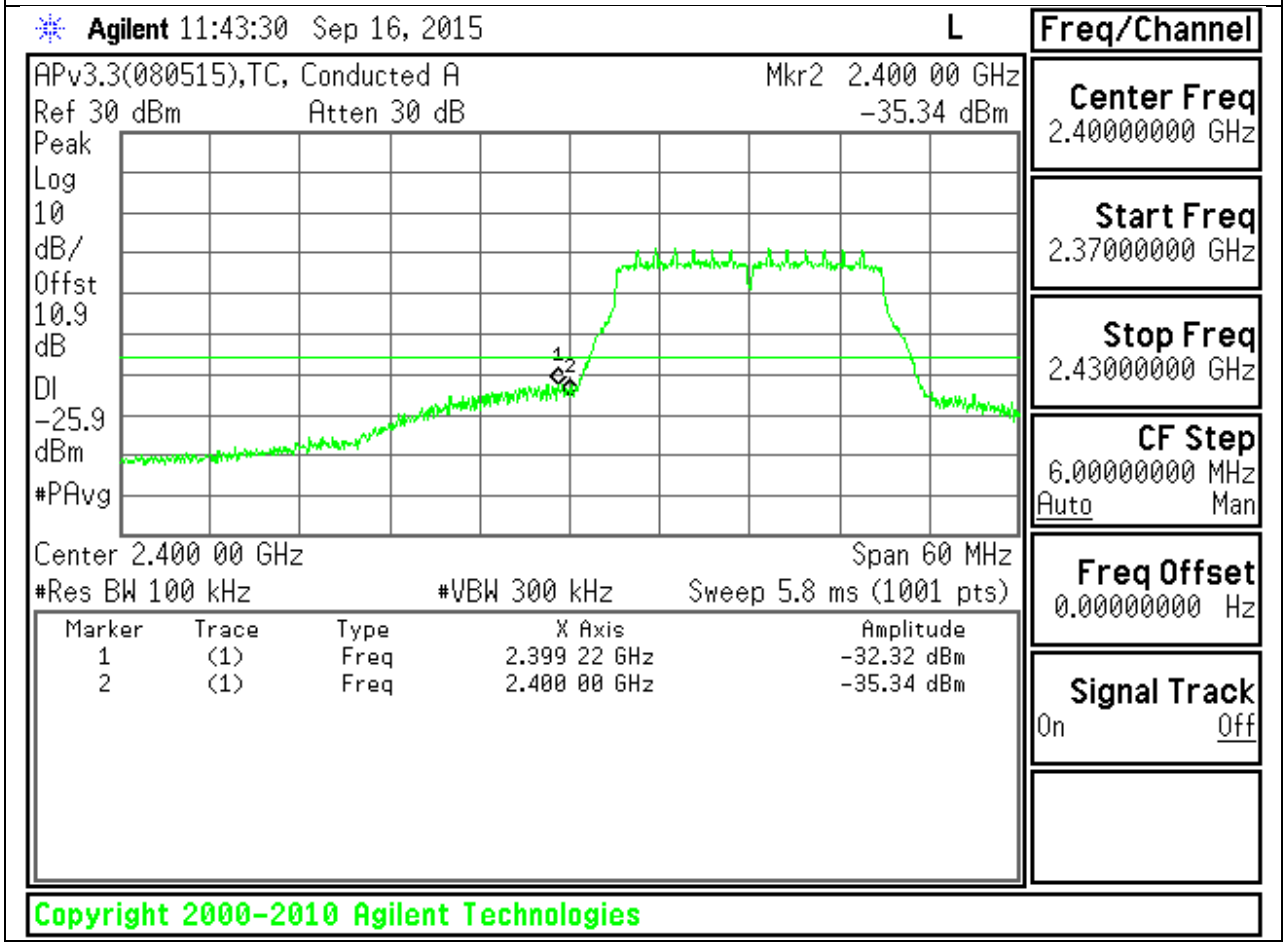
IN-BAND REFERENCE LEVEL

REFERENCE LEVEL MID CH



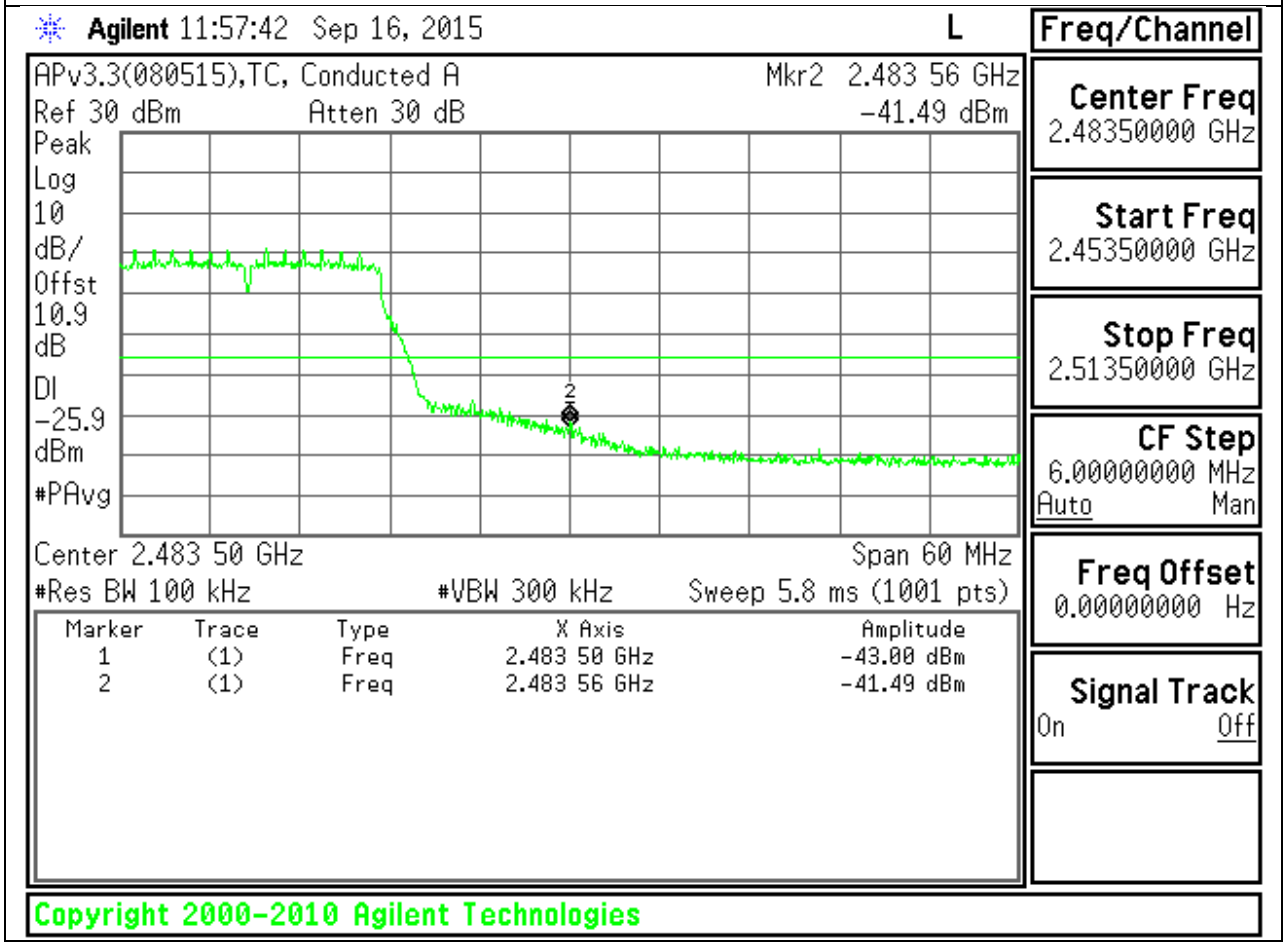
LOW CHANNEL BANDEDGE

AUTHORIZED BAND EDGE LOW CH



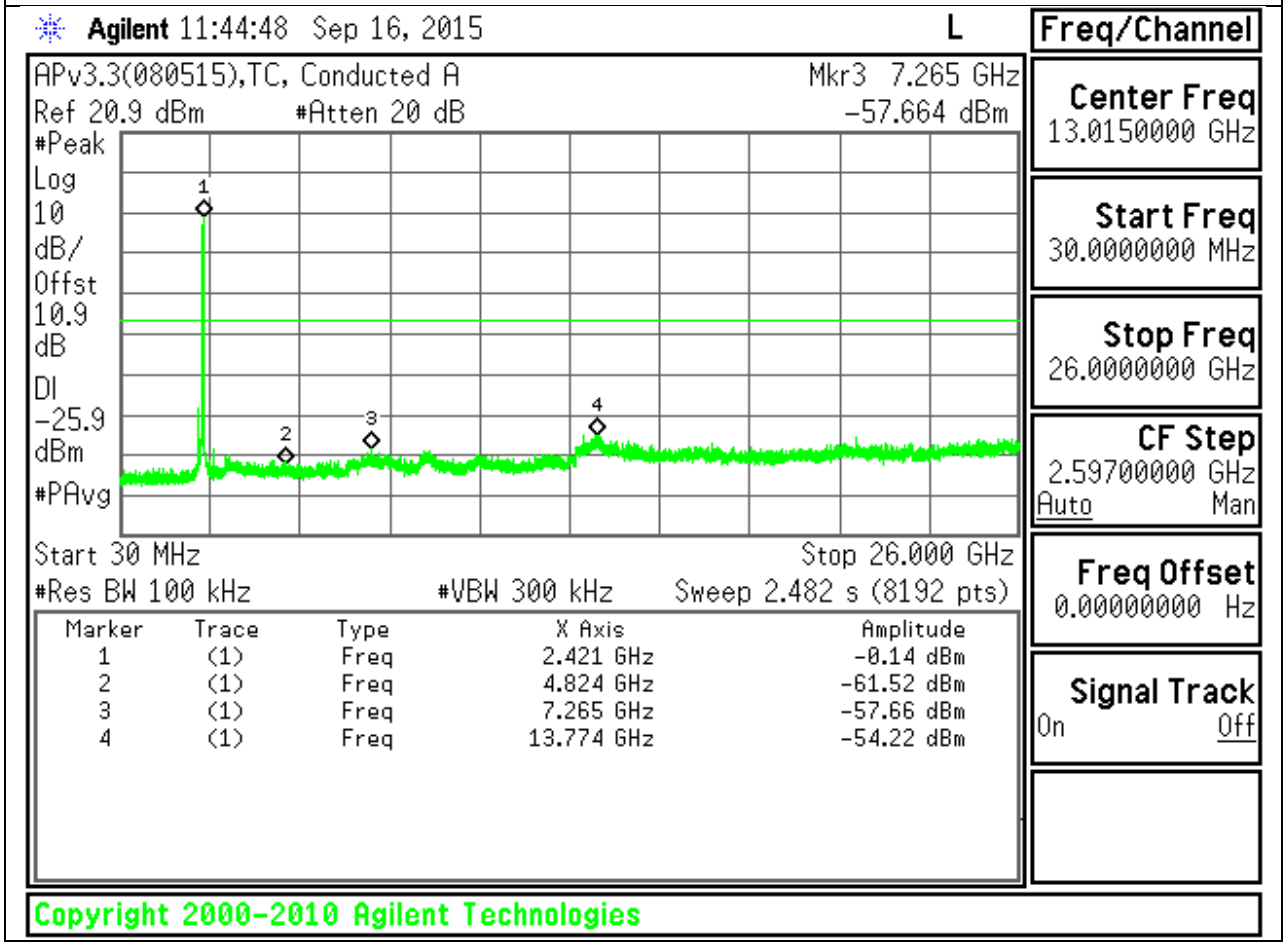
HIGH CHANNEL BANDEDGE

AUTHORIZED BAND EDGE HIGH CH

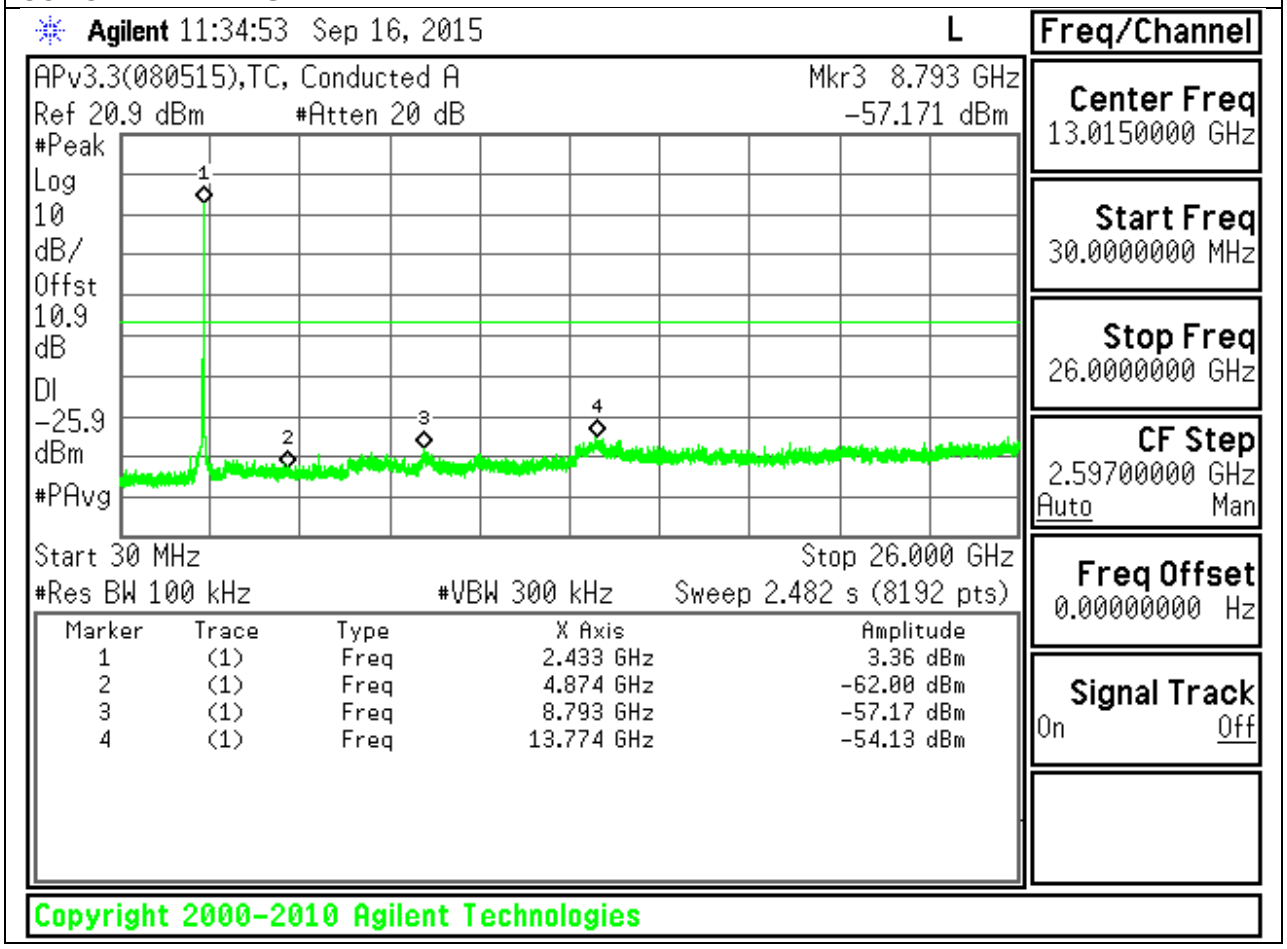


OUT-OF-BAND EMISSIONS

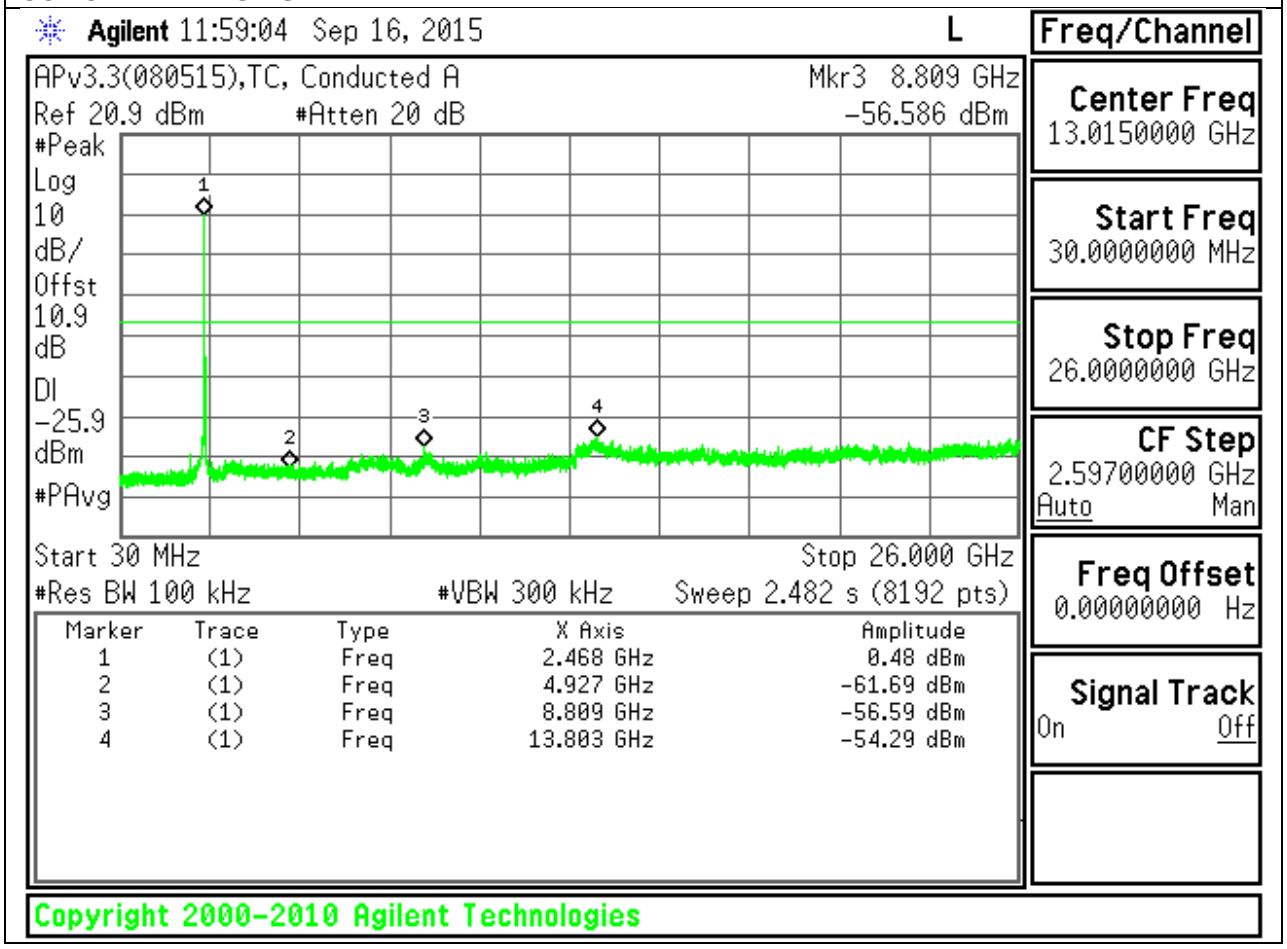
OUT OF BAND LOW CH



OUT OF BAND MID CH



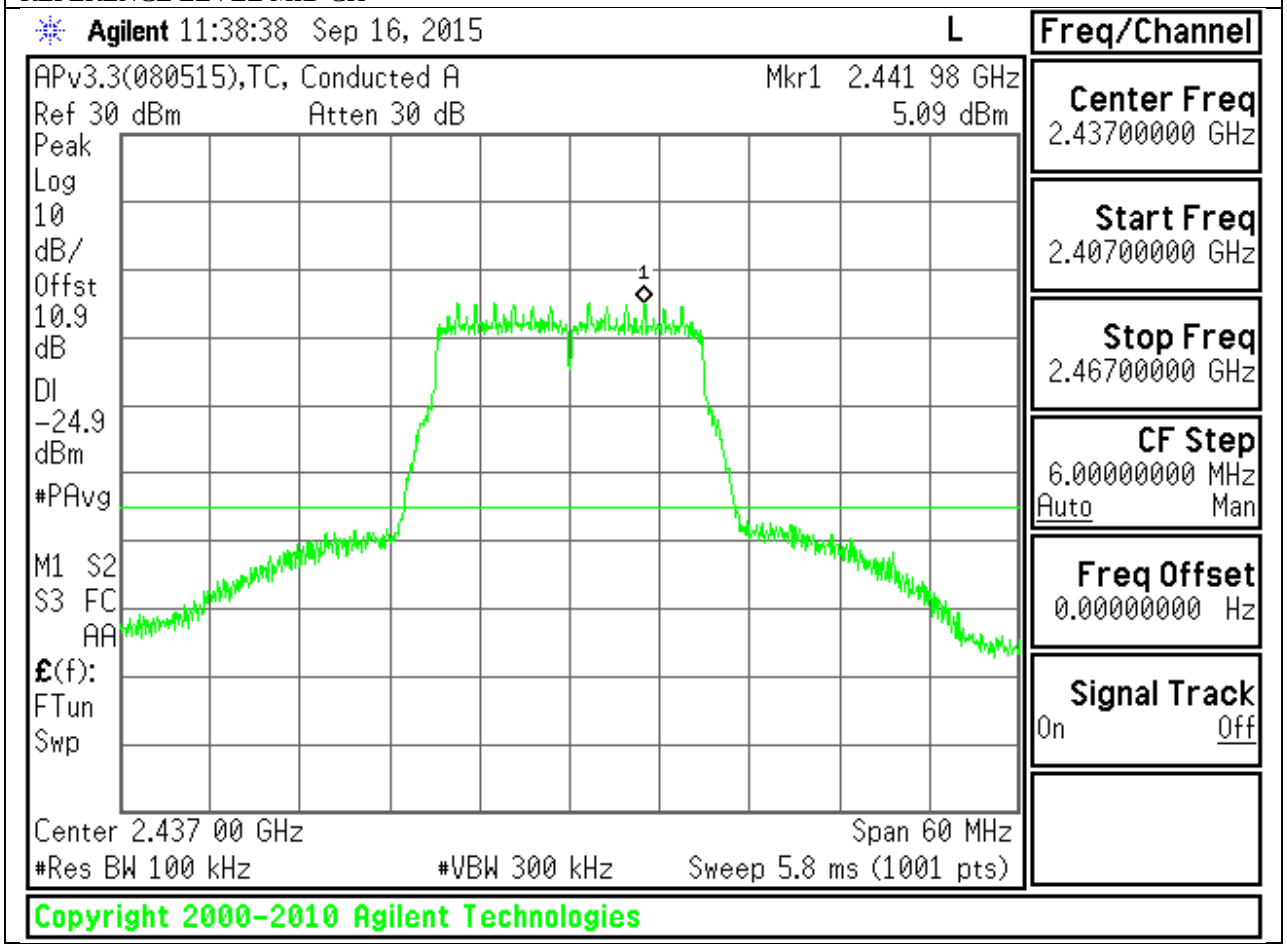
OUT OF BAND HIGH CH



9.6.6. 802.11n HT20 MODE IN THE 2.4 GHz BAND (CHAIN 1)

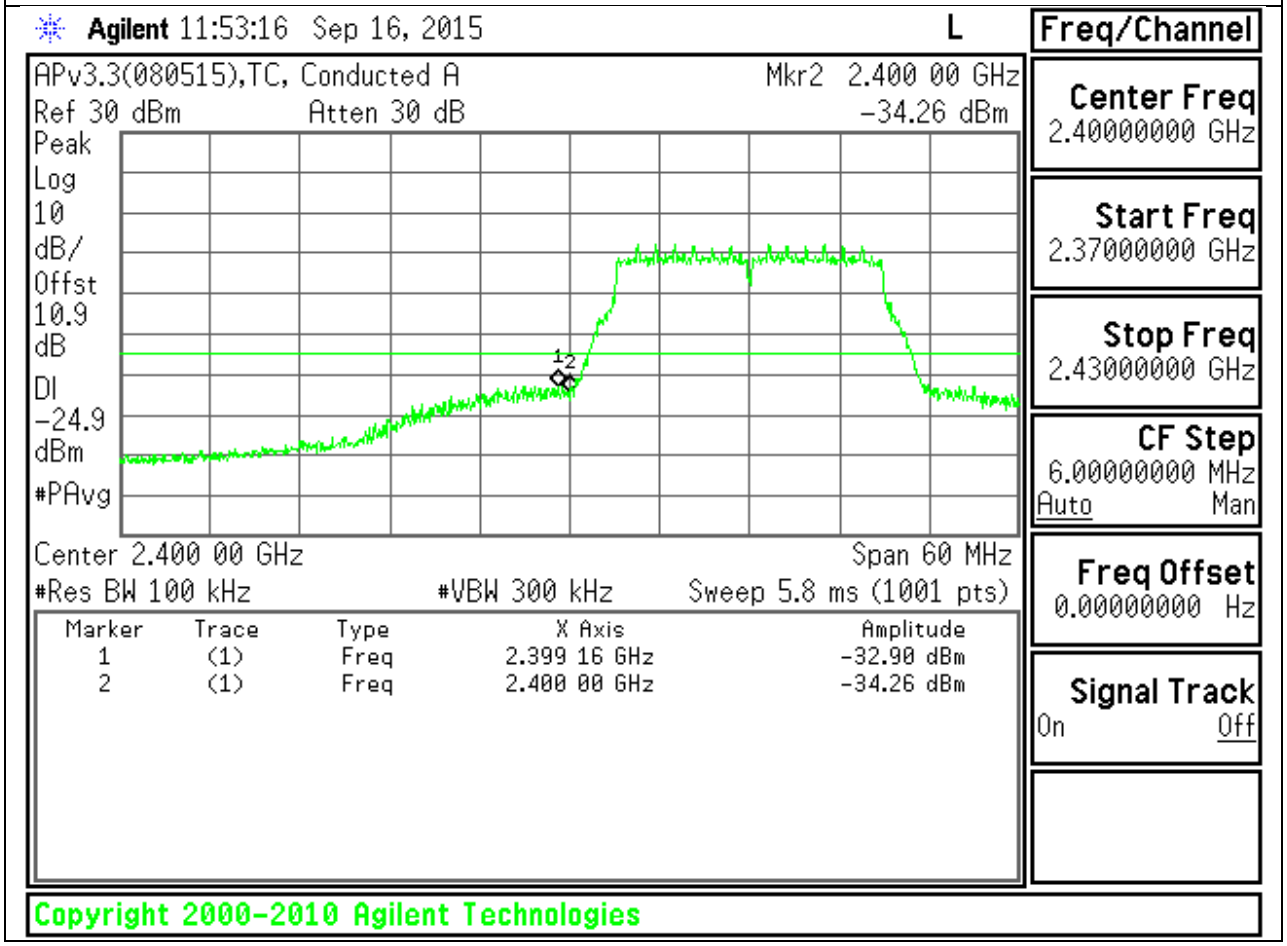
IN-BAND REFERENCE LEVEL

REFERENCE LEVEL MID CH



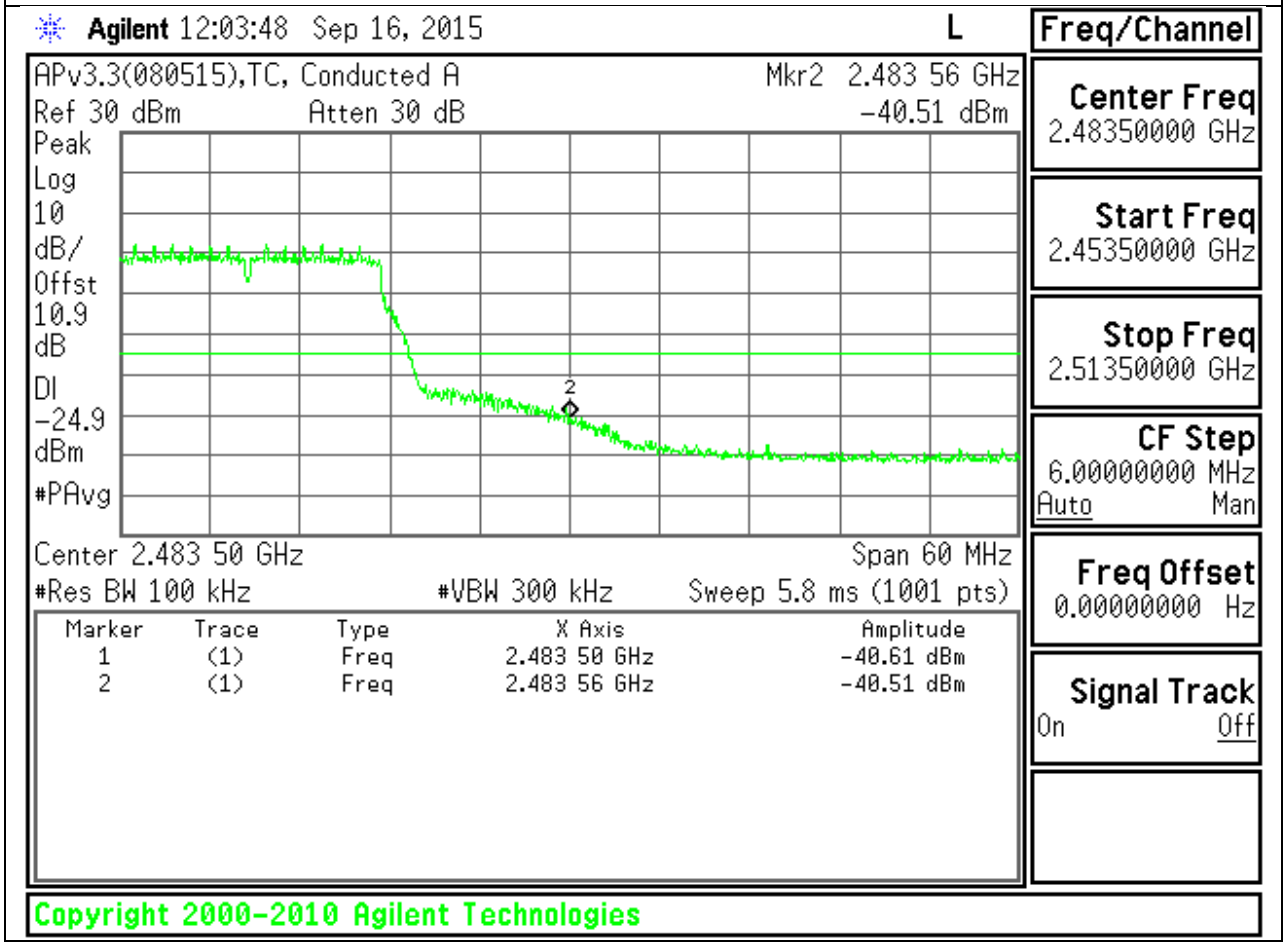
LOW CHANNEL BANDEDGE

AUTHORIZED BAND EDGE LOW CH



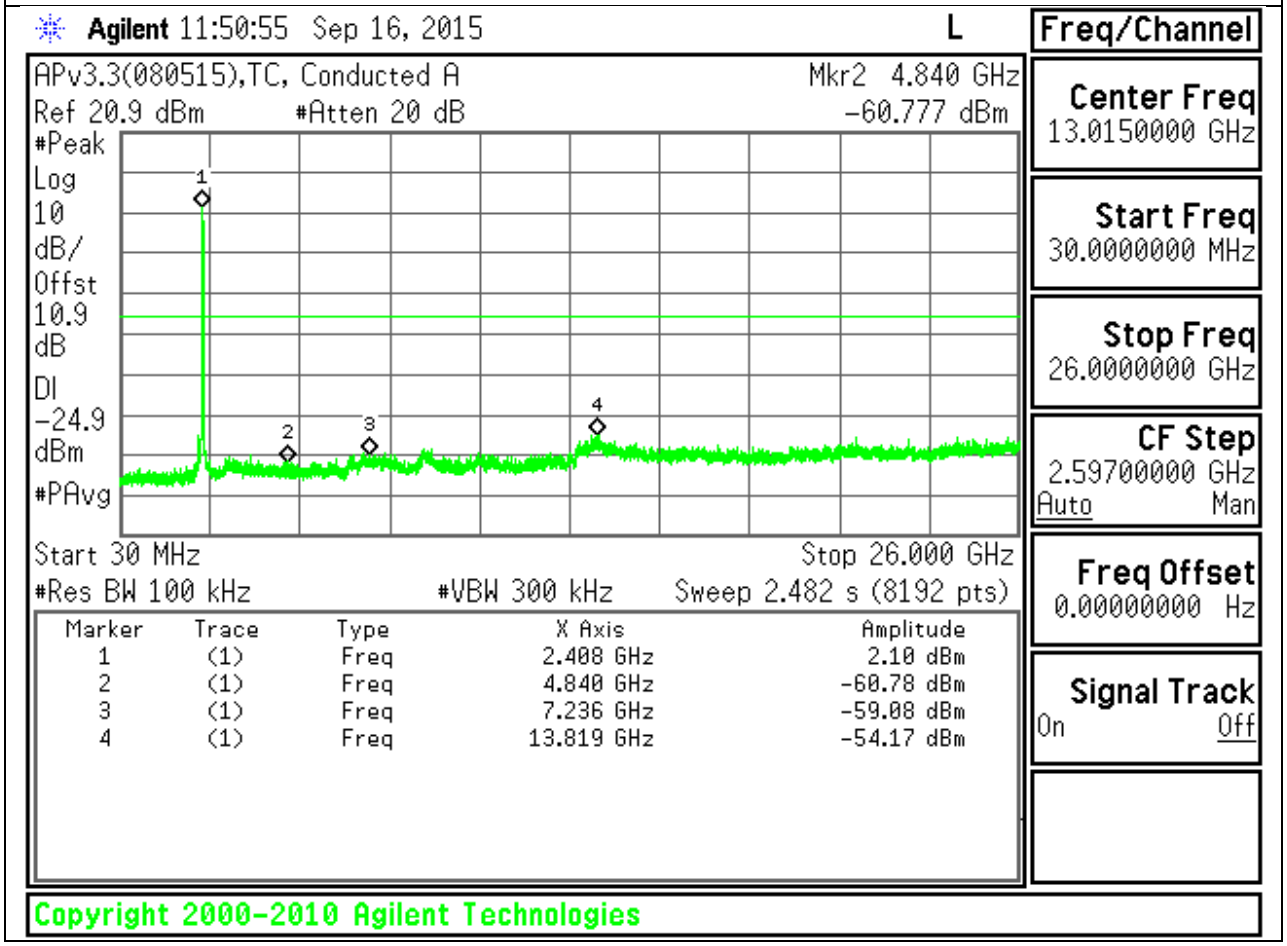
HIGH CHANNEL BANDEDGE

AUTHORIZED BAND EDGE HIGH CH

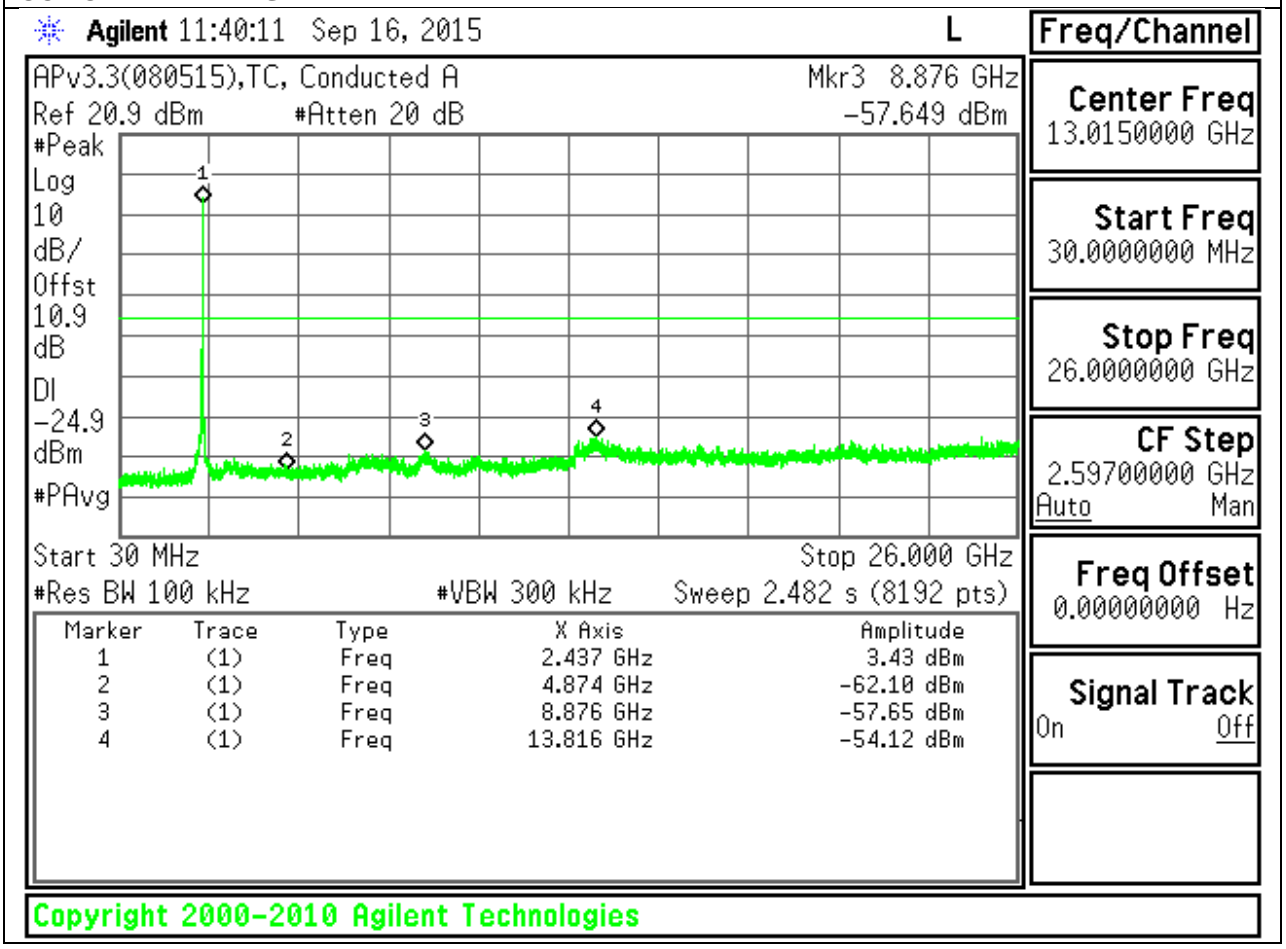


OUT-OF-BAND EMISSIONS

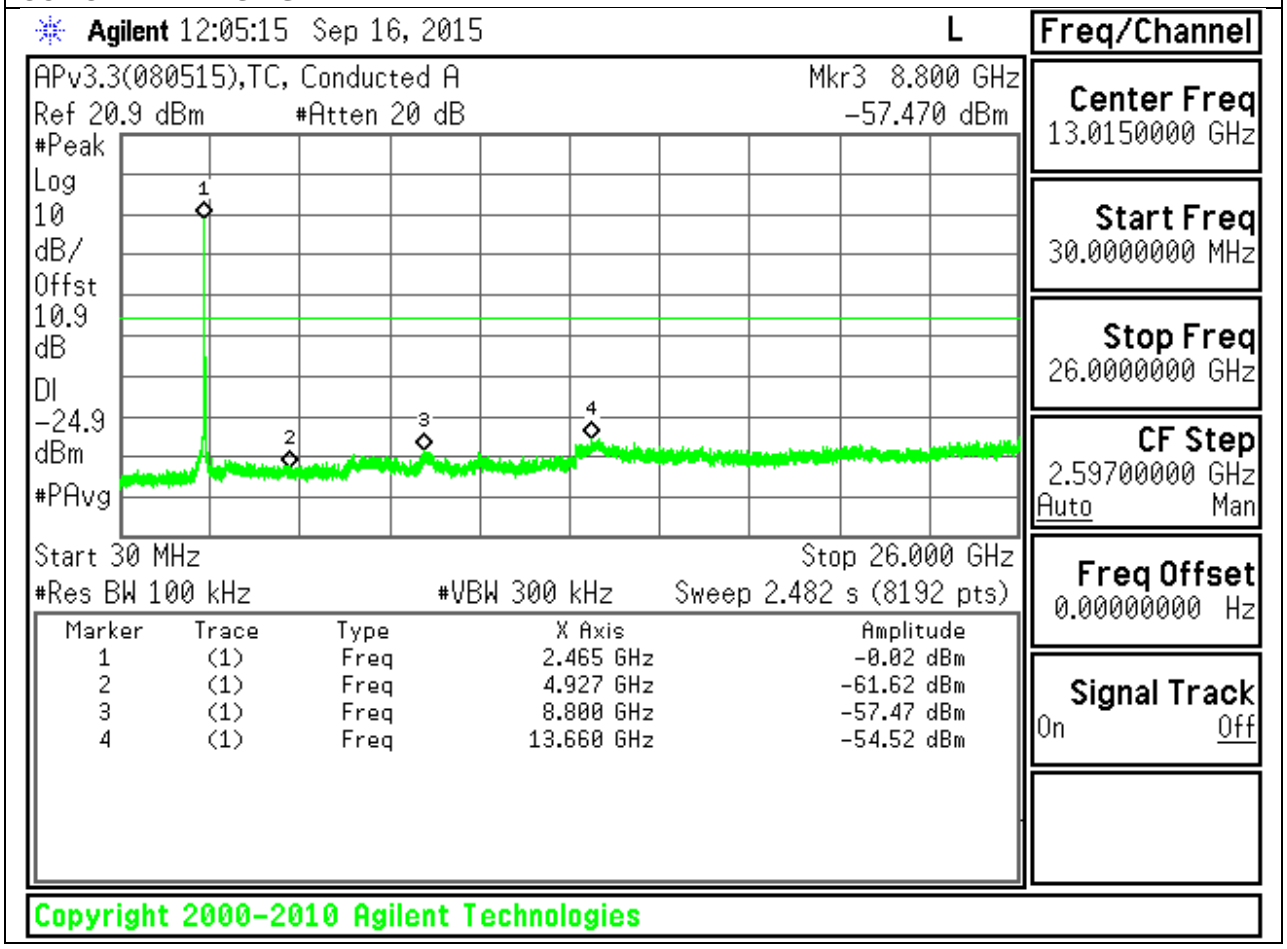
OUT OF BAND LOW CH



OUT OF BAND MID CH



OUT OF BAND HIGH CH



10. RADIATED TEST RESULTS

10.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-GEN Clause 8.9 (Transmitter)

IC RSS-GEN Clause 7 (Receiver)

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for below 1GHz and 150cm for above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and add duty cycle factor for average measurements. Duty cycle factor= 10log (1/x). For this sample B mode = 0dB (duty cycle >98%); G mode = 0dB; N mode = 0.11dB.

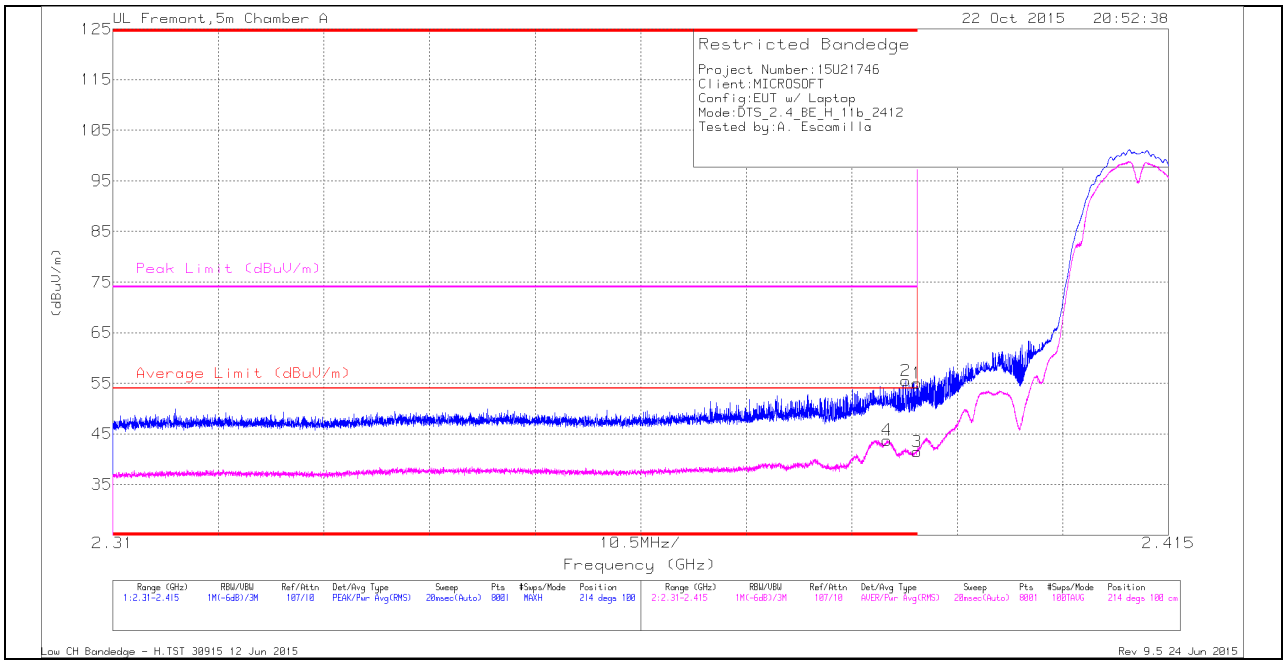
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

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. TX ABOVE 1 GHz 802.11b MODE IN THE 2.4 GHz BAND CHAIN 0

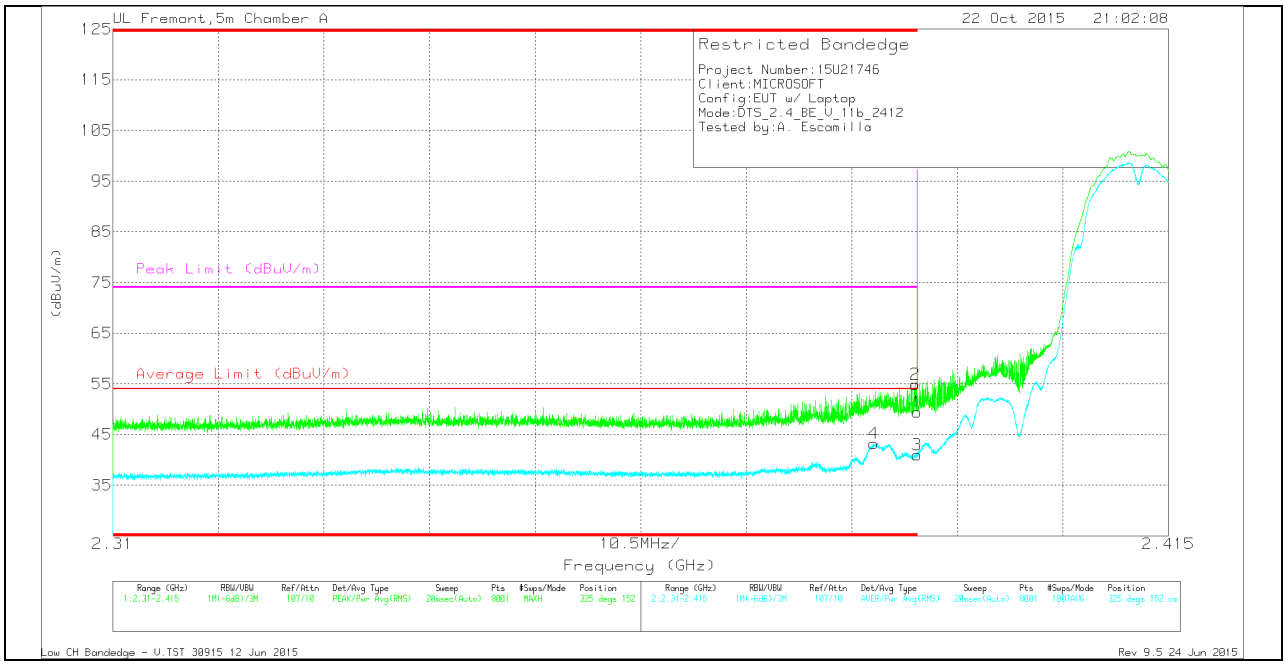
RESTRICTED BANDEDGE (LOW CHANNEL)
HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* 2.387	31.97	RMS	32	-20.2	0	43.77	54	-10.23	-	-	214	100	H
2	* 2.389	43.59	Pk	32	-20.1	0	55.49	-	-	74	-18.51	214	100	H
1	* 2.39	43.18	Pk	32	-20.2	0	54.98	-	-	74	-19.02	214	100	H
3	* 2.39	29.68	RMS	32	-20.2	0	41.48	54	-12.52	-	-	214	100	H

VERTICAL PEAK AND AVERAGE PLOT

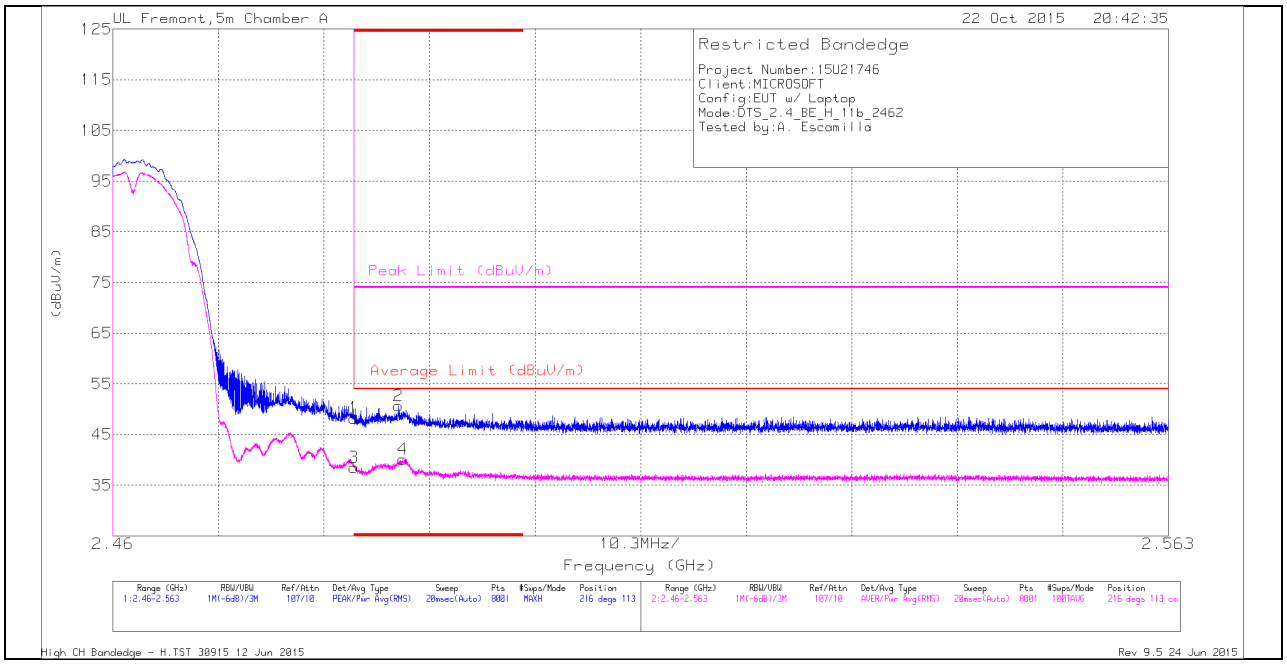


VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/Flt r/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* 2.386	31.41	RMS	32	-20.2	0	43.21	54	-10.79	-	-	325	152	V
1	* 2.39	37.64	Pk	32	-20.2	0	49.44	-	-	74	-24.56	325	152	V
2	* 2.39	43.04	Pk	32	-20.2	0	54.84	-	-	74	-19.16	325	152	V
3	* 2.39	29.23	RMS	32	-20.2	0	41.03	54	-12.97	-	-	325	152	V

AUTHORIZED BANDEDGE (HIGH CHANNEL)

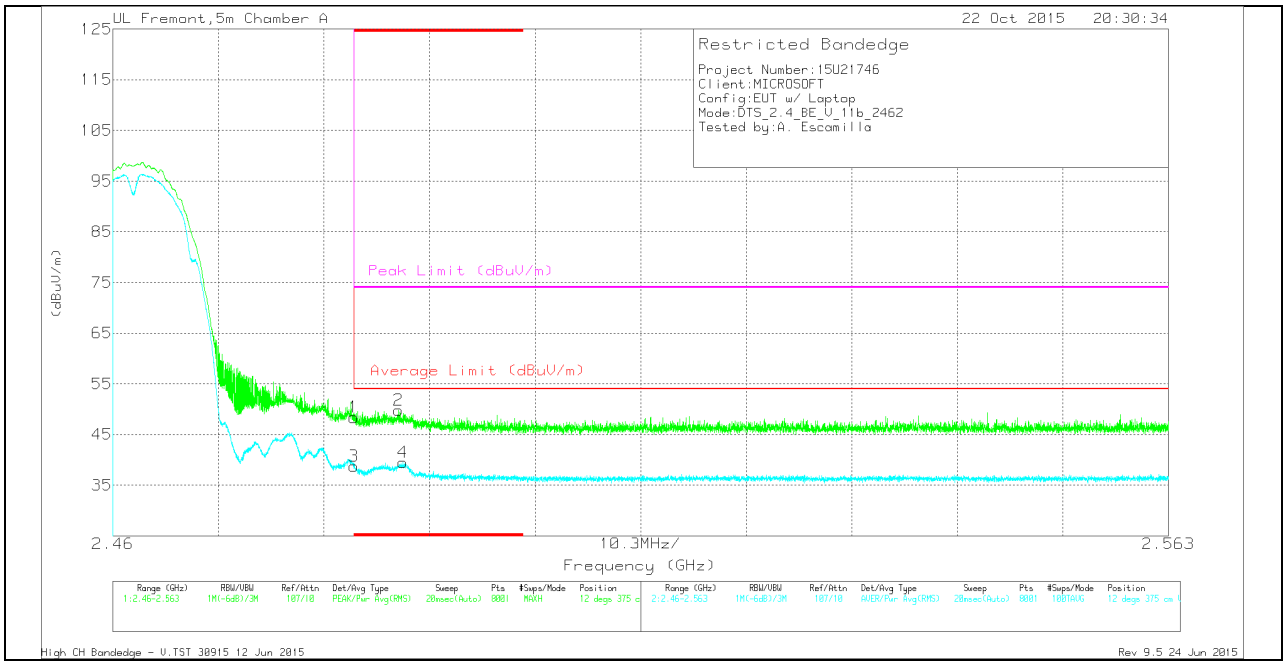
HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/Flt r/Pad (dB)	DC Corr (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	36.44	Pk	32.1	-20.3	0	48.24	-	-	74	-25.76	216	113	H
3	* 2.484	26.74	RMS	32.1	-20.3	0	38.54	54	-15.46	-	-	216	113	H
2	* 2.488	38.88	Pk	32.1	-20.3	0	50.68	-	-	74	-23.32	216	113	H
4	* 2.488	28.34	RMS	32.1	-20.3	0	40.14	54	-13.86	-	-	216	113	H

VERTICAL PEAK AND AVERAGE PLOT

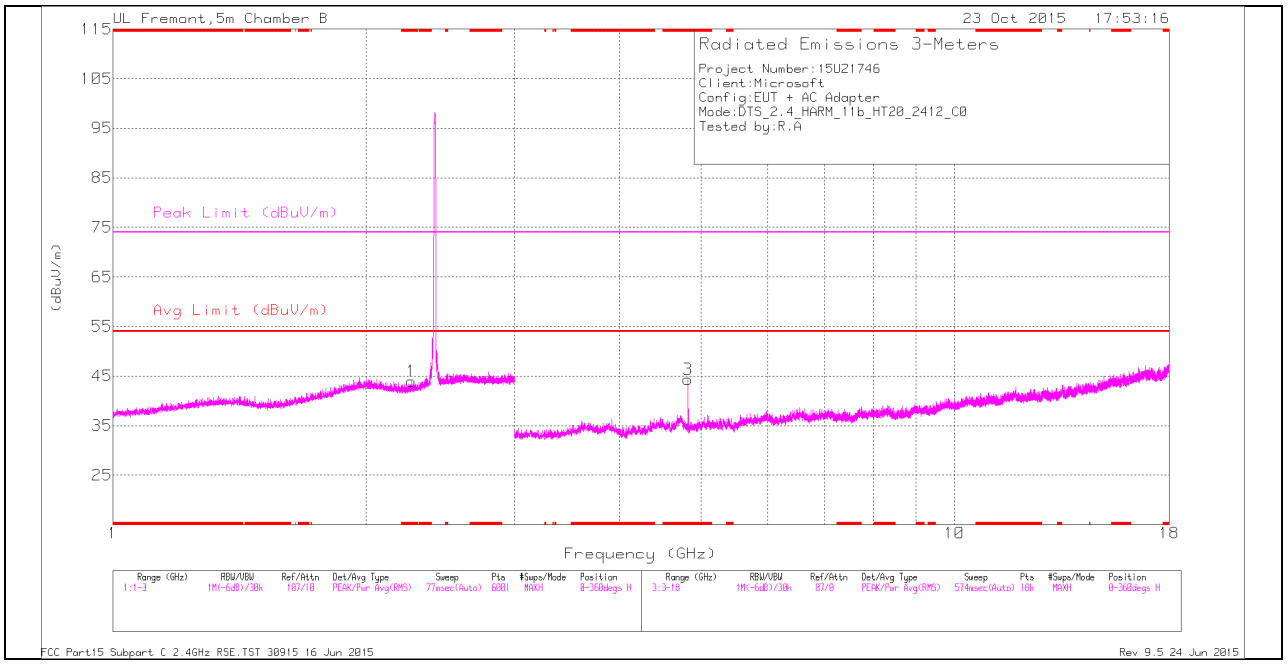


VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (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	36.57	Pk	32.1	-20.3	0	48.37	-	-	74	-25.63	12	375	V
3	* 2.484	26.91	RMS	32.1	-20.3	0	38.71	54	-15.29	-	-	12	375	V
2	* 2.488	38	Pk	32.1	-20.3	0	49.8	-	-	74	-24.2	12	375	V
4	* 2.488	27.65	RMS	32.1	-20.3	0	39.45	54	-14.55	-	-	12	375	V

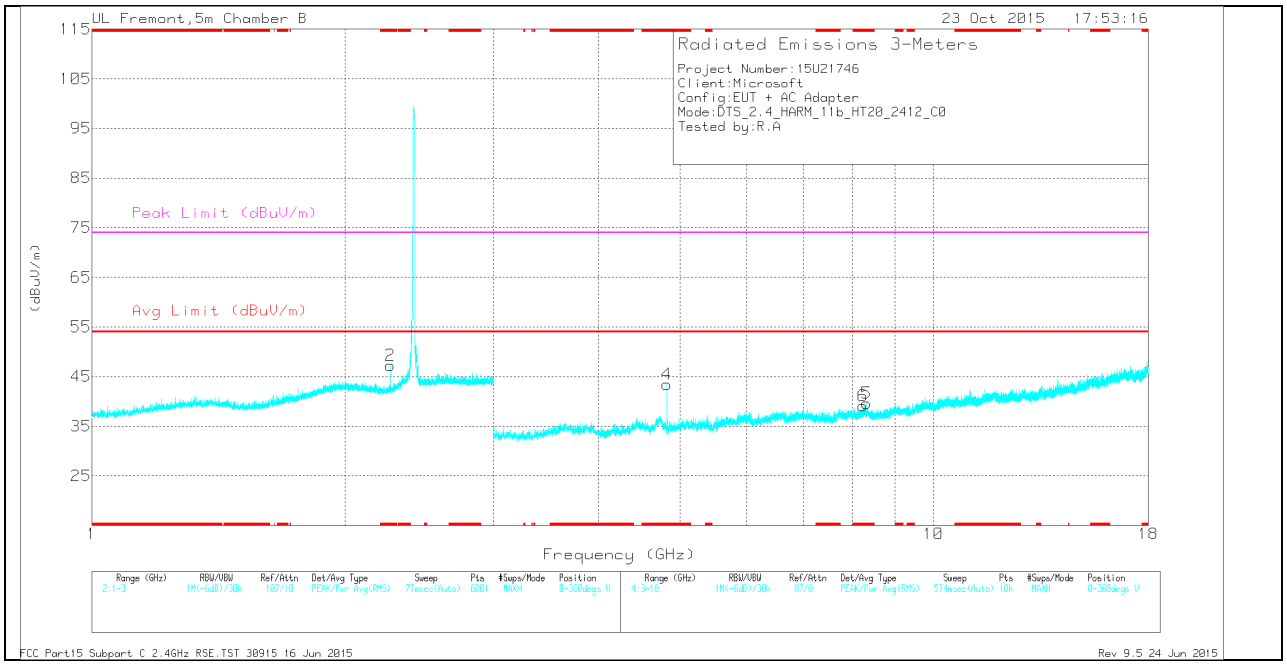
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

LOW CHANNEL VERTICAL

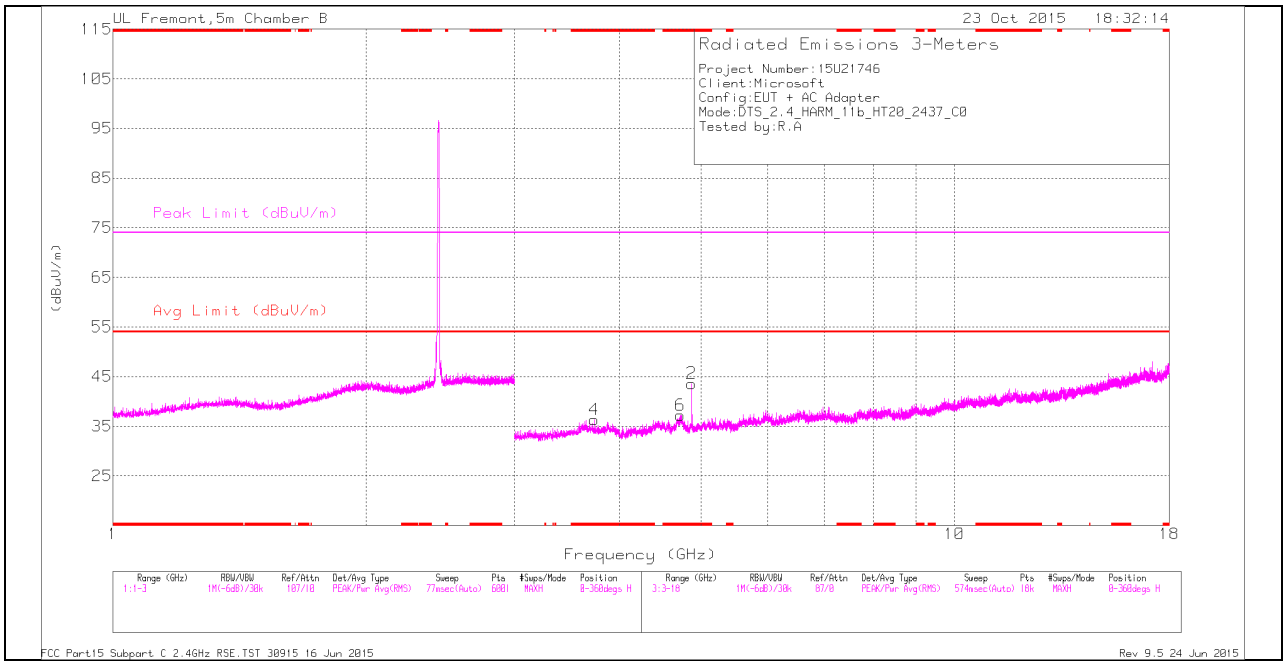


Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

LOW CHANNEL DATA

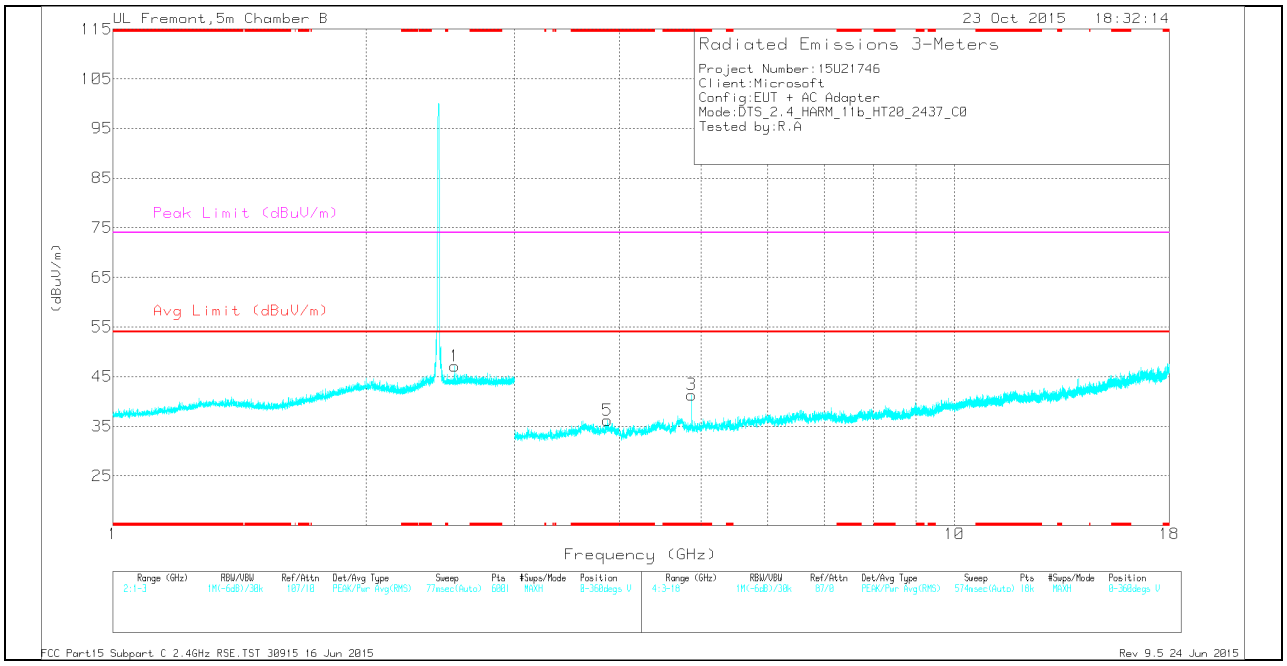
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 2.261	40.17	PK2	31.4	-24.3	0	47.27	-	-	74	-26.73	212	157	H
* 2.261	34.77	MAv1	31.4	-24.3	0	41.87	54	-12.13	-	-	212	157	H
* 2.261	41.64	PK2	31.4	-24.3	0	48.74	-	-	74	-25.26	15	227	V
* 2.261	36.5	MAv1	31.4	-24.3	0	43.6	54	-10.40	-	-	15	227	V
* 4.824	44.65	PK2	34.3	-31.6	0	47.35	-	-	74	-26.65	209	193	H
* 4.824	41.58	MAv1	34.3	-31.6	0	44.28	54	-9.72	-	-	209	193	H
* 4.824	43.81	PK2	34.3	-31.6	0	46.51	-	-	74	-27.49	226	221	V
* 4.824	40.66	MAv1	34.3	-31.6	0	43.36	54	-10.64	-	-	226	221	V
* 8.329	31.25	PK2	35.7	-27.7	0	39.25	-	-	74	-34.75	226	200	V
* 8.327	27.52	MAv1	35.7	-27.8	0	35.42	54	-18.58	-	-	226	200	V
* 8.244	31.82	PK2	35.7	-28.5	0	39.02	-	-	74	-34.98	231	178	V
* 8.244	28.18	MAv1	35.7	-28.5	0	35.38	54	-18.62	-	-	231	178	V

MID CHANNEL HORIZONTAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

MID CHANNEL VERTICAL

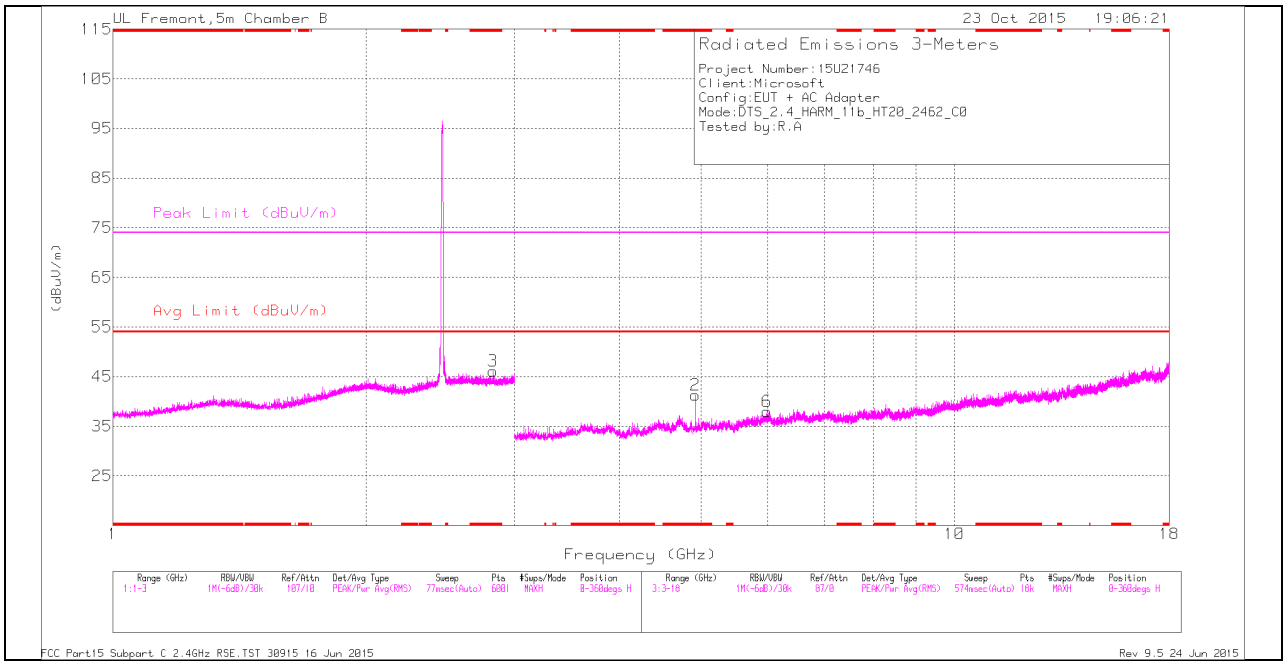


Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

MID CHANNEL DATA

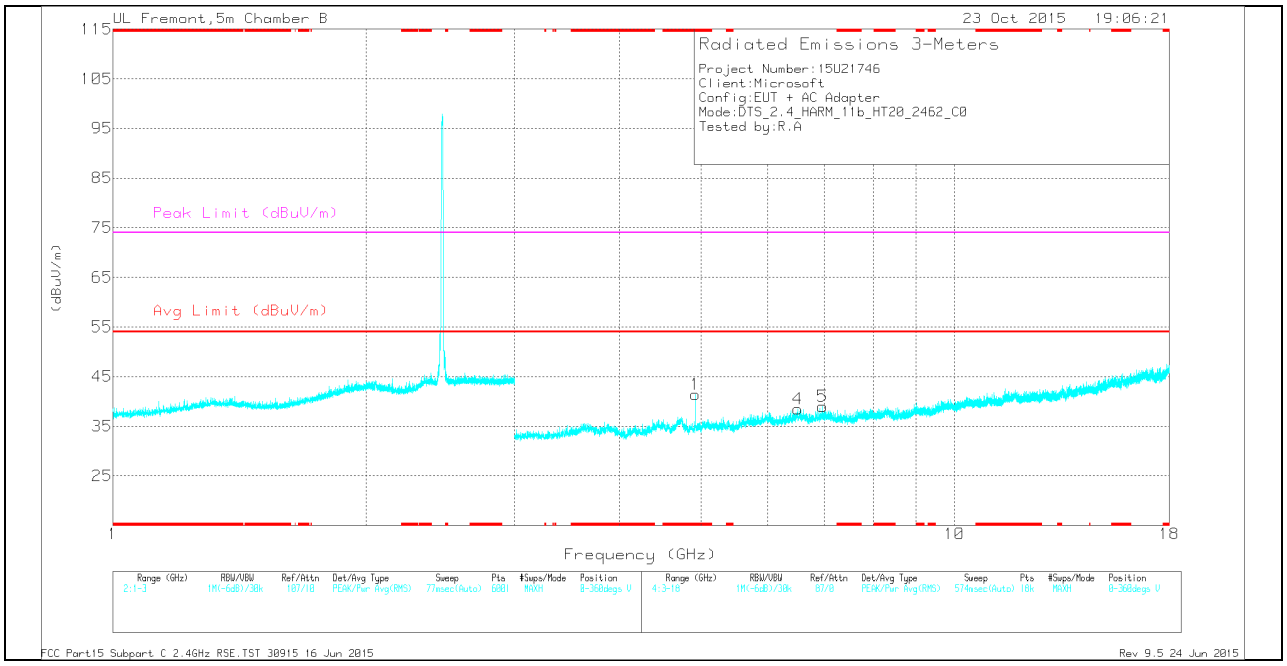
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.874	43.9	PK2	34.2	-32.4	0	45.7	-	-	74	-28.3	231	200	H
* 4.874	40.5	MAv1	34.2	-32.4	0	42.3	54	-11.7	-	-	231	200	H
* 3.731	33.87	PK2	33.5	-32.9	0	34.47	-	-	74	-39.53	223	199	H
* 3.732	30.35	MAv1	33.5	-32.9	0	30.95	54	-23.05	-	-	223	199	H
* 4.718	34.06	PK2	34.2	-31	0	37.26	-	-	74	-36.74	174	192	H
* 4.718	30.53	MAv1	34.2	-31	0	33.73	54	-20.27	-	-	174	192	H
* 4.874	42.56	PK2	34.2	-32.4	0	44.36	-	-	74	-29.64	229	210	V
* 4.874	38.63	MAv1	34.2	-32.4	0	40.43	54	-13.57	-	-	229	210	V
* 3.866	34.15	PK2	33.4	-31.7	0	35.85	-	-	74	-38.15	164	207	V
* 3.866	30.62	MAv1	33.4	-31.7	0	32.32	54	-21.68	-	-	164	207	V
2.547	36.11	PK2	32.6	-23.9	0	44.81	-	-	-	-	320	202	V

HIGH CHANNEL HORIZONTAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

HIGH CHANNEL VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

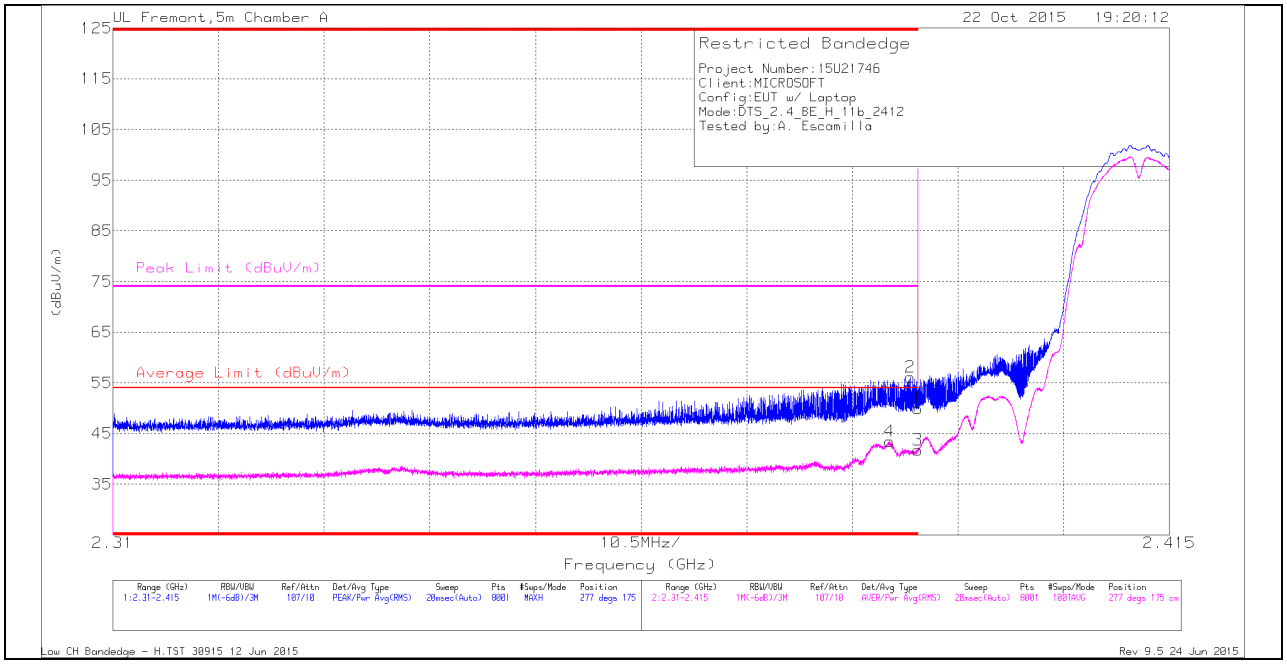
HIGH CHANNEL DATA

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 2.83	36.03	PK2	32.6	-23.7	0	44.93	-	-	74	-29.07	111	199	H
* 2.828	32.09	MAv1	32.6	-23.7	0	40.99	54	-13.01	-	-	111	199	H
* 4.924	43.11	PK2	34.1	-32.5	0	44.71	-	-	74	-29.29	106	222	H
* 4.924	39.24	MAv1	34.1	-32.5	0	40.84	54	-13.16	-	-	106	222	H
* 4.924	43.08	PK2	34.1	-32.5	0	44.68	-	-	74	-29.32	106	222	H
* 4.924	39.26	MAv1	34.1	-32.5	0	40.86	54	-13.14	-	-	106	222	H
* 4.924	42.54	PK2	34.1	-32.5	0	44.14	-	-	74	-29.86	31	297	V
* 4.924	38.57	MAv1	34.1	-32.5	0	40.17	54	-13.83	-	-	31	297	V
5.99	35.18	PK2	35.7	-30.8	0	40.08	-	-	-	-	65	198	H
6.511	32.5	PK2	35.9	-30.1	0	38.3	-	-	-	-	120	203	V
6.972	33.13	PK2	36	-30.8	0	38.33	-	-	-	-	117	188	V

10.2.2. TX ABOVE 1 GHz 802.11b MODE IN THE 2.4 GHz BAND CHAIN 1

RESTRICTED BANDEDGE (LOW CHANNEL)

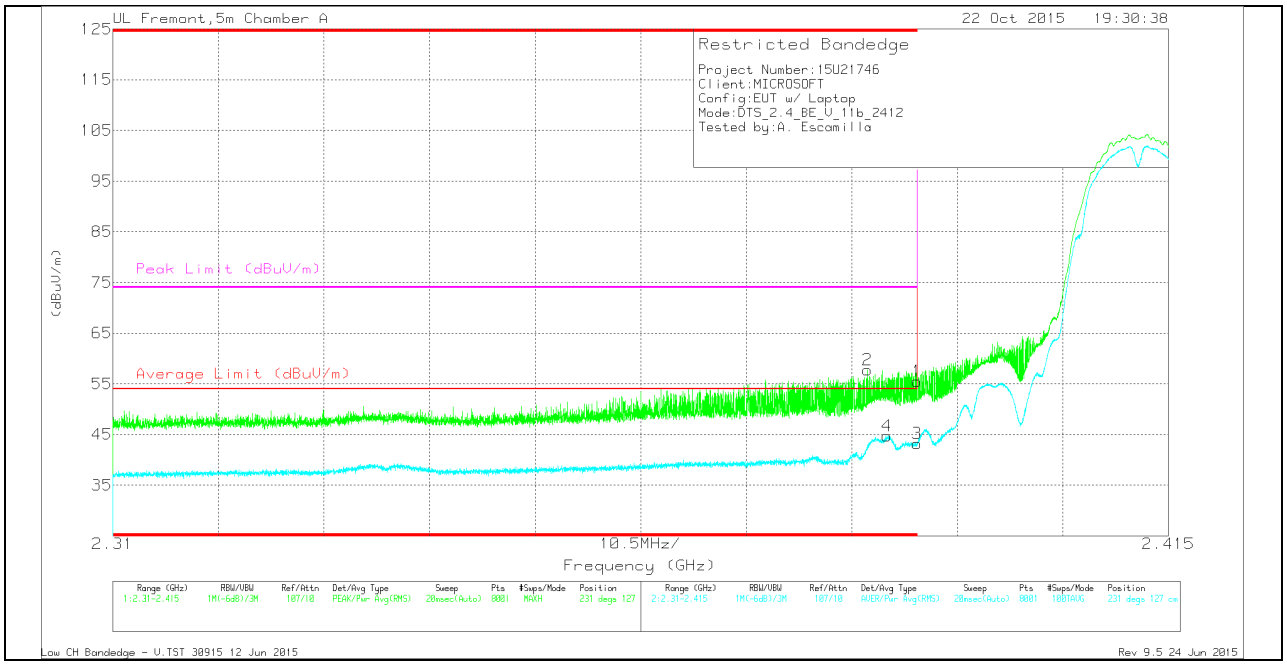
HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (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	38.07	Pk	32	-20.2	0	49.87	-	-	74	-24.13	277	175	H
2	* 2.389	44.19	Pk	32	-20.1	0	56.09	-	-	74	-17.91	277	175	H
3	* 2.39	29.97	RMS	32	-20.2	0	41.77	54	-12.23	-	-	277	175	H
4	* 2.387	31.63	RMS	32	-20.2	0	43.43	54	-10.57	-	-	277	175	H

VERTICAL PEAK AND AVERAGE PLOT

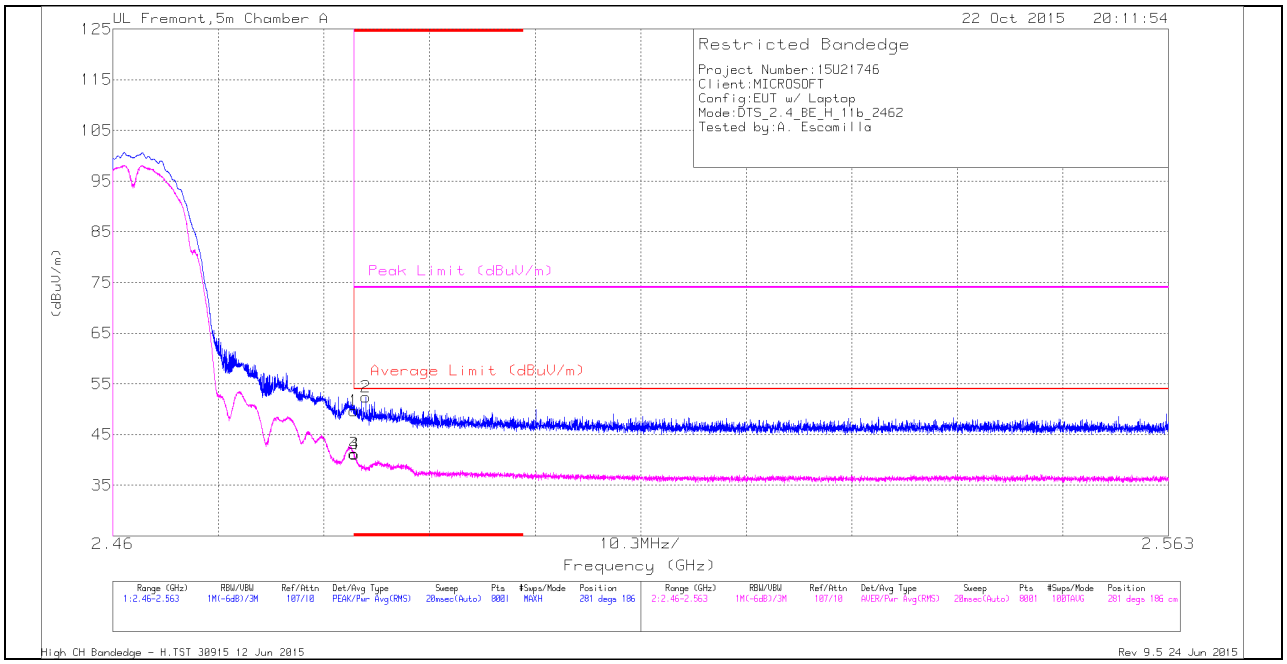


VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/Flt r/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.385	45.95	Pk	32	-20.2	0	57.75	-	-	74	-16.25	231	127	V
4	* 2.387	32.9	RMS	32	-20.2	0	44.7	54	-9.3	-	-	231	127	V
1	* 2.39	43.74	Pk	32	-20.2	0	55.54	-	-	74	-18.46	231	127	V
3	* 2.39	31.42	RMS	32	-20.2	0	43.22	54	-10.78	-	-	231	127	V

AUTHORIZED BANDEDGE (HIGH CHANNEL)

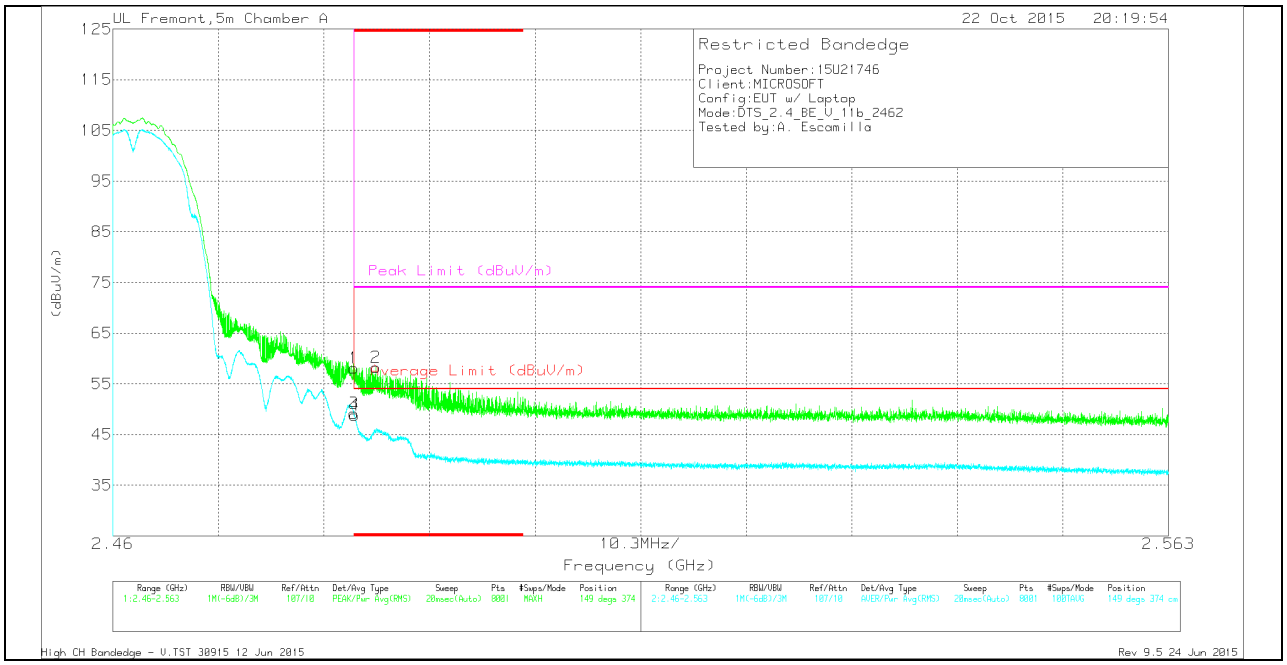
HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/Flt r/Pad (dB)	DC Corr (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	37.82	Pk	32.1	-20.3	0	49.62	-	-	74	-24.38	281	186	H
3	* 2.484	29.43	RMS	32.1	-20.3	0	41.23	54	-12.77	-	-	281	186	H
4	* 2.484	29.26	RMS	32.1	-20.3	0	41.06	54	-12.94	-	-	281	186	H
2	* 2.485	40.61	Pk	32.1	-20.3	0	52.41	-	-	74	-21.59	281	186	H

VERTICAL PEAK AND AVERAGE PLOT

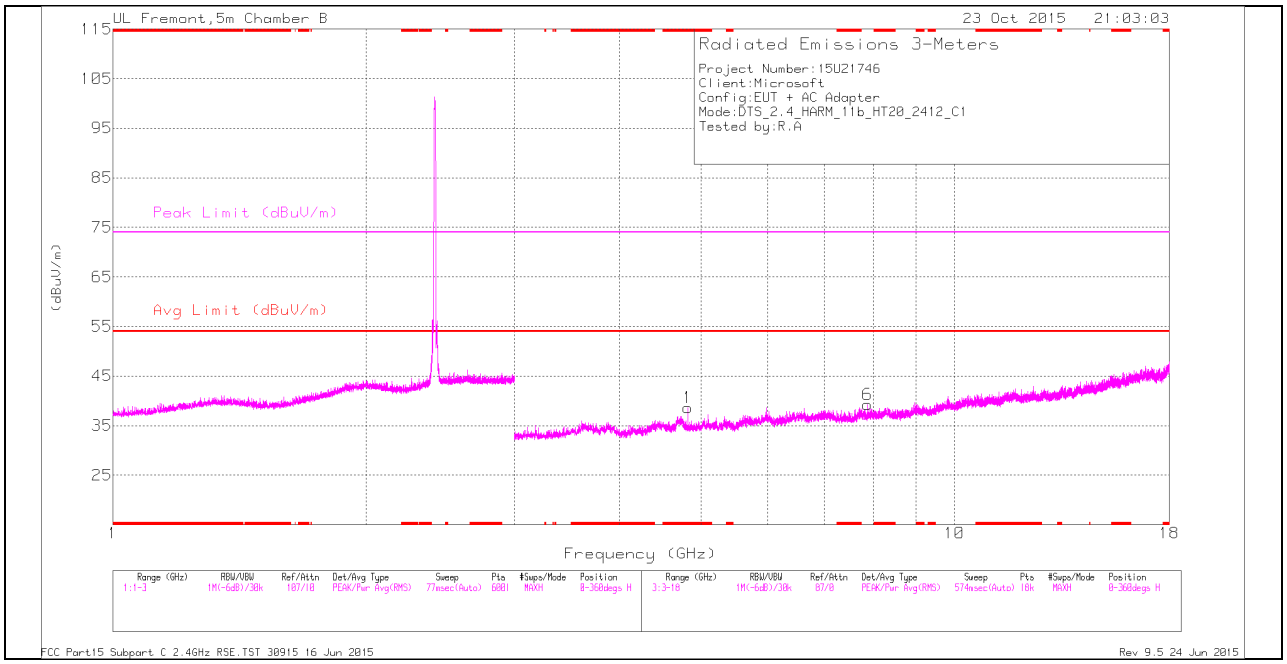


VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (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	46.3	Pk	32.1	-20.3	0	58.1	-	-	74	-15.9	149	374	V
3	* 2.484	37.32	RMS	32.1	-20.3	0	49.12	54	-4.88	-	-	149	374	V
4	* 2.484	36.98	RMS	32.1	-20.3	0	48.78	54	-5.22	-	-	149	374	V
2	* 2.486	46.47	Pk	32.1	-20.3	0	58.27	-	-	74	-15.73	149	374	V

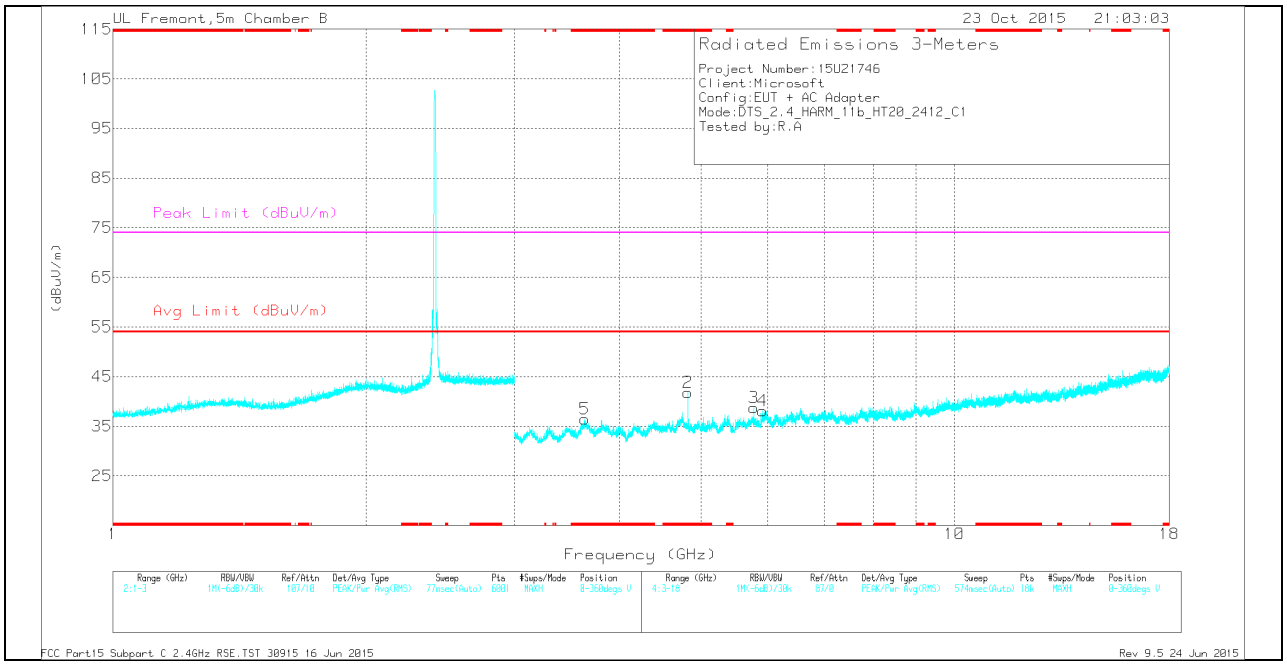
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

LOW CHANNEL VERTICAL

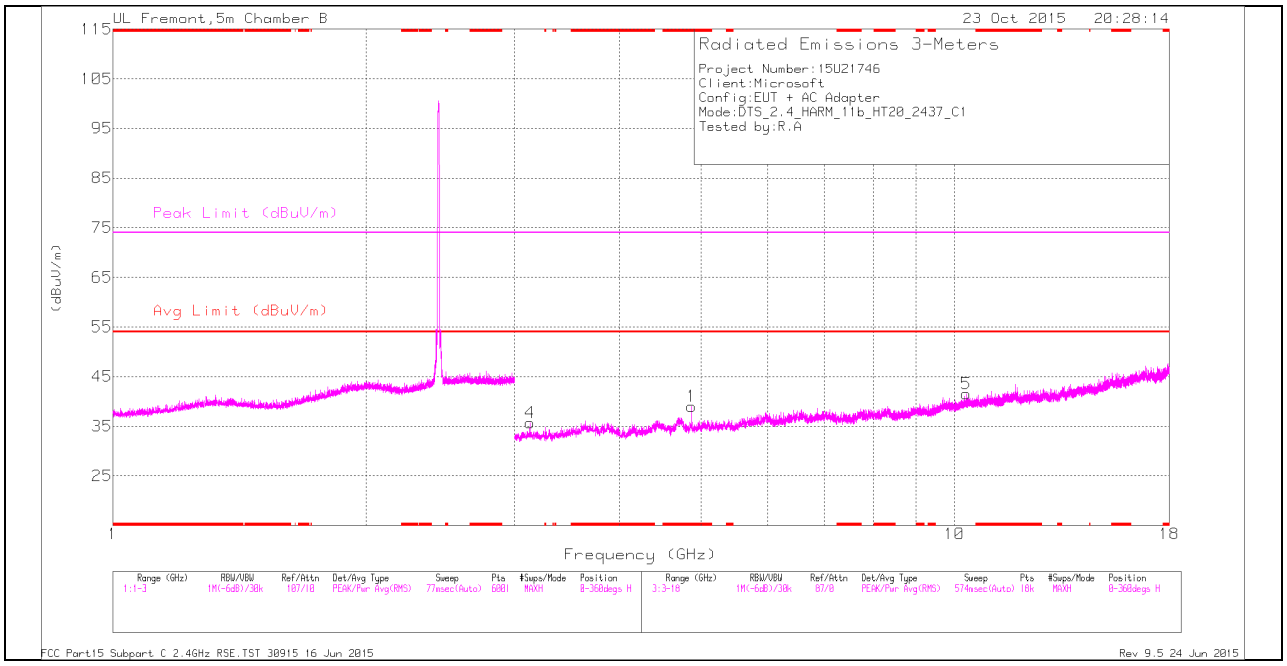


Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

LOW CHANNEL DATA

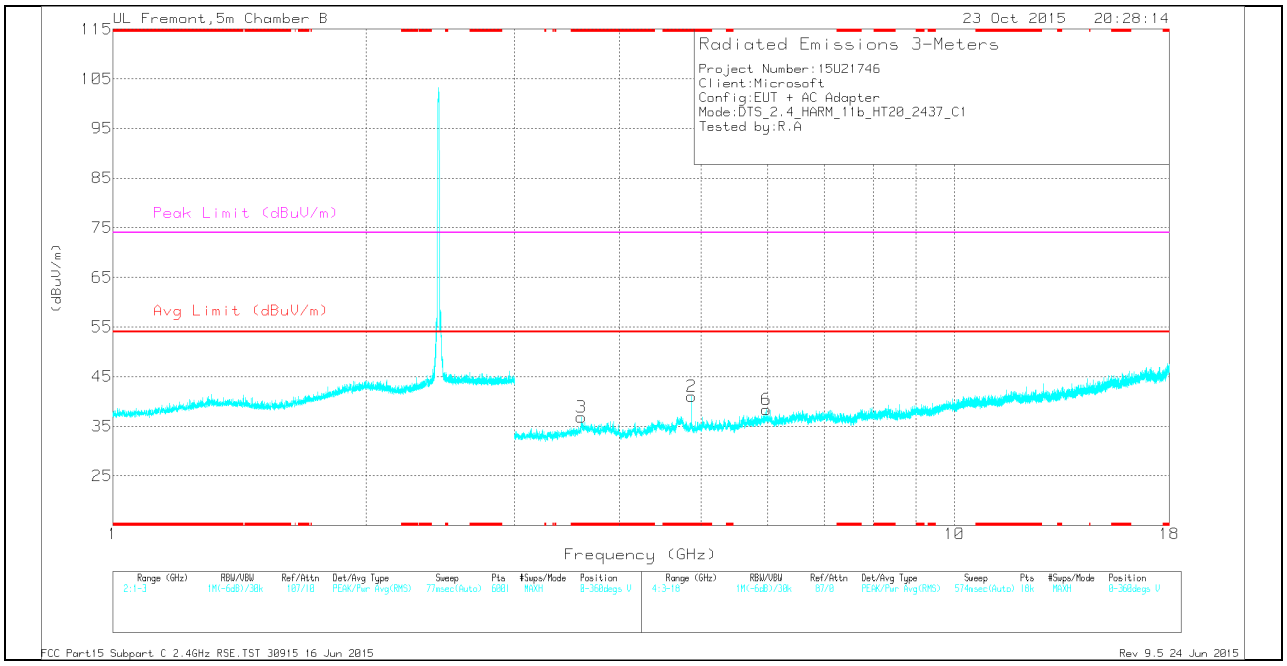
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.824	39.99	PK2	34.3	-31.6	0	42.69	-	-	74	-31.31	280	149	H
* 4.824	35.37	MAv1	34.3	-31.6	0	38.07	54	-15.93	-	-	280	149	H
* 4.824	41.59	PK2	34.3	-31.6	0	44.29	-	-	74	-29.71	21	198	V
* 4.824	37.71	MAv1	34.3	-31.6	0	40.41	54	-13.59	-	-	21	198	V
* 3.639	34.95	PK2	33.8	-32.7	0	36.05	-	-	74	-37.95	31	208	V
* 3.641	31.03	MAv1	33.7	-32.7	0	32.03	54	-21.97	-	-	31	208	V
5.778	34.15	PK2	35.1	-32	0	37.25	-	-	-	-	35	184	V
5.914	33.45	PK2	35.5	-30.9	0	38.05	-	-	-	-	22	205	V
7.884	32.18	PK2	35.6	-29.3	0	38.48	-	-	-	-	89	200	H

MID CHANNEL HORIZONTAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

MID CHANNEL VERTICAL

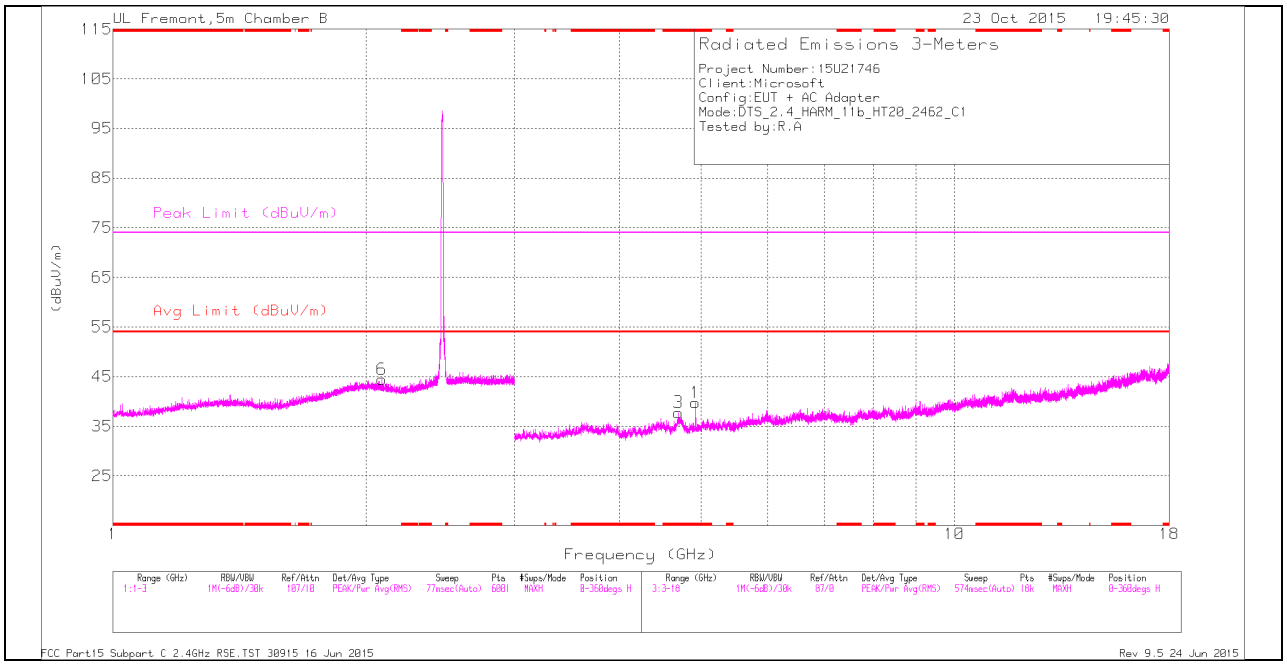


Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

MID CHANNEL DATA

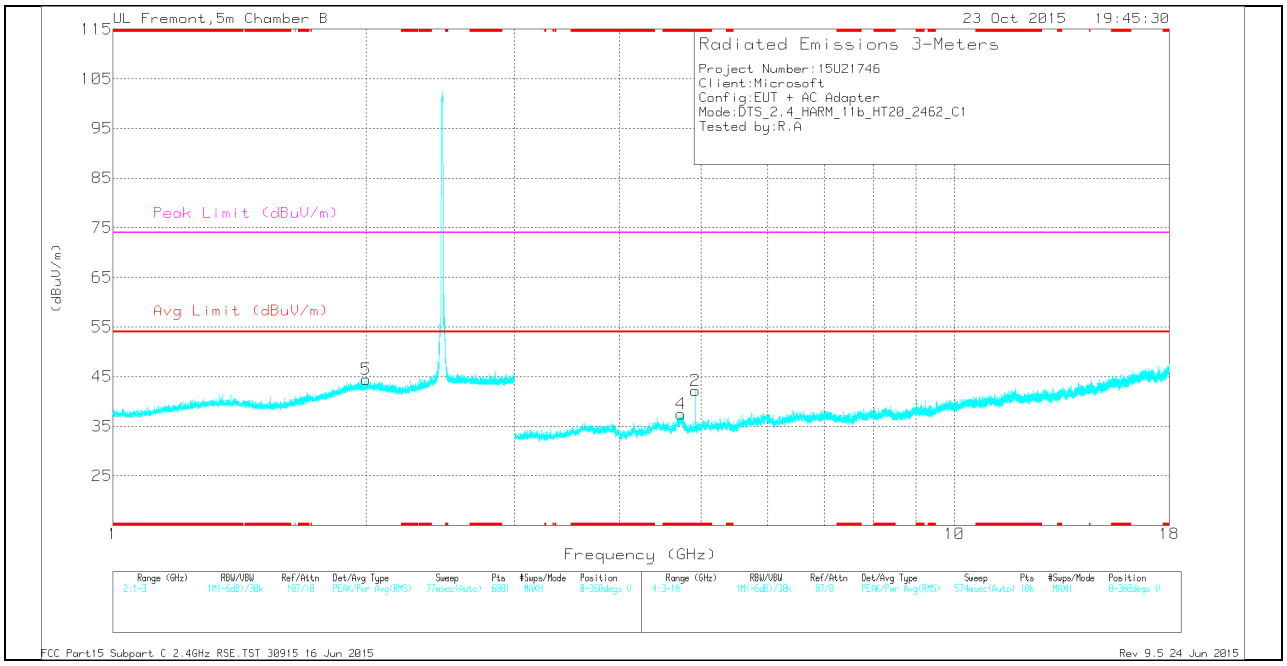
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.874	39.96	PK2	34.2	-32.4	0	41.76	-	-	74	-32.24	252	281	H
* 4.874	34.7	MAv1	34.2	-32.4	0	36.5	54	-17.5	-	-	252	281	H
* 4.874	42.59	PK2	34.2	-32.4	0	44.39	-	-	74	-29.61	16	280	V
* 4.874	38.62	MAv1	34.2	-32.4	0	40.42	54	-13.58	-	-	16	280	V
* 3.602	34.38	PK2	33.8	-32.8	0	35.38	-	-	74	-38.62	25	259	V
* 3.602	30.76	MAv1	33.8	-32.8	0	31.76	54	-22.24	-	-	25	259	V
3.132	34.01	PK2	32.6	-32.4	0	34.21	-	-	-	-	102	199	H
5.981	32.9	PK2	35.6	-30.7	0	37.8	-	-	-	-	114	205	V
10.33	29.02	PK2	37.4	-25.3	0	41.12	-	-	-	-	106	202	H

HIGH CHANNEL HORIZONTAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

HIGH CHANNEL VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

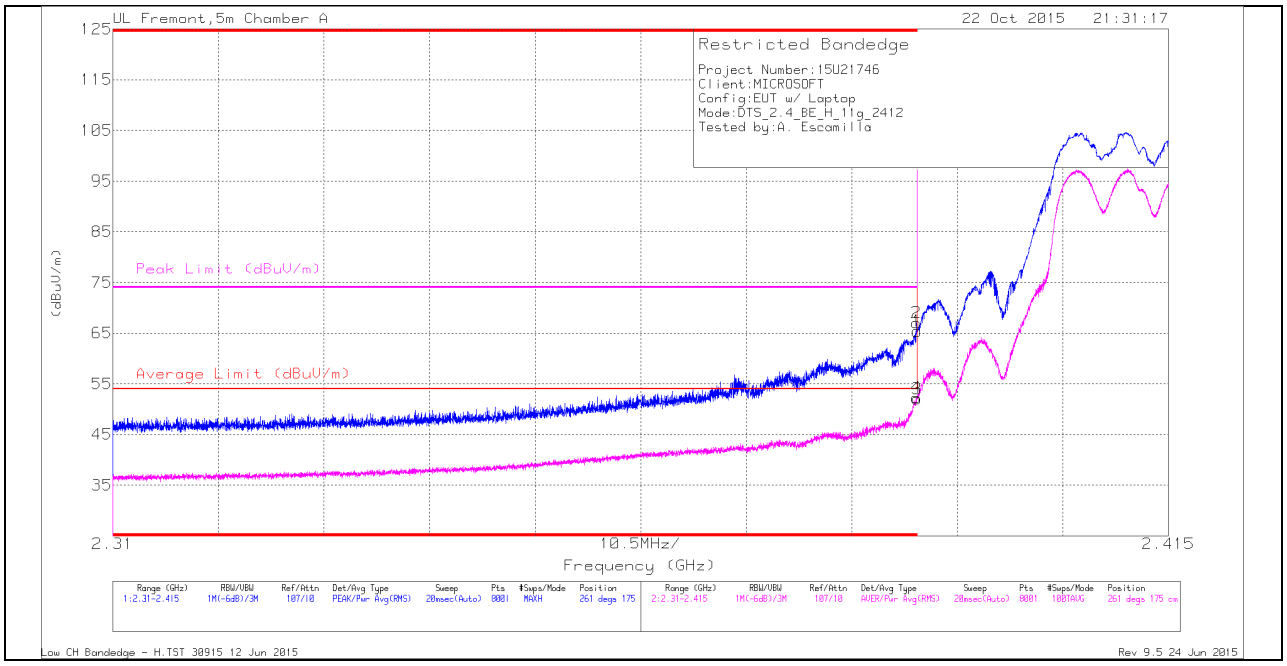
HIGH CHANNEL DATA

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.924	41.4	PK2	34.1	-32.5	0	43	-	-	74	-31	214	103	H
* 4.924	36.7	MAv1	34.1	-32.5	0	38.3	54	-15.7	-	-	214	103	H
* 4.698	37.16	PK2	34.2	-31.6	0	39.76	-	-	74	-34.24	255	281	H
* 4.698	30.4	MAv1	34.2	-31.6	0	33	54	-21	-	-	255	281	H
* 4.924	43.29	PK2	34.1	-32.5	0	44.89	-	-	74	-29.11	21	175	V
* 4.924	39.51	MAv1	34.1	-32.5	0	41.11	54	-12.89	-	-	21	175	V
* 4.729	34.09	PK2	34.3	-30.7	0	37.69	-	-	74	-36.31	151	244	V
* 4.729	30.71	MAv1	34.3	-30.7	0	34.31	54	-19.69	-	-	151	244	V
2	36.43	PK2	32.3	-24.5	0	44.23	-	-	-	-	155	203	V
2.086	36.2	PK2	31.9	-24.4	0	43.7	-	-	-	-	169	193	H

10.2.3. TX ABOVE 1 GHz 802.11g MODE IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL)

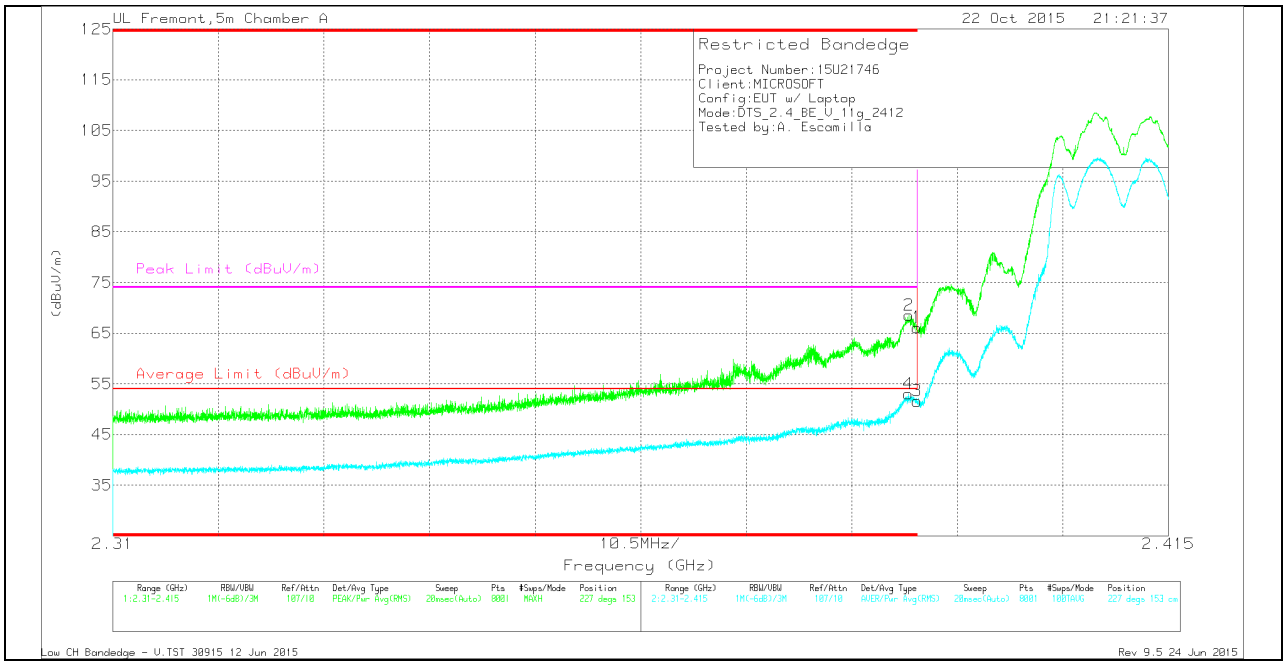
HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (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	53.58	Pk	32	-20.2	0	65.38	-	-	74	-8.62	261	175	H
2	* 2.39	55.28	Pk	32	-20.2	0	67.08	-	-	74	-6.92	261	175	H
3	* 2.39	40.26	RMS	32	-20.2	0	52.06	54	-1.94	-	-	261	175	H
4	* 2.39	40.43	RMS	32	-20.2	0	52.23	54	-1.77	-	-	261	175	H

VERTICAL PEAK AND AVERAGE PLOT

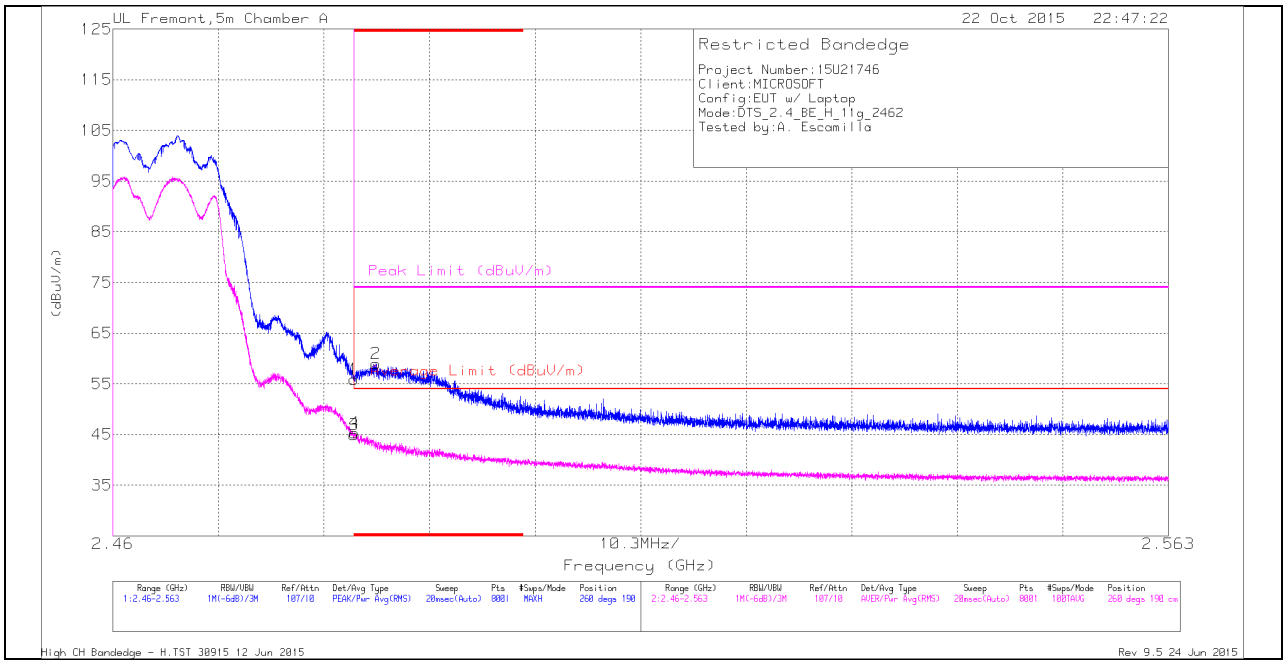


VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.389	56.6	Pk	32	-20.1	0	68.5	-	-	74	-5.5	227	153	V
4	* 2.389	41.09	RMS	32	-20.1	0	52.99	54	-1.01	-	-	227	153	V
1	* 2.39	54.32	Pk	32	-20.2	0	66.12	-	-	74	-7.88	227	153	V
3	* 2.39	39.8	RMS	32	-20.2	0	51.6	54	-2.4	-	-	227	153	V

AUTHORIZED BANDEDGE (HIGH CHANNEL)

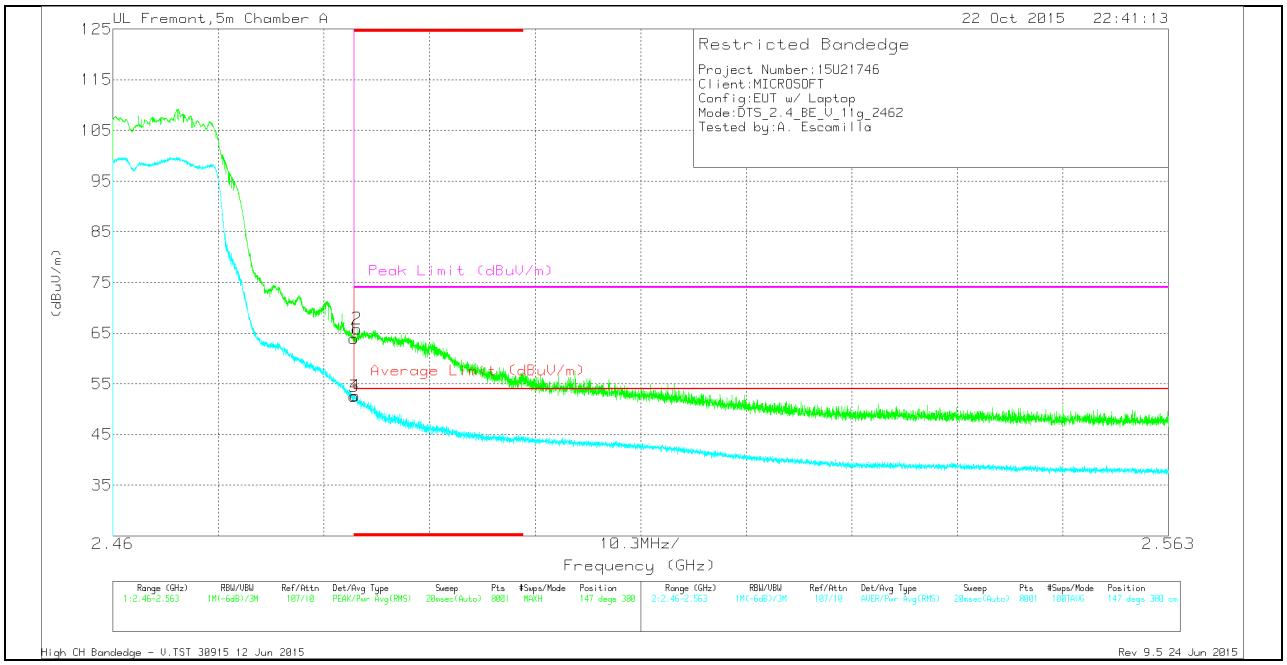
HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/Flt r/Pad (dB)	DC Corr (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	44.12	Pk	32.1	-20.3	0	55.92	-	-	74	-18.08	260	190	H
3	* 2.484	33.16	RMS	32.1	-20.3	0	44.96	54	-9.04	-	-	260	190	H
4	* 2.484	33.47	RMS	32.1	-20.3	0	45.27	54	-8.73	-	-	260	190	H
2	* 2.486	47.15	Pk	32.1	-20.3	0	58.95	-	-	74	-15.05	260	190	H

VERTICAL PEAK AND AVERAGE PLOT

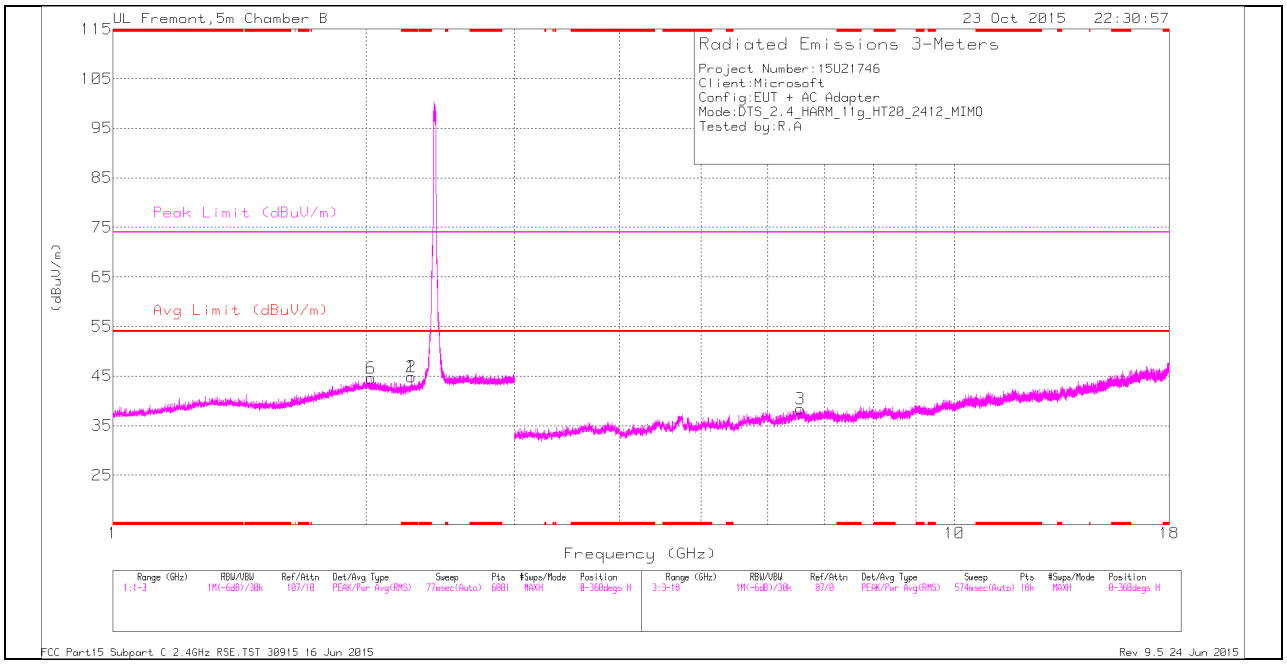


VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/Flt r/Pad (dB)	DC Corr (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	52.11	Pk	32.1	-20.3	0	63.91	-	-	74	-10.09	147	380	V
2	* 2.484	54.07	Pk	32.1	-20.3	0	65.87	-	-	74	-8.13	147	380	V
3	* 2.484	40.78	RMS	32.1	-20.3	0	52.58	54	-1.42	-	-	147	380	V
4	* 2.484	40.9	RMS	32.1	-20.3	0	52.7	54	-1.3	-	-	147	380	V

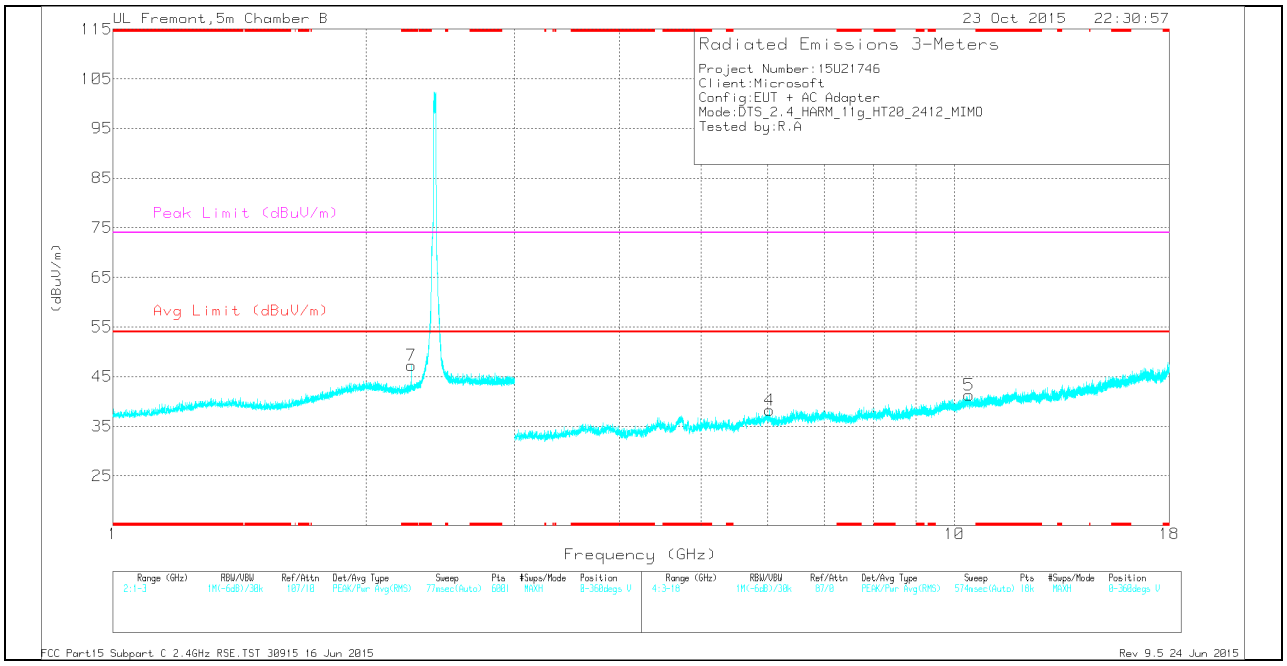
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

LOW CHANNEL VERTICAL

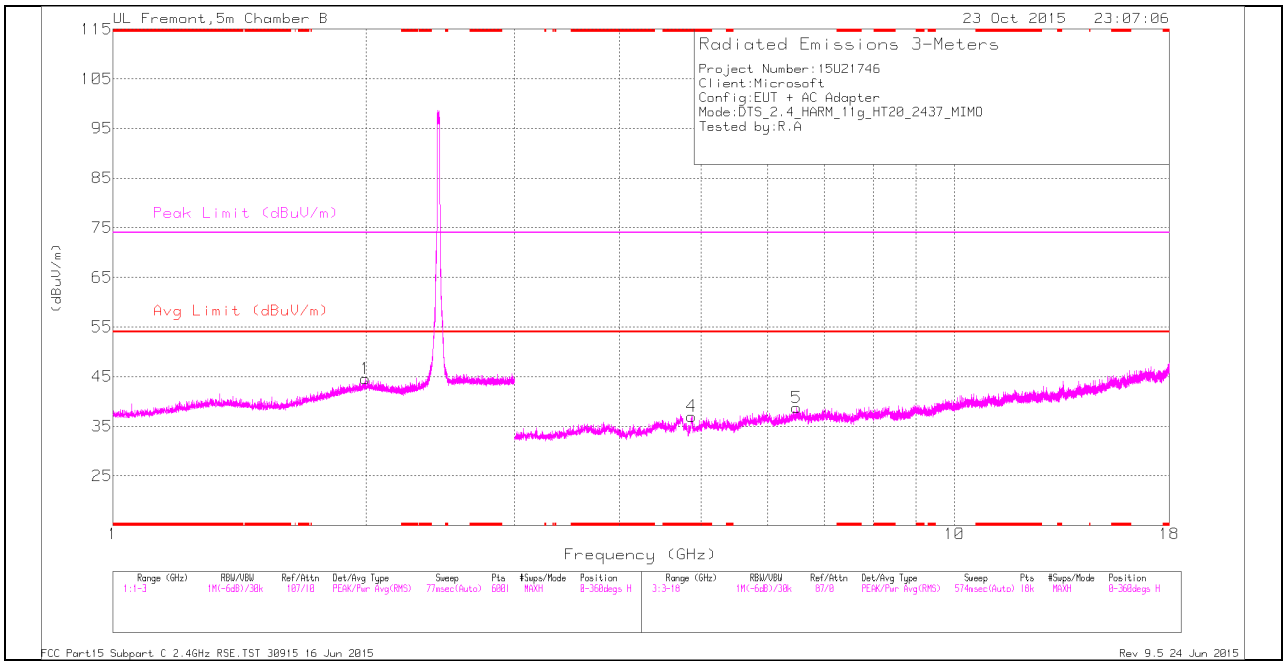


Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

LOW CHANNEL DATA

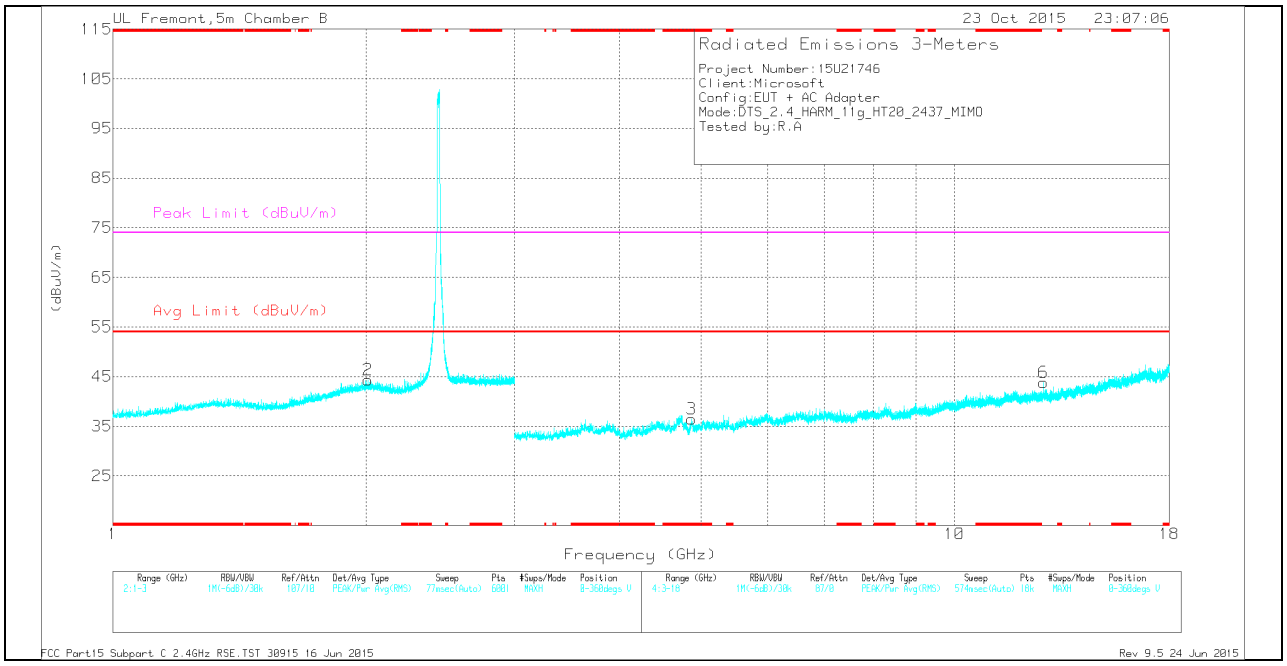
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 2.261	40.73	PK2	31.4	-24.3	0	47.83	-	-	74	-26.17	209	105	H
* 2.261	34.85	MAv1	31.4	-24.3	0	41.95	54	-12.05	-	-	209	105	H
* 2.261	39.03	PK2	31.4	-24.3	0	46.13	-	-	74	-27.87	209	105	H
* 2.261	35.64	MAv1	31.4	-24.3	0	42.74	54	-11.26	-	-	209	105	H
* 2.261	43.95	PK2	31.4	-24.3	0	51.05	-	-	74	-22.95	236	124	V
* 2.261	39.6	MAv1	31.4	-24.3	0	46.7	54	-7.3	-	-	236	124	V
2.028	36.22	PK2	32.2	-24.4	0	44.02	-	-	-	-	214	109	H
6.029	33.33	PK2	35.6	-31.3	0	37.63	-	-	-	-	161	200	V
6.555	33.37	PK2	35.9	-30.4	0	38.87	-	-	-	-	188	205	H
10.407	28.84	PK2	37.4	-25.4	0	40.84	-	-	-	-	220	187	V

MID CHANNEL HORIZONTAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

MID CHANNEL VERTICAL

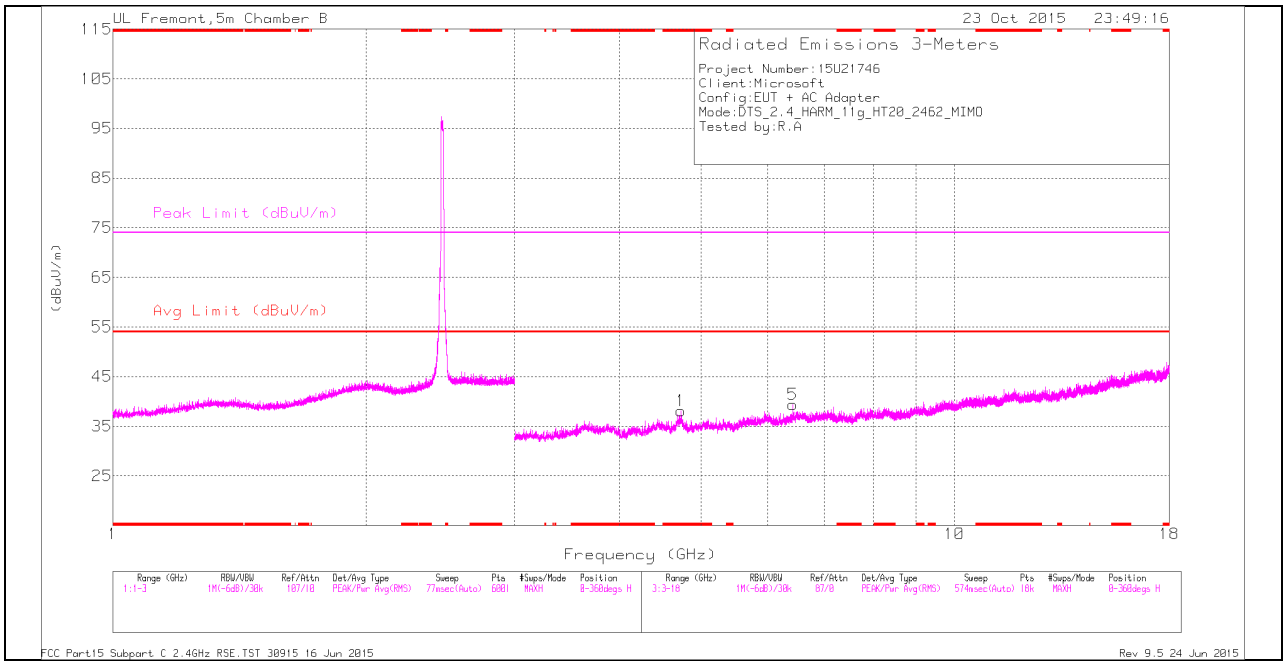


Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

MID CHANNEL DATA

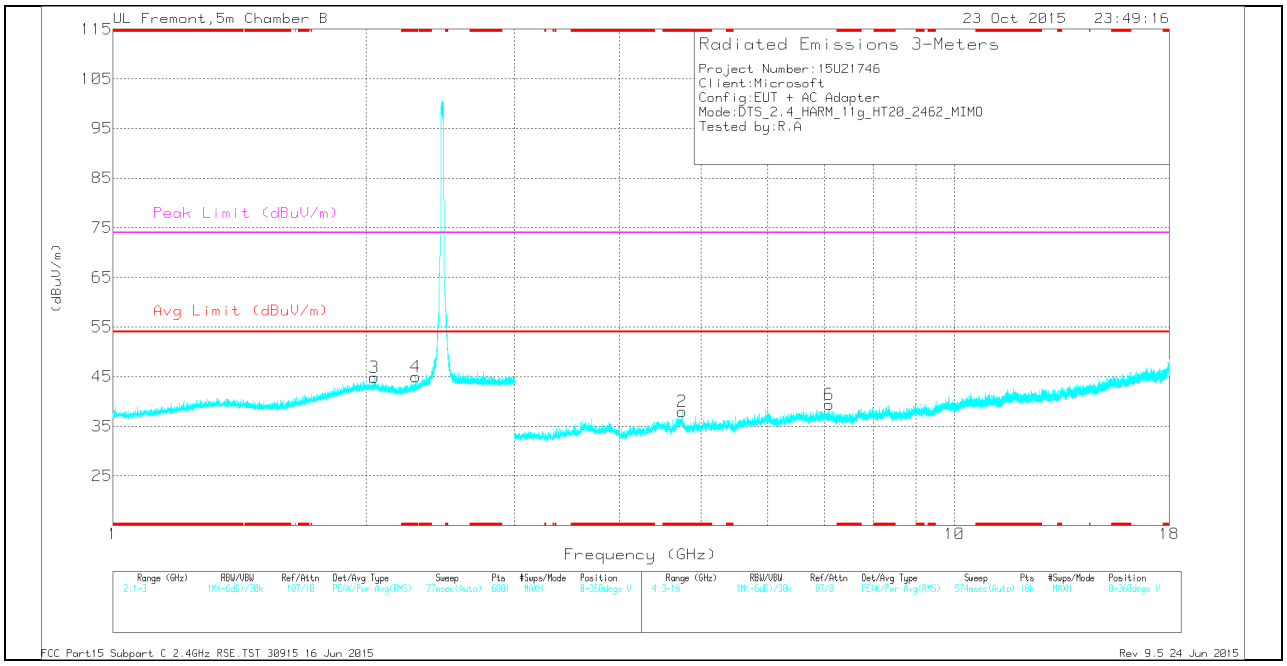
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.871	38.59	PK2	34.2	-32.4	0	40.39	-	-	74	-33.61	282	227	H
* 4.871	32.13	MAv1	34.2	-32.4	0	33.93	54	-20.07	-	-	282	227	H
* 4.873	38.16	PK2	34.2	-32.4	0	39.96	-	-	74	-34.04	59	157	V
* 4.873	31.46	MAv1	34.2	-32.4	0	33.26	54	-20.74	-	-	59	157	V
1.997	36.15	PK2	32.3	-24.5	0	43.95	-	-	-	-	285	221	H
2.01	36.27	PK2	32.3	-24.5	0	44.07	-	-	-	-	276	200	V
6.496	33.3	PK2	35.8	-30.3	0	38.8	-	-	-	-	250	193	H
12.751	28.16	PK2	38.7	-24.1	0	42.76	-	-	-	-	187	250	V

HIGH CHANNEL HORIZONTAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

HIGH CHANNEL VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

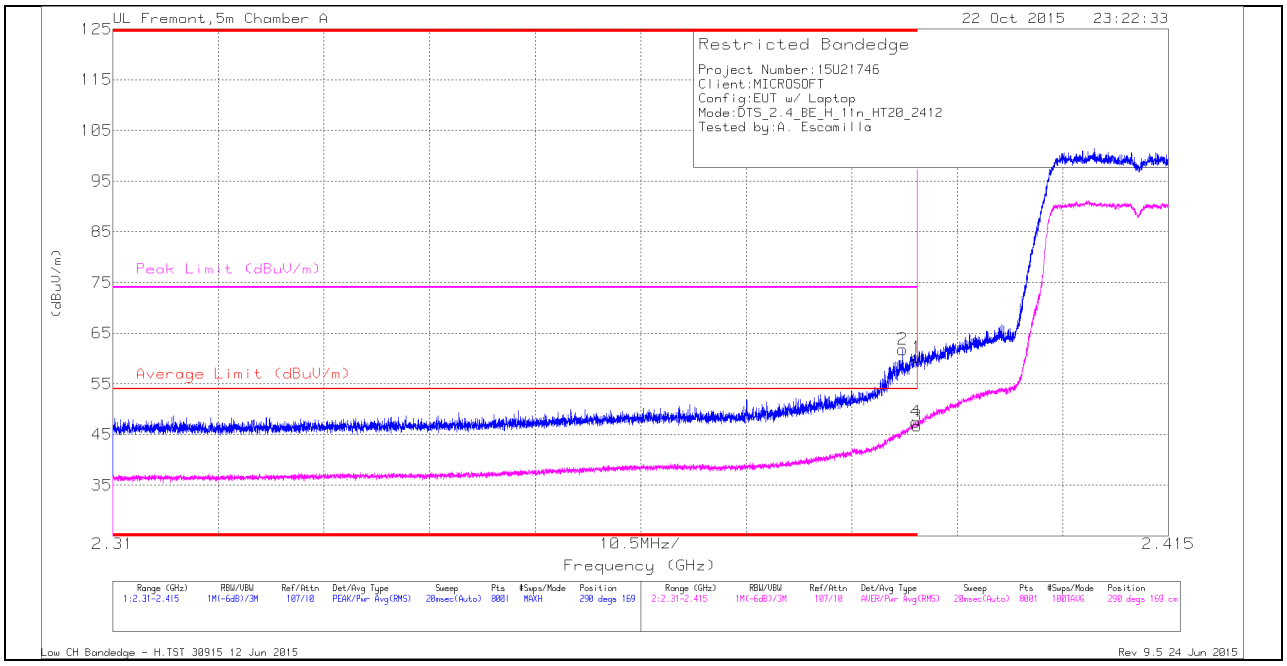
HIGH CHANNEL DATA

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 2.291	38.84	PK2	31.5	-24.3	0	46.04	-	-	74	-27.96	25	252	V
* 2.29	32.27	MAv1	31.5	-24.3	0	39.47	54	-14.53	-	-	25	252	V
* 4.729	36.78	PK2	34.3	-30.7	0	40.38	-	-	74	-33.62	308	253	H
* 4.728	29.99	MAv1	34.3	-30.8	0	33.49	54	-20.51	-	-	308	253	H
* 4.744	36.94	PK2	34.3	-30.7	0	40.54	-	-	74	-33.46	291	303	V
* 4.744	30.27	MAv1	34.3	-30.7	0	33.87	54	-20.13	-	-	291	303	V
2.045	36.36	PK2	32.1	-24.5	0	43.96	-	-	-	-	265	203	V
6.427	33.64	PK2	35.7	-31	0	38.34	-	-	-	-	250	197	H
7.092	32.47	PK2	35.6	-29.5	0	38.57	-	-	-	-	242	205	V

10.2.4. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL)

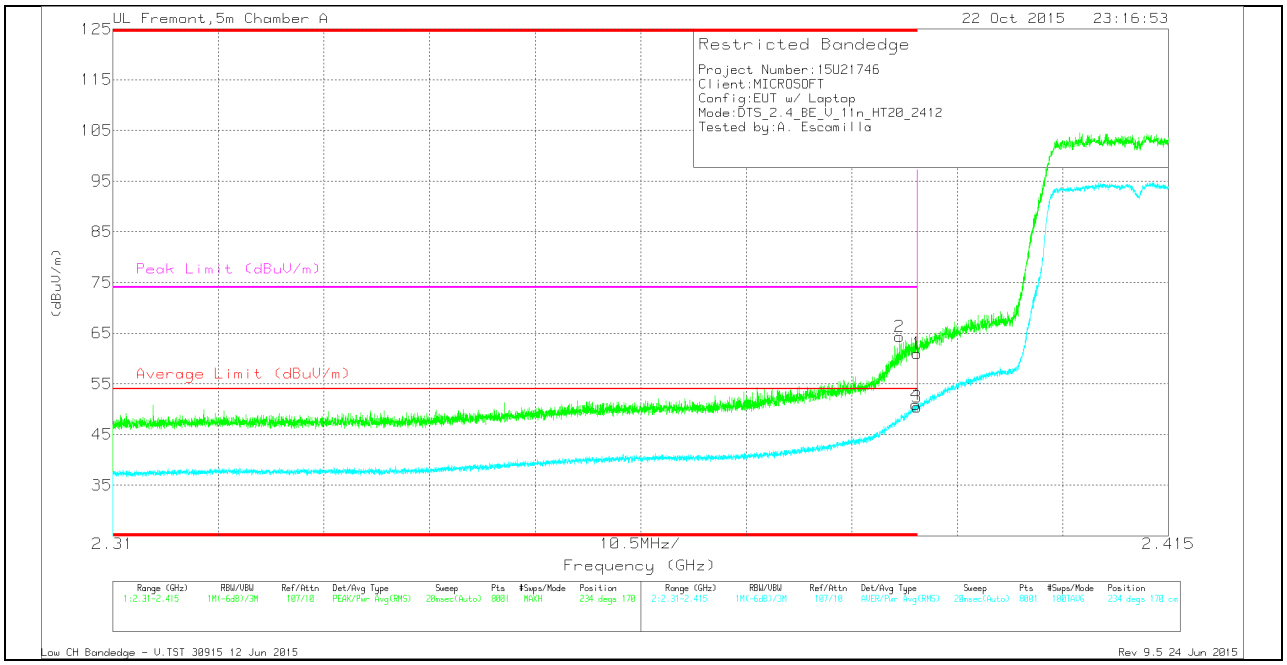
HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/Flt r/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.389	49.88	Pk	32	-20.1	0	61.78	-	-	74	-12.22	290	169	H
1	* 2.39	48.48	Pk	32	-20.2	0	60.28	-	-	74	-13.72	290	169	H
3	* 2.39	34.74	RMS	32	-20.2	.11	46.65	54	-7.35	-	-	290	169	H
4	* 2.39	35.59	RMS	32	-20.2	.11	47.5	54	-6.5	-	-	290	169	H

VERTICAL PEAK AND AVERAGE PLOT

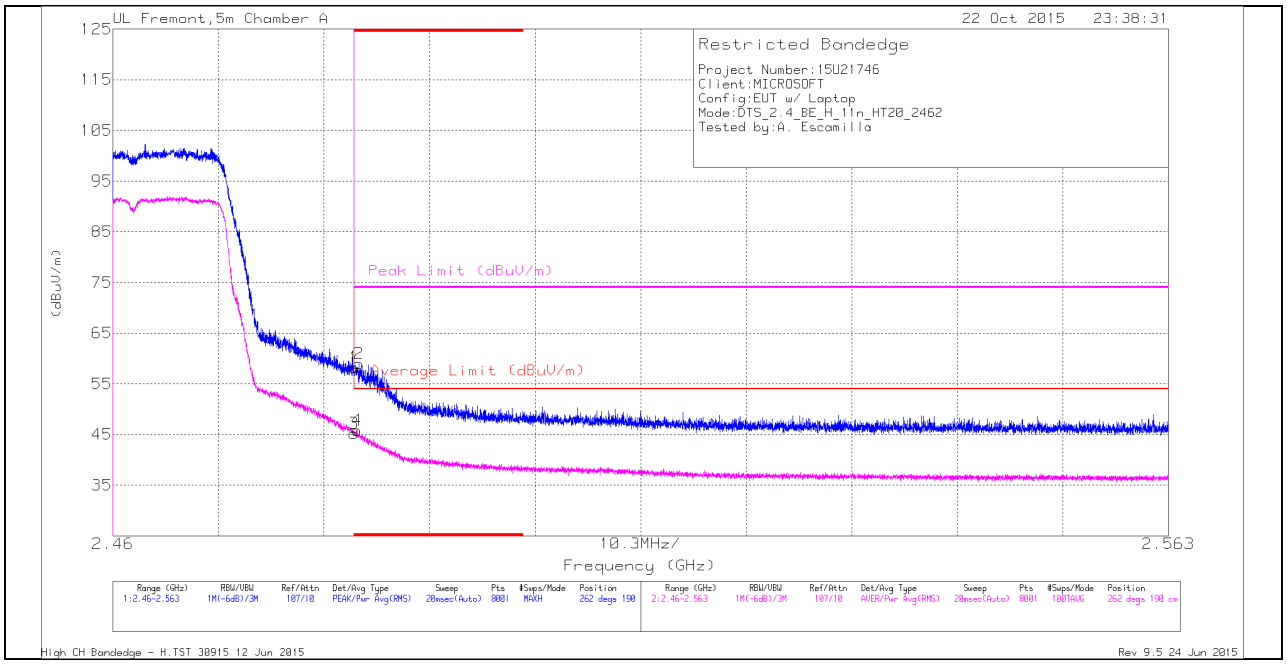


VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.388	52.56	Pk	32	-20.2	0	64.36	-	-	74	-9.64	234	170	V
1	* 2.39	49.23	Pk	32	-20.2	0	61.03	-	-	74	-12.97	234	170	V
3	* 2.39	38.5	RMS	32	-20.2	.11	50.41	54	-3.59	-	-	234	170	V
4	* 2.39	39.01	RMS	32	-20.2	.11	50.92	54	-3.08	-	-	234	170	V

AUTHORIZED BANDEDGE (HIGH CHANNEL)

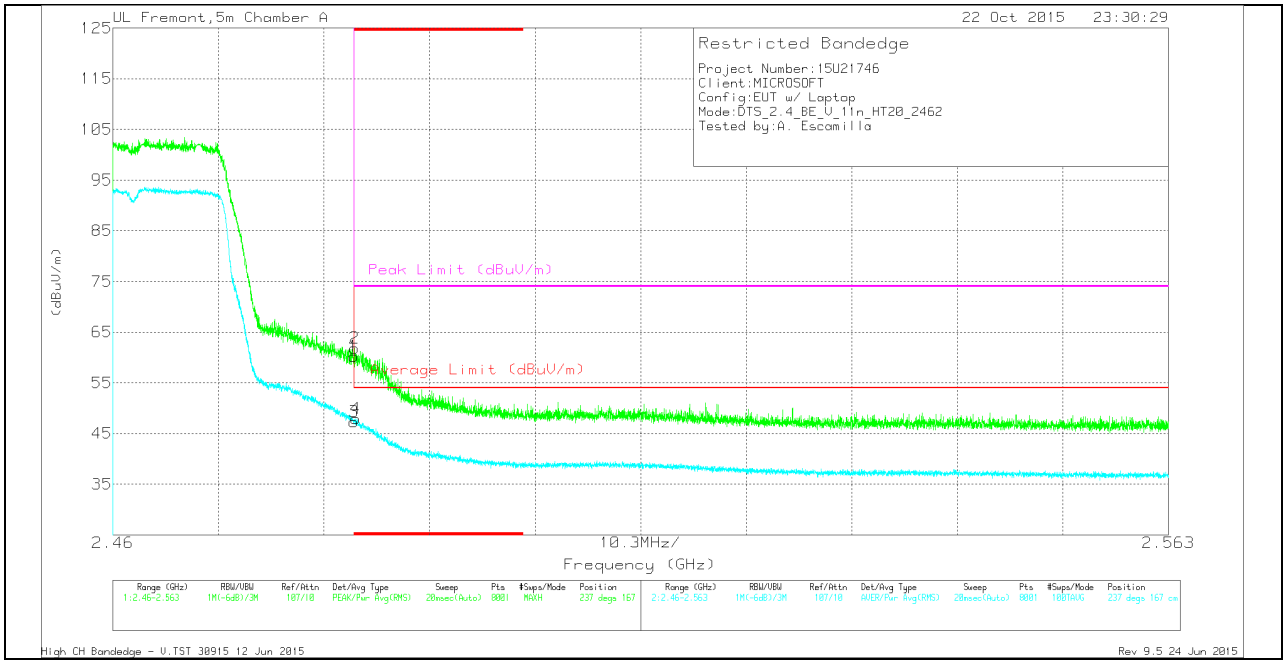
HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/Flt r/Pad (dB)	DC Corr (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	46.48	Pk	32.1	-20.3	0	58.28	-	-	74	-15.72	262	190	H
2	* 2.484	47.2	Pk	32.1	-20.3	0	59	-	-	74	-15	262	190	H
3	* 2.484	33.29	RMS	32.1	-20.3	.11	45.2	54	-8.8	-	-	262	190	H
4	* 2.484	33.92	RMS	32.1	-20.3	.11	45.83	54	-8.17	-	-	262	190	H

VERTICAL PEAK AND AVERAGE PLOT

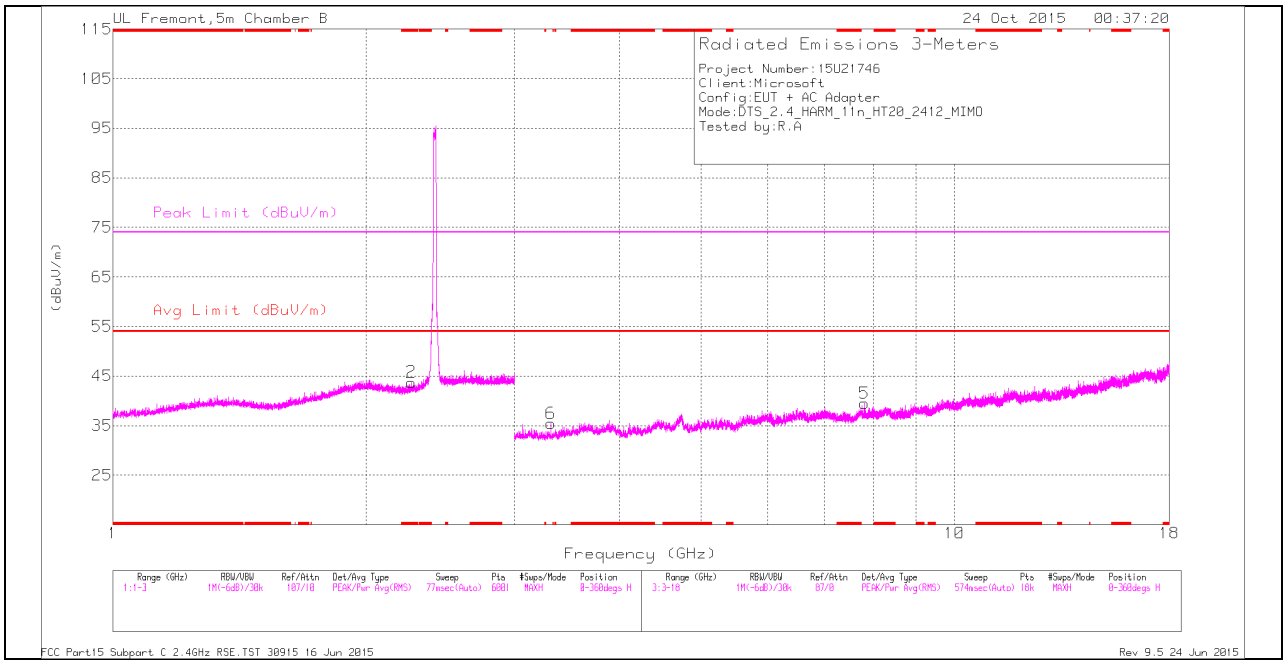


VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/Flt r/Pad (dB)	DC Corr (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	48.4	Pk	32.1	-20.3	0	60.2	-	-	74	-13.8	237	167	V
2	* 2.484	50.09	Pk	32.1	-20.3	0	61.89	-	-	74	-12.11	237	167	V
3	* 2.484	35.42	RMS	32.1	-20.3	.11	47.33	54	-6.67	-	-	237	167	V
4	* 2.484	36.05	RMS	32.1	-20.3	.11	47.96	54	-6.04	-	-	237	167	V

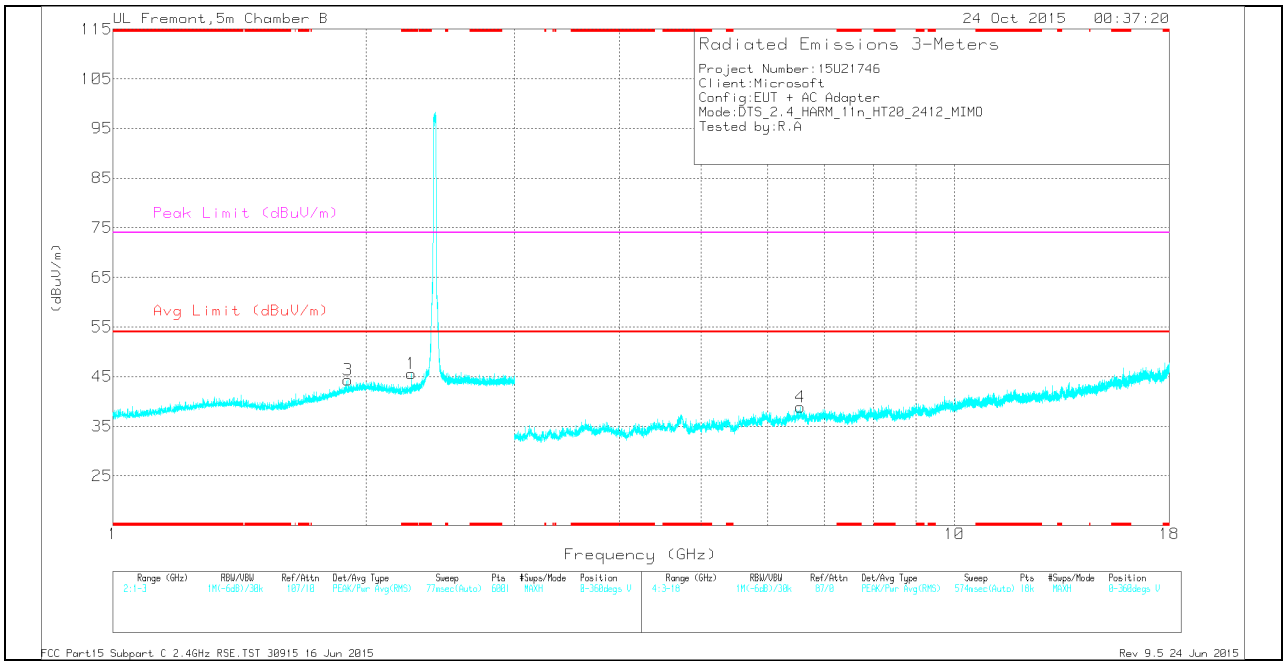
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

LOW CHANNEL VERTICAL

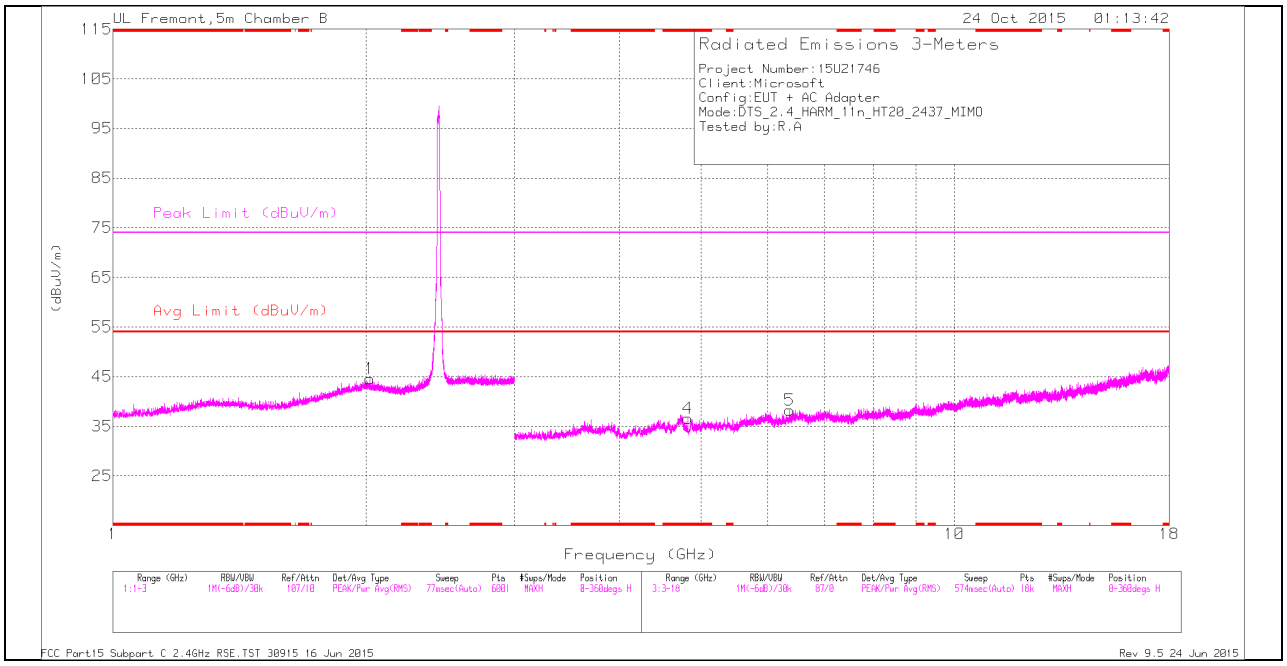


Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

LOW CHANNEL DATA

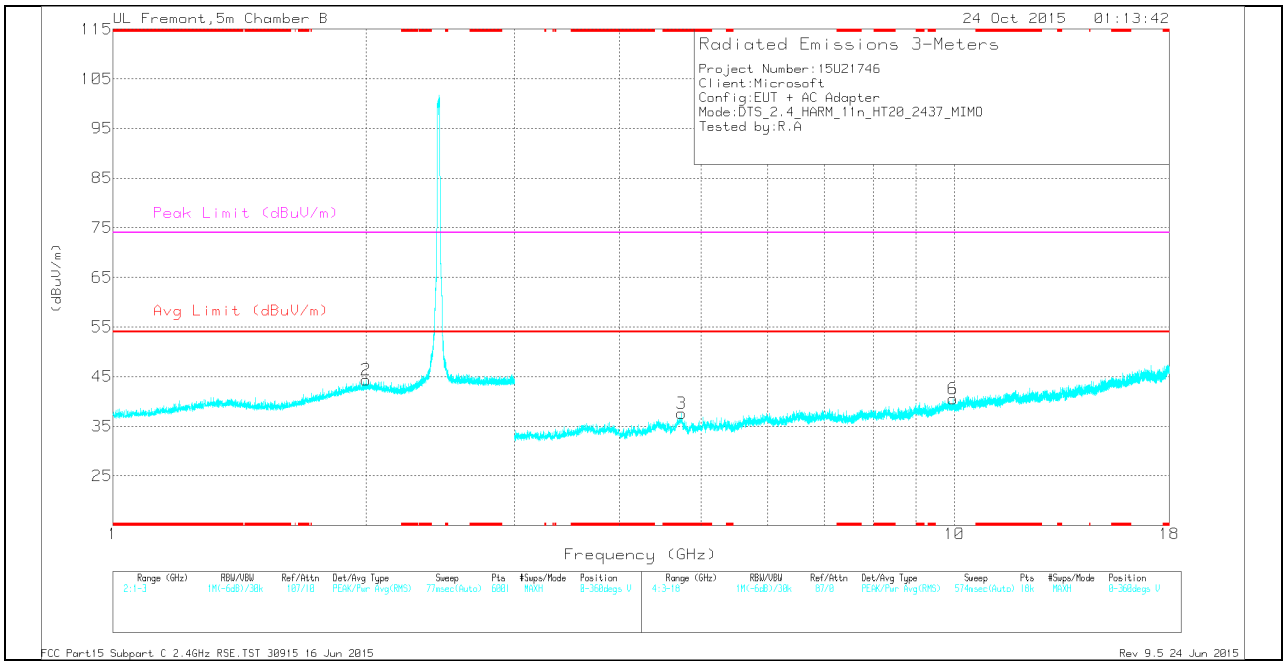
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 2.261	40.34	PK2	31.4	-24.3	0	47.44	-	-	74	-26.56	207	128	H
* 2.261	34.54	MAv1	31.4	-24.3	.11	41.75	54	-12.25	-	-	207	128	H
* 2.261	42.48	PK2	31.4	-24.3	0	49.58	-	-	74	-24.42	242	117	V
* 2.261	37.75	MAv1	31.4	-24.3	.11	44.96	54	-9.04	-	-	242	117	V
1.904	36.23	PK2	31.8	-24.6	0	43.43	-	-	-	-	165	206	V
3.314	33.77	PK2	32.8	-32.6	0	33.97	-	-	-	-	145	210	H
6.562	33.28	PK2	35.9	-30.4	0	38.78	-	-	-	-	148	213	V
7.81	31.94	PK2	35.5	-28.7	0	38.74	-	-	-	-	142	230	H

MID CHANNEL HORIZONTAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

MID CHANNEL VERTICAL

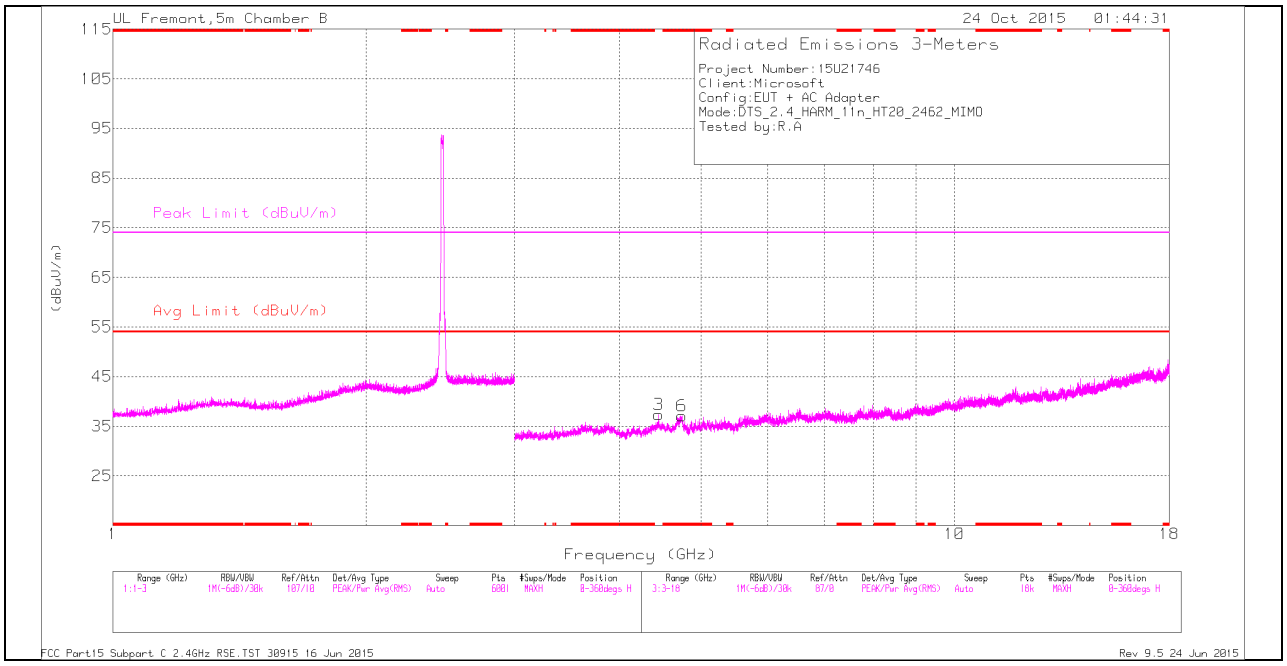


Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

MID CHANNEL DATA

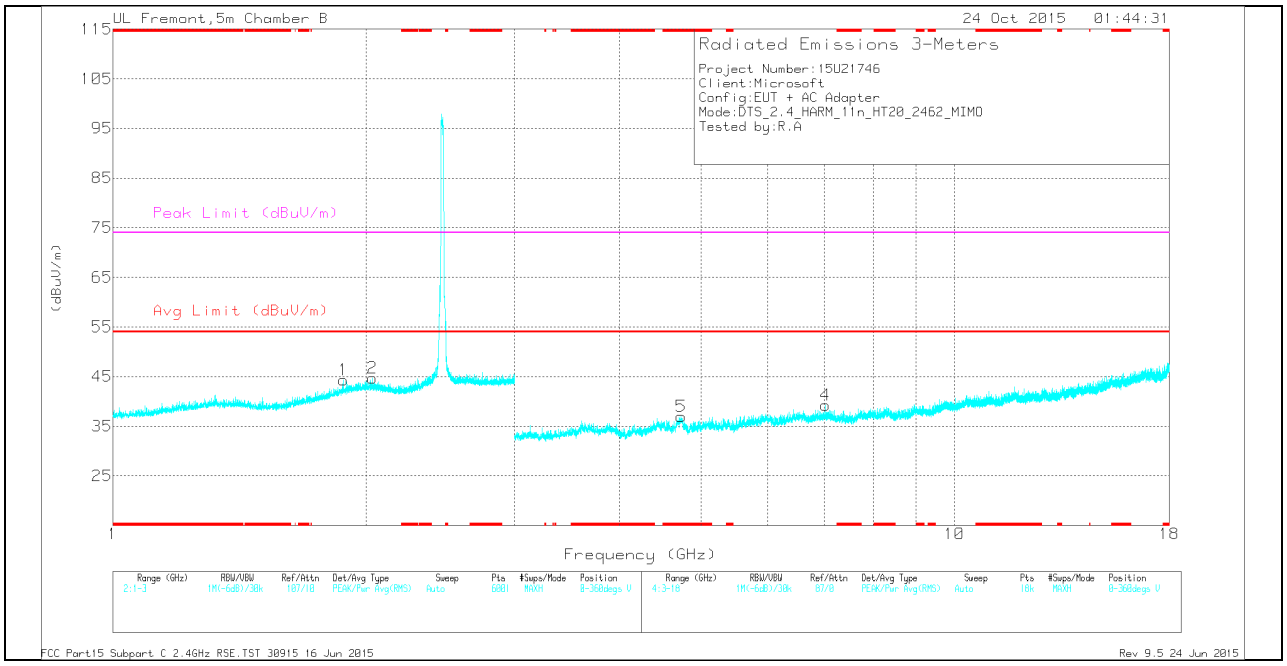
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.825	32.72	PK2	34.3	-31.6	0	35.42	-	-	74	-38.58	14	206	H
* 4.825	29.06	MAv1	34.3	-31.6	.11	31.87	54	-22.13	-	-	14	206	H
* 4.738	34.33	PK2	34.3	-30.7	0	37.93	-	-	74	-36.07	137	168	V
* 4.737	30.82	MAv1	34.3	-30.7	.11	34.53	54	-19.47	-	-	137	168	V
2	36.44	PK2	32.3	-24.5	0	44.24	-	-	-	-	153	209	V
2.02	36.12	PK2	32.2	-24.4	0	43.92	-	-	-	-	177	195	H
6.369	33.81	PK2	35.6	-31.6	0	37.81	-	-	-	-	156	201	H
9.953	29.29	PK2	37.1	-26.2	0	40.19	-	-	-	-	103	213	V

HIGH CHANNEL HORIZONTAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

HIGH CHANNEL VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

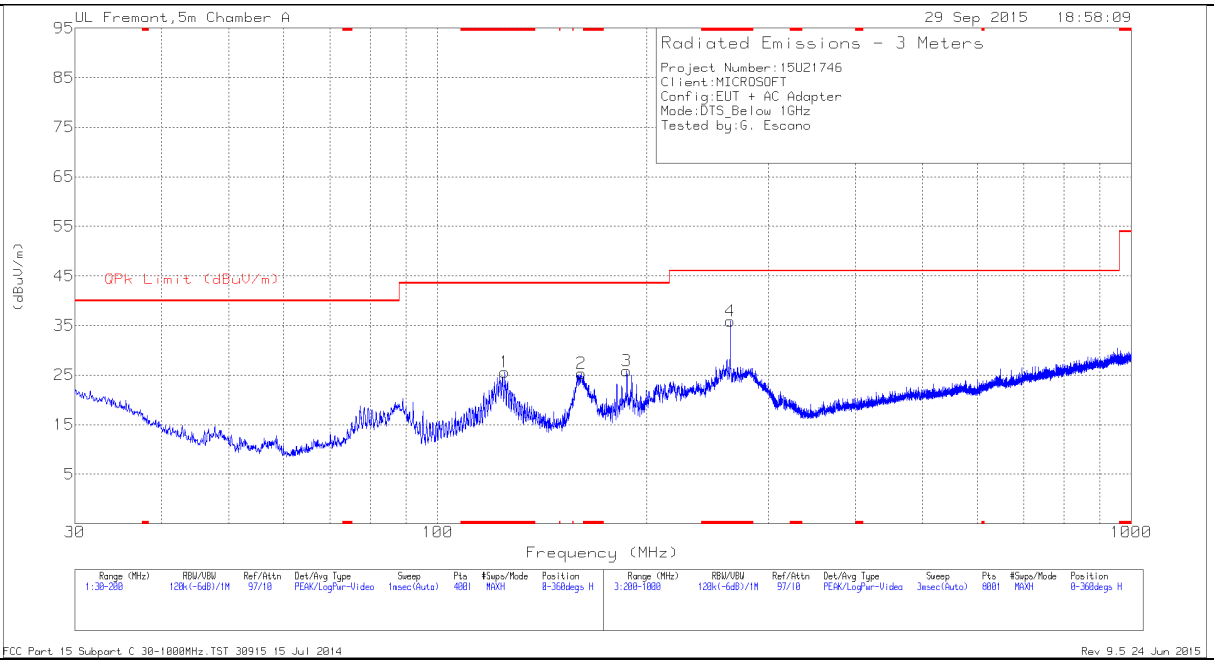
HIGH CHANNEL DATA

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.743	34.55	PK2	34.3	-30.7	0	38.15	-	-	74	-35.85	132	201	H
* 4.742	30.84	MAv1	34.3	-30.7	.11	34.55	54	-19.45	-	-	132	201	H
* 4.733	37.67	PK2	34.3	-30.7	0	41.27	-	-	74	-32.73	64	224	V
* 4.736	30.62	MAv1	34.3	-30.7	.11	34.33	54	-19.67	-	-	64	224	V
1.88	36.77	PK2	31.6	-24.6	0	43.77	-	-	-	-	20	198	V
2.035	35.28	PK2	32.2	-24.5	0	42.98	-	-	-	-	40	206	V
4.45	34.87	PK2	33.9	-30.8	0	37.97	-	-	-	-	57	196	H
7.023	36.9	PK2	35.9	-30.5	0	42.3	-	-	-	-	60	217	V

10.3. WORST-CASE BELOW 1 GHz

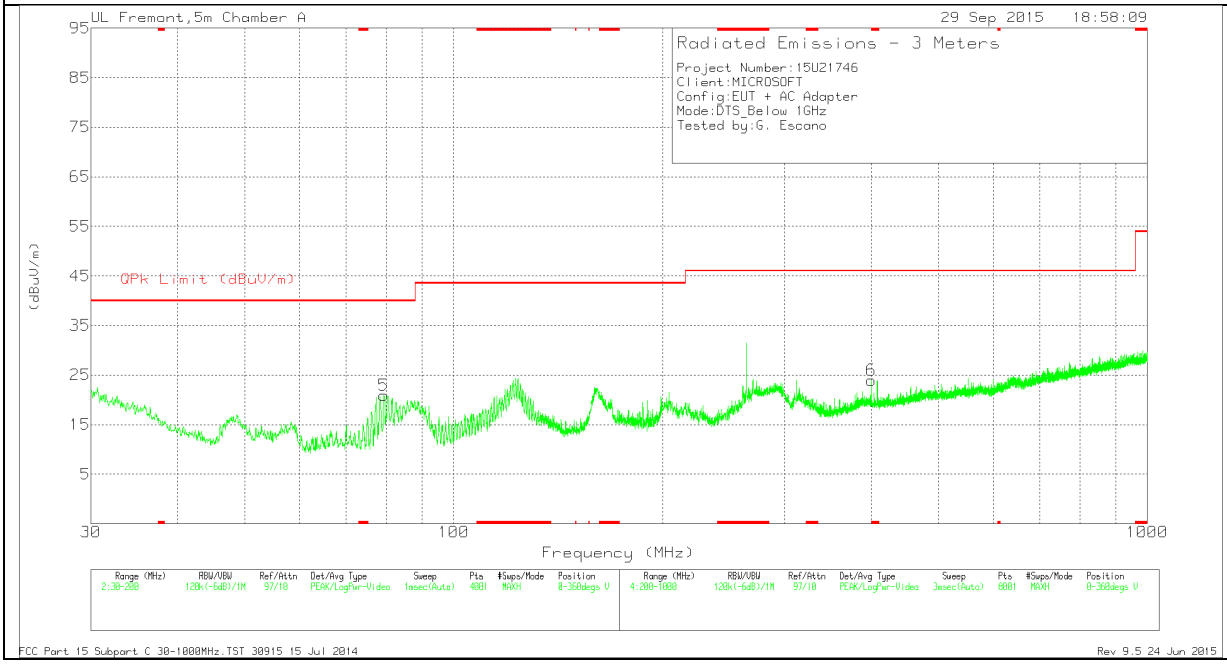
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT



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

VERTICAL PLOT



Below 1G Data

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T477 (dB/m)	Amp/Cbl (dB/m)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 124.945	38.21	Pk	17.8	-30.4	25.61	43.52	-17.91	0-360	199	H
4	* 264	48.89	Pk	16.6	-29.6	35.89	46.02	-10.13	0-360	101	H
6	* 400	33.41	Pk	19.6	-29.1	23.91	46.02	-22.11	0-360	101	V
5	79.3	40.07	Pk	11.5	-30.7	20.87	40	-19.13	0-360	101	V
2	161.24	39.26	Pk	16.2	-30.1	25.36	43.52	-18.16	0-360	100	H
3	187.3775	40.78	Pk	15.1	-30	25.88	43.52	-17.64	0-360	100	H

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

Pk - Peak detector

Radiated Emissions

Frequency (MHz)	Meter Reading (dBuV)	Det	AF T477 (dB/m)	Amp/Cbl (dB/m)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 124.7631	26.82	Qp	17.8	-30.4	14.22	43.52	-29.3	65	187	H
* 264.0384	48.45	Qp	16.6	-29.6	35.45	46.02	-10.57	165	110	H
* 399.9942	30.46	Qp	19.6	-29.1	20.96	46.02	-25.06	213	138	V
79.2952	34.86	Qp	11.5	-30.7	15.66	40	-24.34	76	122	V
161.3619	30.37	Qp	16.2	-30.1	16.47	43.52	-27.05	150	162	H
187.3804	38.75	Qp	15.1	-30	23.85	43.52	-19.67	196	133	H

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

Qp - Quasi-Peak detector

11. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

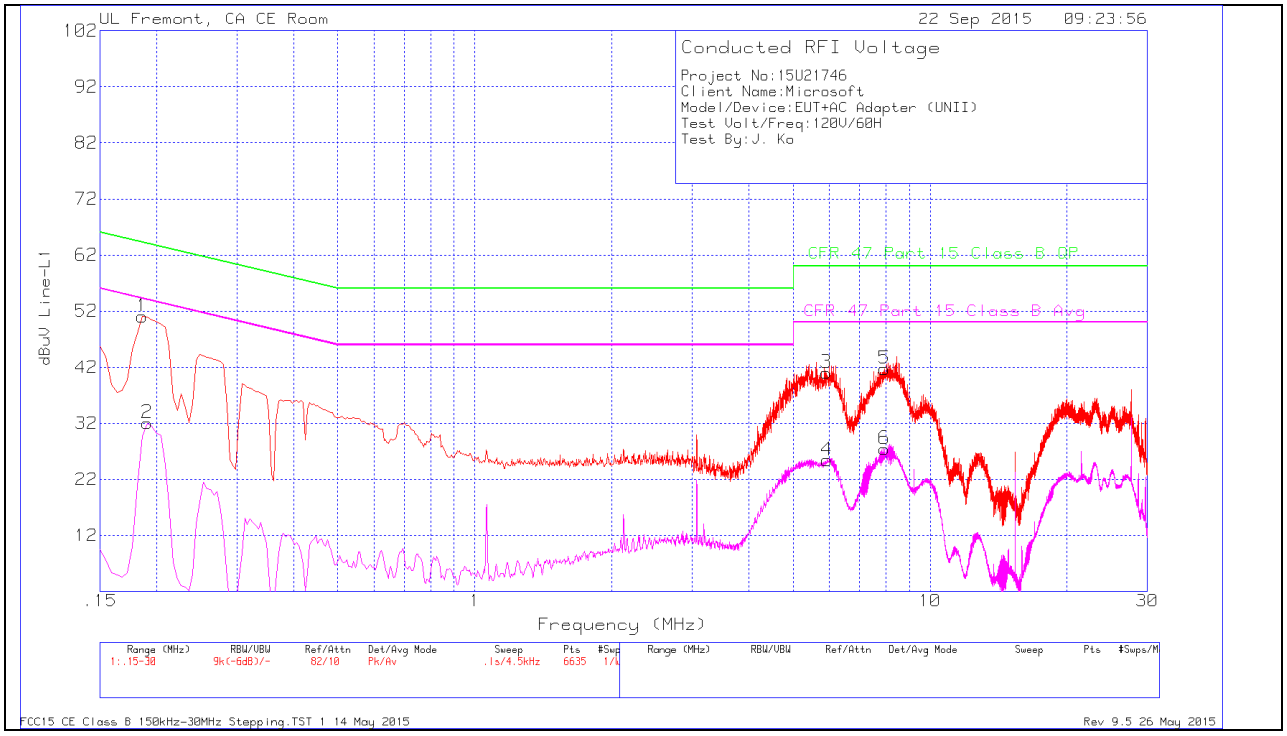
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

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

RESULTS

6 WORST EMISSIONS

LINE 1 PLOT

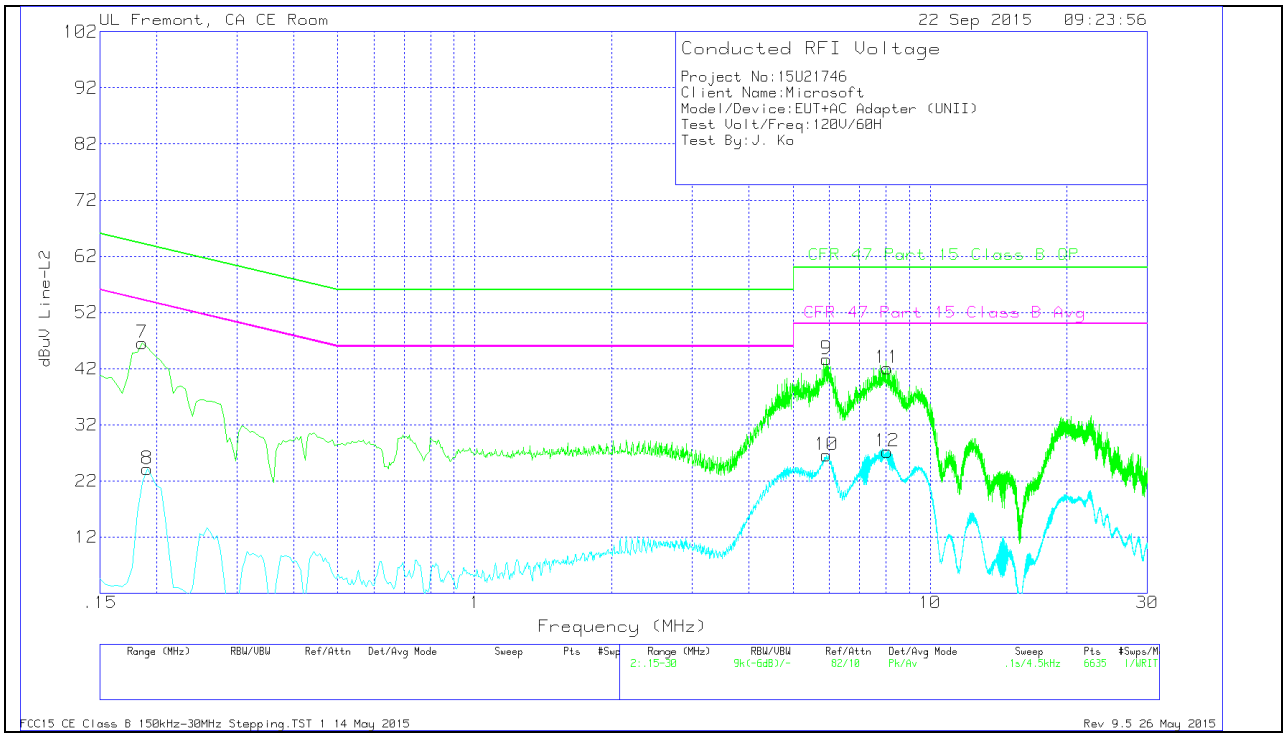


LINE 1 RESULTS

Range 1: Line-L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1	LC Cables 1&3	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	Margin (dB)	CFR 47 Part 15 Class B Avg	Margin (dB)
1	.186	50.03	Pk	1	0	51.03	64.21	-13.18		
2	.1905	31.04	Av	1	0	32.04	-	-	54.01	-21.97
3	5.9145	40.71	Pk	.2	.1	41.01	60	-18.99		
4	5.9325	25.1	Av	.2	.1	25.4	-	-	50	-24.6
5	7.9485	41.43	Pk	.2	.1	41.73	60	-18.27		
6	7.944	27.13	Av	.2	.1	27.43	-	-	50	-22.57

LINE 2 PLOT



LINE 2 RESULTS

Range 2: Line-L2 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2	LC Cables 2&3	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	Margin (dB)	CFR 47 Part 15 Class B Avg	Margin (dB)
7	.186	45.45	Pk	1.1	0	46.55	64.21	-17.66		
8	.1905	23.02	Av	1.1	0	24.12	-	-	54.01	-29.89
9	5.9235	43.39	Pk	.2	.1	43.69	60	-16.31		
10	5.9235	26.31	Av	.2	.1	26.61	-	-	50	-23.39
11	8.061	41.79	Pk	.2	.1	42.09	60	-17.91		
12	8.061	26.95	Av	.2	.1	27.25	-	-	50	-22.75