CLASS II PERMISSIVE CHANGE
TEST REPORT

Report Number : 16U22953-E1V4

Applicant	:	Microsoft 1 Microsoft Way Redmond, WA 98052, USA
Model	:	1537
FCC ID	:	C3K1537
EUT Description	:	WIRELESS INPUT DEVICE
Test Standard(s)	:	**FCC 47 CFR PART 15 SUBPART E**

Date of Issue:
Thursday, April 28, 2016

Prepared by:
UL Verification Services Inc.
47173 Benicia Street
Fremont, CA 94538, U.S.A.
TEL: (510) 771-1000
FAX: (510) 661-0888

NVLAP LAB CODE 200065-0

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	4/11/2016	Initial Issue	---
V2	4/21/2016	Updated description	Francisco de Anda
V3	4/27/2016	Correction to FCC ID	Grace Rincand
V4	4/28/2016	Update to section 3.2	Francisco de Anda

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	MICROSOFT 1 MICROSOFT WAY REDMOND, WA, 98052, USA
EUT DESCRIPTION:	WIRELESS INPUT DEVICE
MODEL:	1537
SERIAL NUMBER:	02980796003526 (Conducted), 02980793973526 (Radiated)
DATE TESTED:	March 29th 2016 – March 31st 2016

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

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

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

Approved & Released For
UL Verification Services Inc. By:

Francisco de Anda
CONSUMER TECHNOLOGY DIVISION
Program Manager
UL Verification Services Inc.

Prepared By:

Chris Xiong
CONSUMER TECHNOLOGY DIVISION
Lab Engineer
UL Verification Services Inc.

2. SUMMARY OF TESTING

2.1. 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.

2.2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, KDB 789033 D02 v01r02, ANSI C63.10-2013.

2.3. CALIBRATION AND UNCERTAINTY

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.

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

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%.

2.4. MEASUREMENT METHOD

On Time and Duty Cycle: KDB 789033 D02 v01r02, Section B.

26 dB Emission BW: KDB 789033 D02 v01r02, Section C.

99% Occupied BW: KDB 789033 D02 v01r02, Section D.

Conducted Output Power: KDB 789033 D02 v01r02, Section E.2.b (Method SA-1).

Power Spectral Density: KDB 789033 D02 v01r02, Section F.

Unwanted emissions in restricted bands: KDB 789033 D02 v01r02, Sections G.3, G.4, G.5, and G.6.

Unwanted emissions in non-restricted bands: KDB 789033 D02 v01r02, Sections G.3, G.4, and G.5.

AC Power Line Conducted Emissions: ANSI C63.10-2013, Section 6.2.

2.5. 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**	**ID Num**	**Cal Due**
Spectrum Analyzer, 44 GHz	Keysight	N9030A	T907	01/06/17
Spectrum Analyzer,9KHz-40GHz	HP	8564E	T104	07/28/16
Antenna, Horn, 1-18 GHz	ETS	3117	T345	03/07/17
Antenna, Horn,18- 26 GHz	ARA	MWH-1826/B	T447	05/12/16
Antenna, Horn, 26-40 GHz	ARA	MWH-2640	T90	07/28/16
Antenna, Bilog, 30MHz-1 GHz	Sunol Sciences	JB1	T130	09/01/16
RF Preamplifier, 100kHz -1GHz	HP	8447D	T10	02/01/17
RF Preamplifier, 1GHz - 18GHz	Miteq	AFS42-00101800-25-S-42	T1156	03/09/17
RF Preamplifier, 18 - 26GHz	Agilent	8449B	T404	06/29/16
RF Preamplifier, 26 - 40GHz	Miteq	NSP 4000 SP2	T88	04/07/16
Low Pass Filter 3GHz	Micro-Tronics	LPS17541	T482	03/09/17
High Pass Filter 5GHz	Micro-Tronics	HPS17542	T483	03/09/17
High Pass Filter 6GHz	Micro-Tronics	HPM17543	T485	03/09/17

Test Software List			
Description	**Manufacturer**	**Model**	**Version**
Radiated Software	UL	UL EMC	Ver 9.5, June 24, 2015
Antenna Port Software	UL	UL RF	Ver 4.3, March 3, 2016

3. EQUIPMENT UNDER TEST

3.1. DESCRIPTION OF EUT

The EUT is an 802.11a/g/n transceiver, Model 1537.

3.2. DESCRIPTION OF CLASS II PERMISSIVE CHANGE

The purpose of this C2PC is to upgrade the device described under section 3.1 of this report to the new rules per KDB 789033 D02 v01r02.

For UNII-1, UNII-2 and UNII-2C bands, we have reviewed the original test reports (13U14963A,UNII-1 and 13U14963-6, UNII-2/2C) and are hereby attesting that all the current technical requirements are still met and all applicable test procedures remain the same. Therefore, the original test report is still applicable and no additional testing is done.

3.3. MAXIMUM OUTPUT POWER

The transmitter has a maximum average conducted output power as follows:

5.8 GHz BAND

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
1TX			
5745 - 5825	802.11a	5.96	3.94
5745 - 5825	802.11n HT20	5.96	3.94

3.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an integral antenna with a maximum gain of 1 dBi

3.5. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was R61.

The test utility software used during testing was Atheros Radio Test 2 (ART2-GUI), ver. 2.3.

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

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

802.11a mode: 6 Mbps
802.11n HT20mode: MCS0

3.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Lenovo	2447-L81	R9-W7CWY	DoC
Laptop AC Adapter	Lenovo	45N0113	11S45N0113Z1ZHX82664BH	

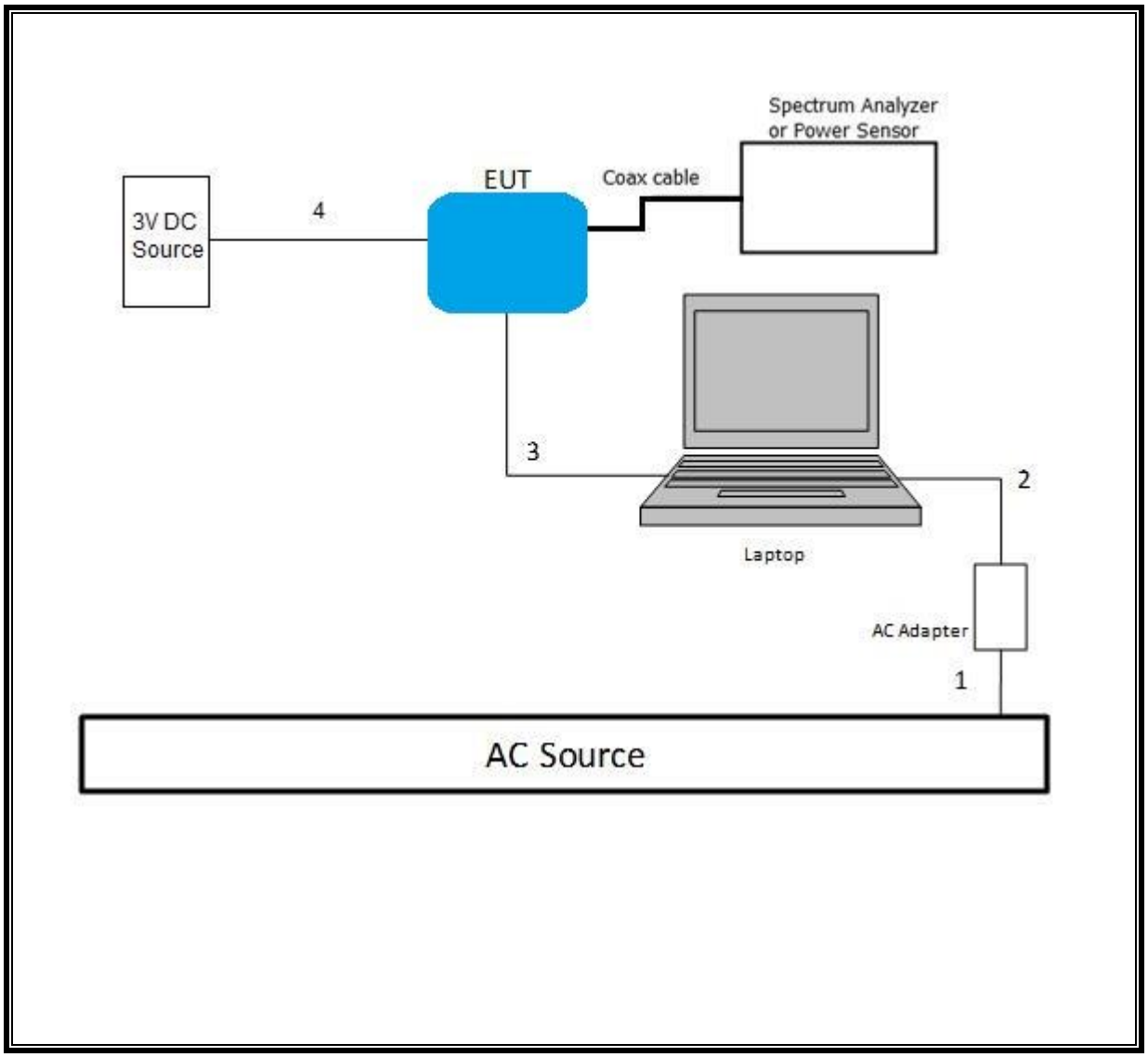
I/O CABLES

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	AC	1	2C/AC	Unshielded	.85m	
2	DC	1	2C/DC	Unshielded	1.8m	
3	USB	1	Mains	Shielded	0.45	
4	DC	1	NA	Unshielded	<3	External DC source during conducted testing

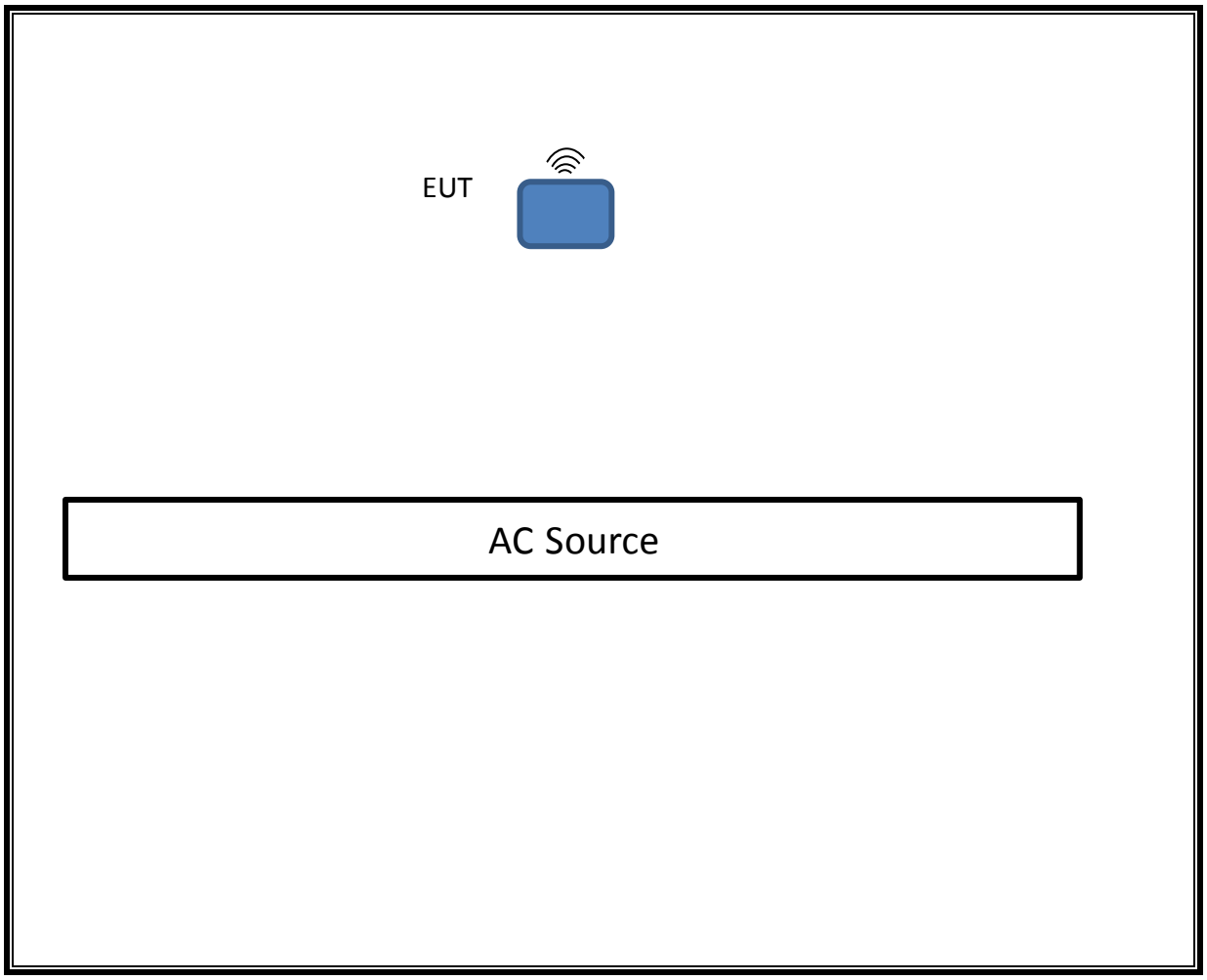
TEST SETUP

The EUT is attached to a laptop PC during antenna-port testing and powered by a DC power supply. The EUT is tested as a battery-powered stand-alone device during radiated testing. The laptop PC is used to configure the device during test using the Atheros radio test utility ART2.

SETUP DIAGRAM FOR CONDUCTED TESTS



SETUP DIAGRAM FOR RADIATED TESTS



4. ANTENNA PORT TEST RESULTS

4.1. ON TIME AND DUTY CYCLE

LIMITS

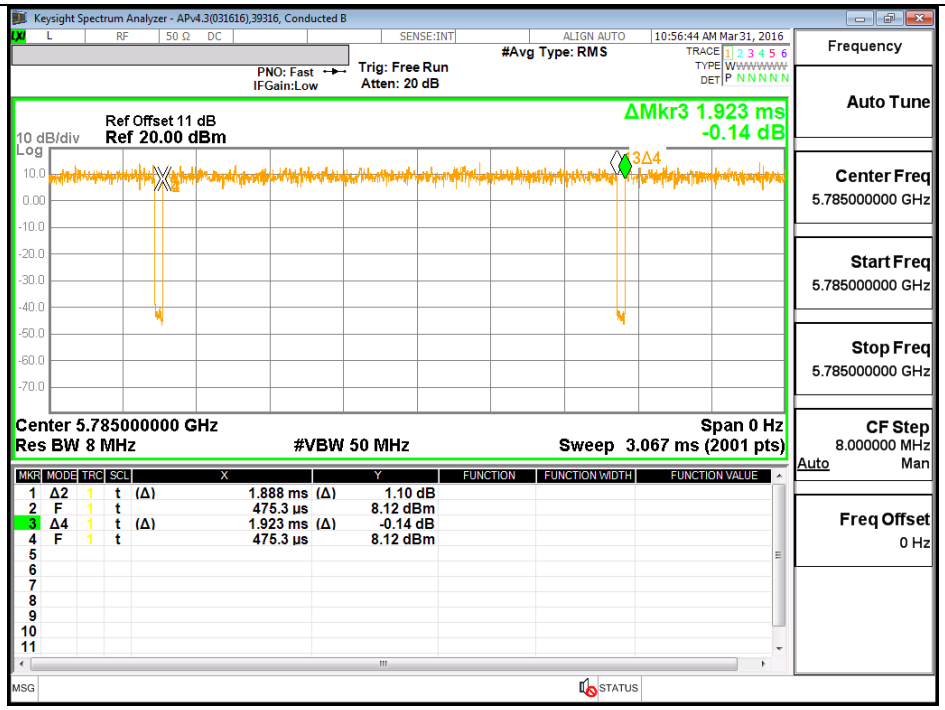
None; for reporting purposes only.

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)
802.11a 1TX	2.022	2.058	0.983	98.25%	0.00	0.010
802.11n HT20 1TX	1.888	1.923	0.982	98.18%	0.00	0.010

DUTY CYCLE PLOTS

802.11a



802.11n HT20

4.2. 26 dB BANDWIDTH

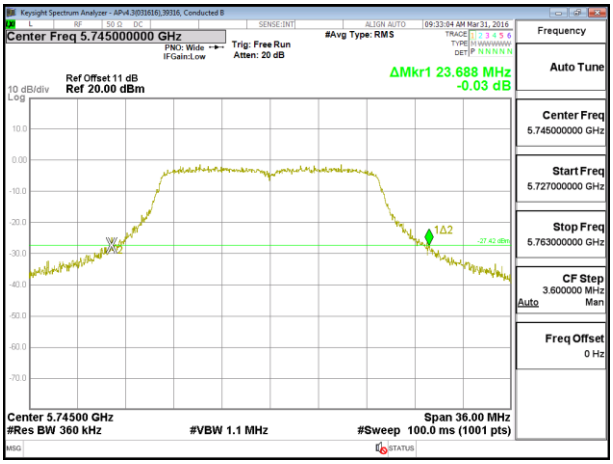
LIMITS

None; for reporting purposes only.

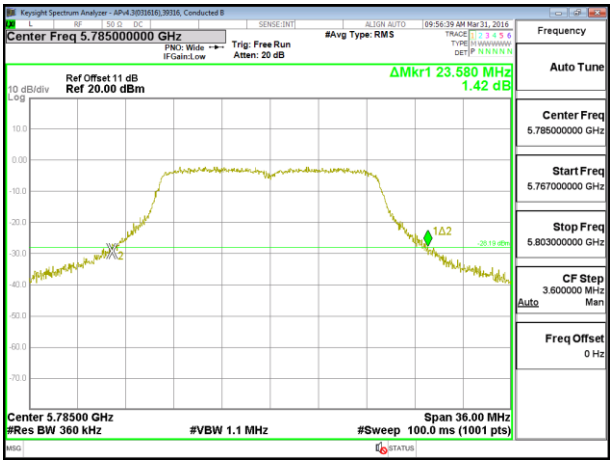
RESULTS

4.2.1. 802.11a MODE IN THE 5.8 GHz BAND

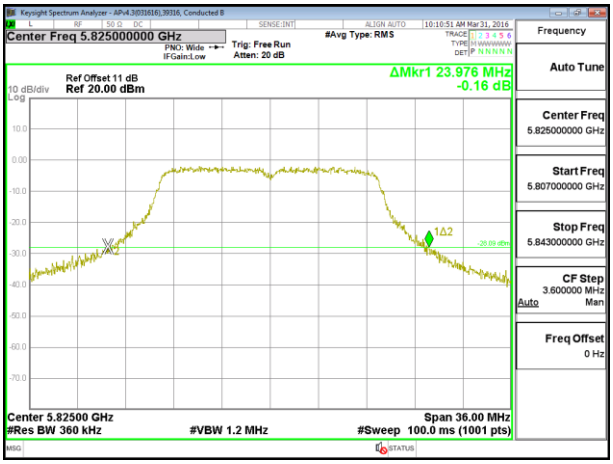
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5745	23.69
Mid	5785	23.58
High	5825	23.98



LOW CHANNEL



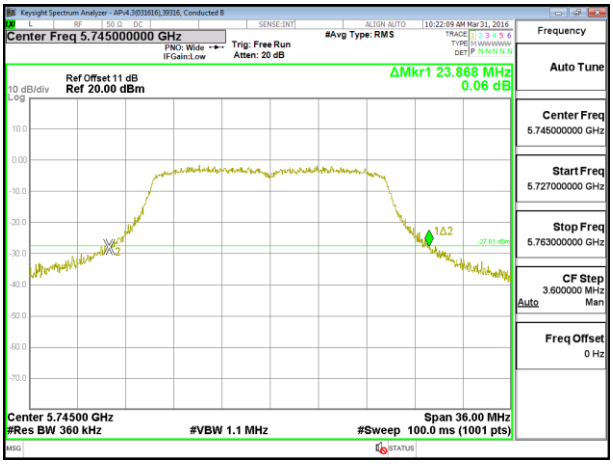
MID CHANNEL



HIGH CHANNEL

4.2.2. 802.11n HT20 MODE IN THE 5.8 GHz BAND

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5745	23.87
Mid	5785	24.20
High	5825	24.35



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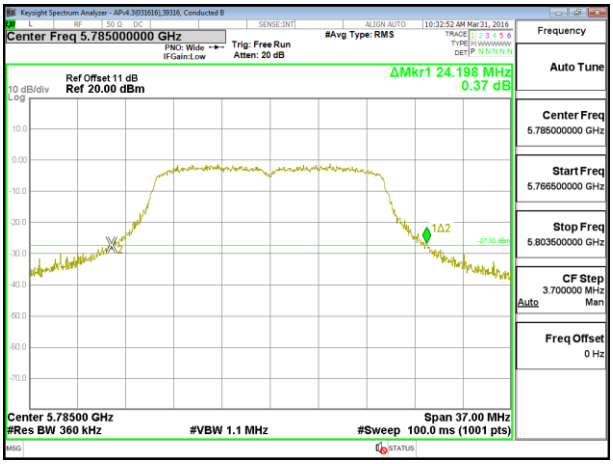

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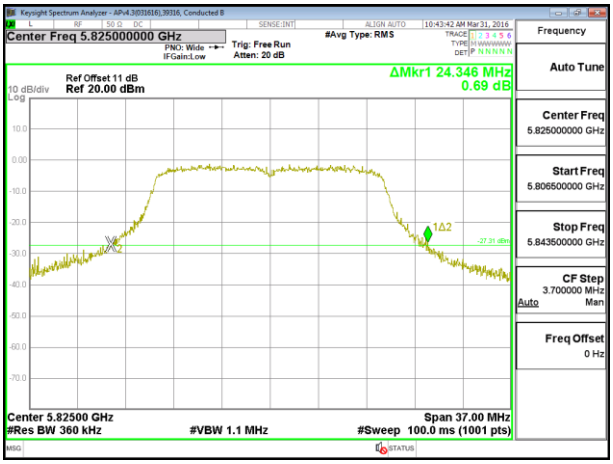


HIGH CHANNEL

4.3. 99% BANDWIDTH

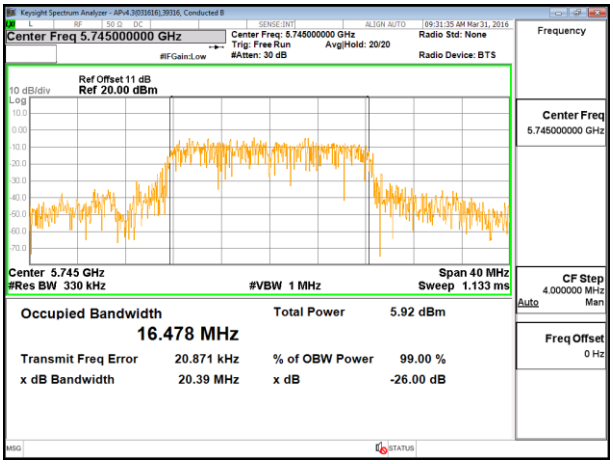
LIMITS

None; for reporting purposes only.

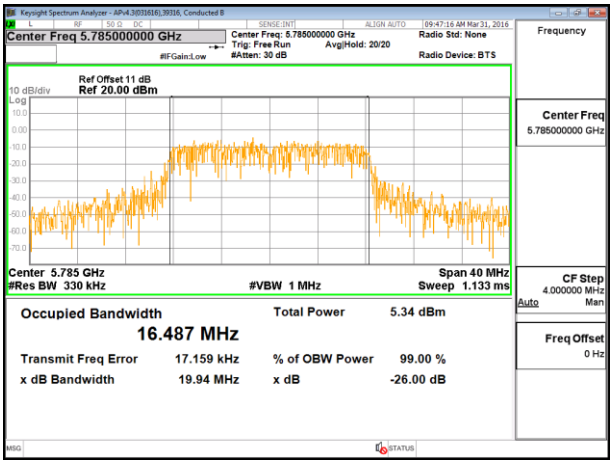
RESULTS

4.3.1. 802.11a MODE IN THE 5.8 GHz BAND

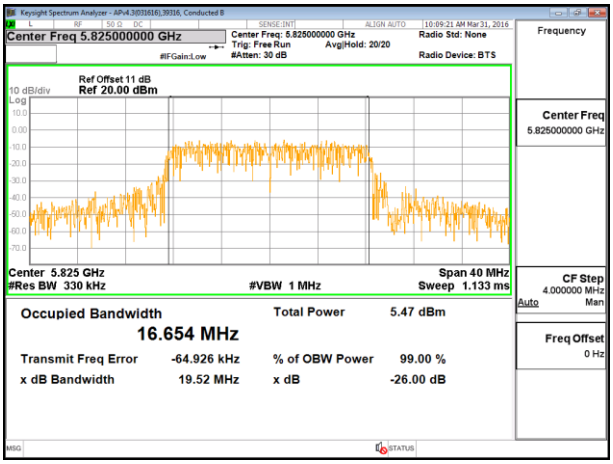
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5745	16.48
Mid	5785	16.49
High	5825	16.65



LOW CHANNEL



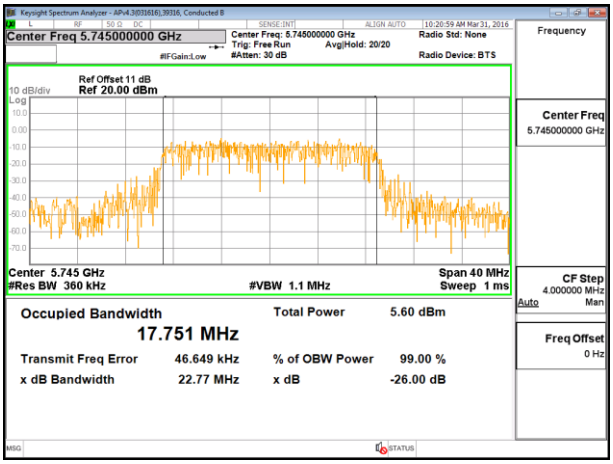
MID CHANNEL



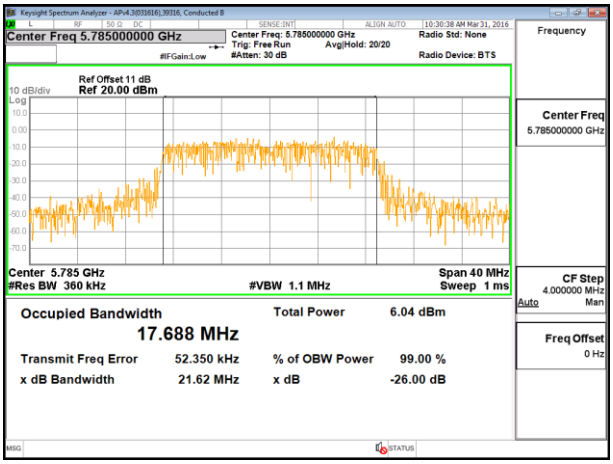
HIGH CHANNEL

4.3.2. 802.11n HT20 MODE IN THE 5.8 GHz BAND

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5745	17.75
Mid	5785	17.69
High	5825	17.73



LOW CHANNEL



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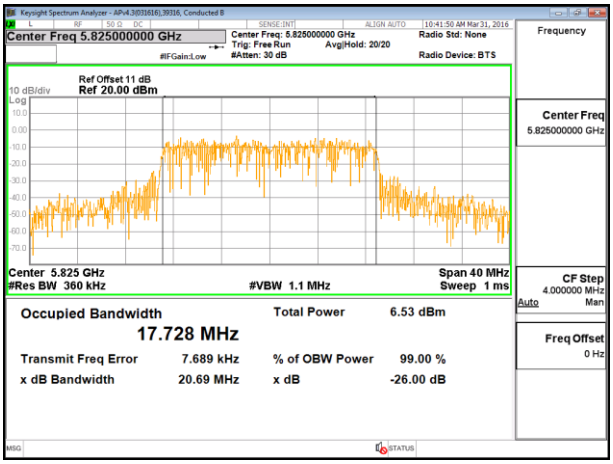


HIGH CHANNEL

4.4. 6 dB BANDWIDTH

LIMITS

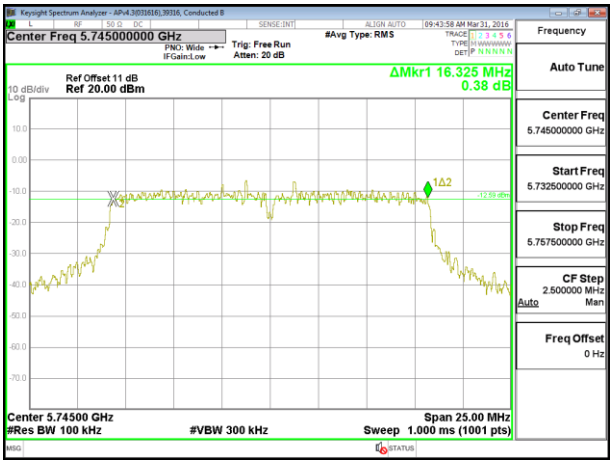
FCC §15.407 (e)

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

RESULTS

4.4.1. 802.11a MODE IN THE 5.8 GHz BAND

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	5745	16.325	0.5
Mid	5785	16.500	0.5
High	5825	16.500	0.5



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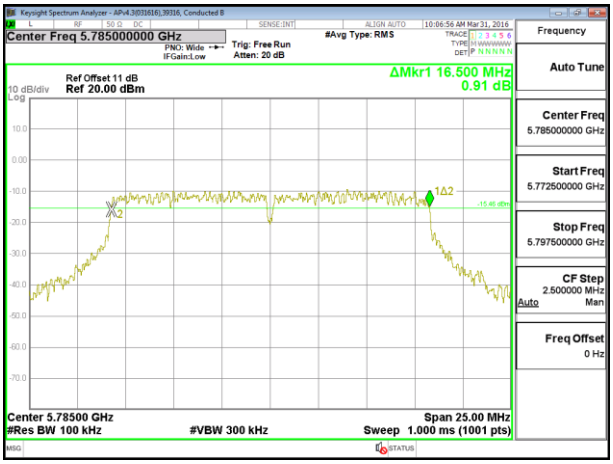

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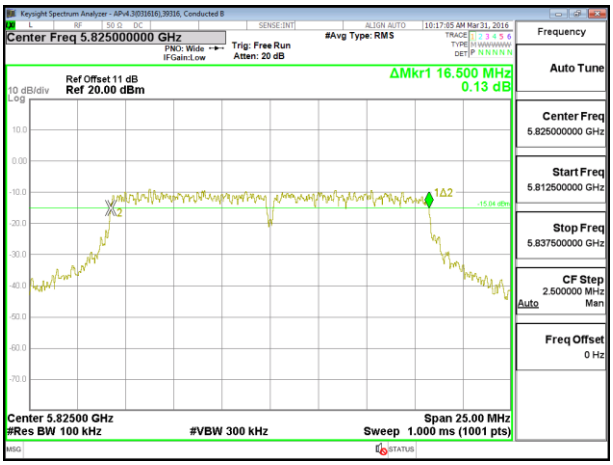
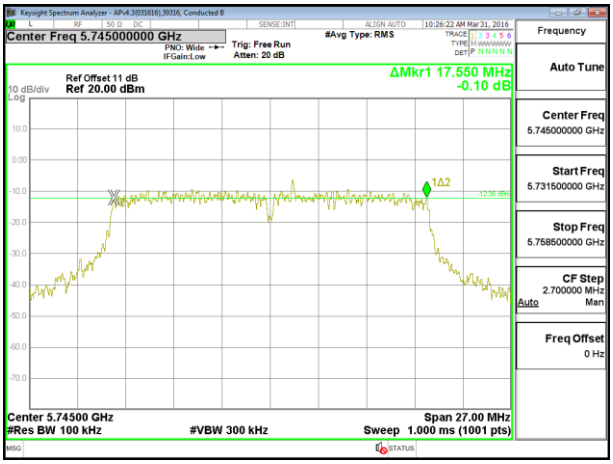


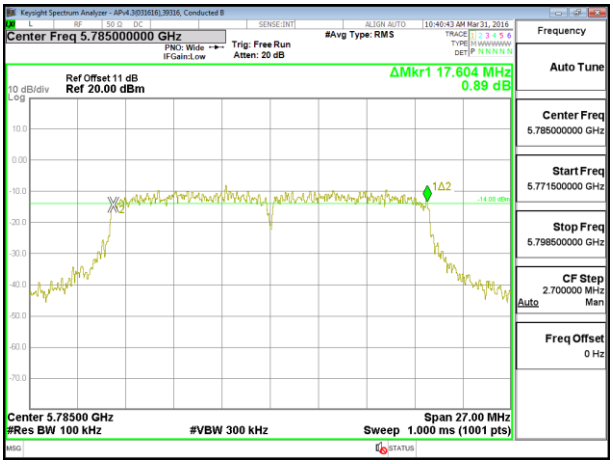
HIGH CHANNEL

4.4.2. 802.11n HT20 MODE IN THE 5.8 GHz BAND

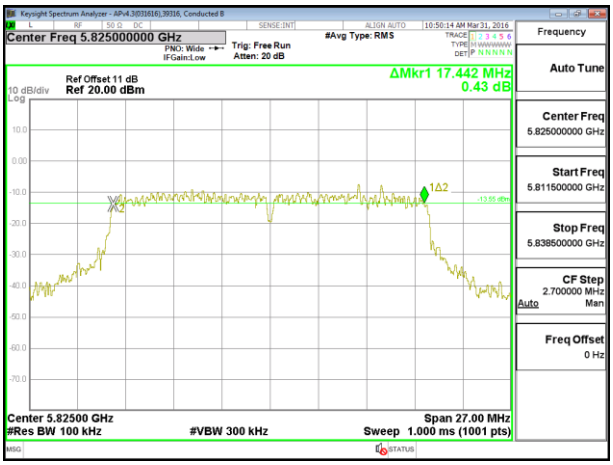
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	5745	17.550	0.5
Mid	5785	17.604	0.5
High	5825	17.442	0.5



LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

4.5. OUTPUT POWER AND PPSD

LIMITS

FCC §15.407 (a) (3)

Band 5.725-5.85 GHz

The maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information.

DIRECTIONAL ANTENNA GAIN

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

RESULTS

4.5.1. 802.11a MODE IN THE 5.8 GHz BAND

Antenna Gain and Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC/IC Power Limit (dBm)	FCC/IC PSD Limit (dBm)
Low	5745	1.00	30.00	30.00
Mid	5785	1.00	30.00	30.00
High	5825	1.00	30.00	30.00

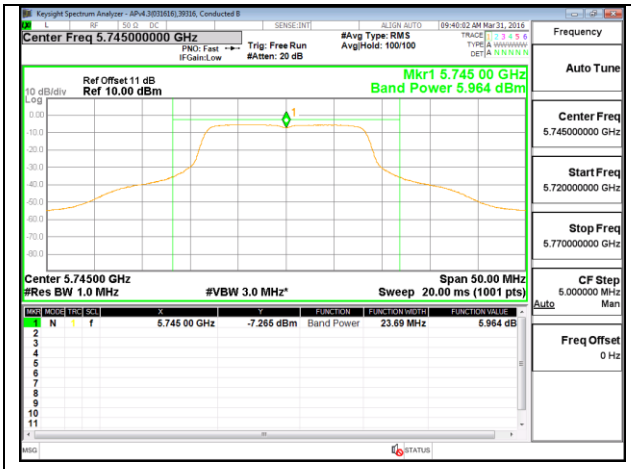
Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5745	5.96	5.96	30.00	-24.04
Mid	5785	5.62	5.62	30.00	-24.38
High	5825	5.89	5.89	30.00	-24.11

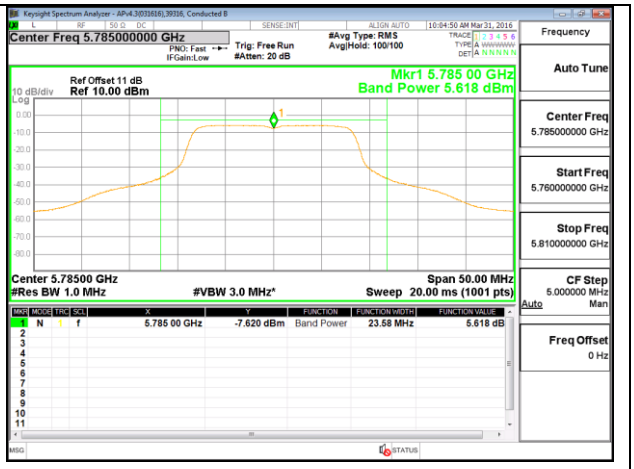
PSD Results

Channel	Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5745	-8.48	-8.48	30.00	-38.48
Mid	5785	-8.67	-8.67	30.00	-38.67
High	5825	-8.27	-8.27	30.00	-38.27

OUTPUT POWER PLOTS



LOW CHANNEL



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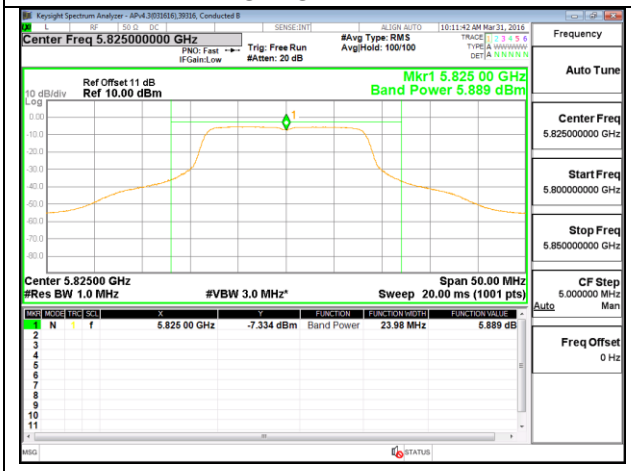
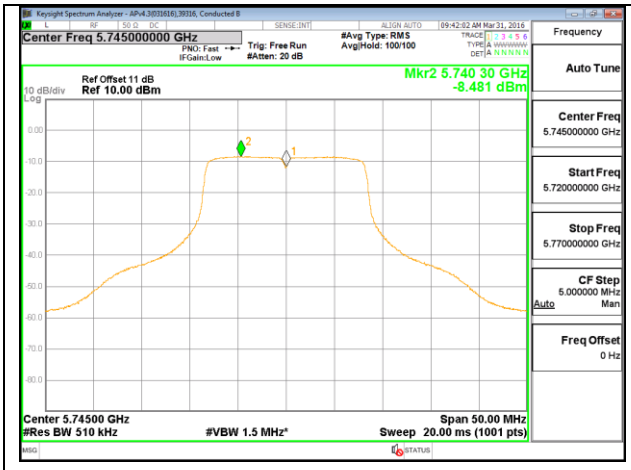


HIGH CHANNEL

PSD PLOTS



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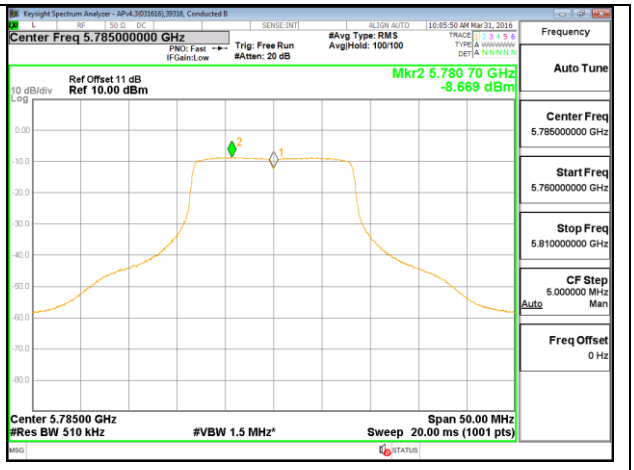

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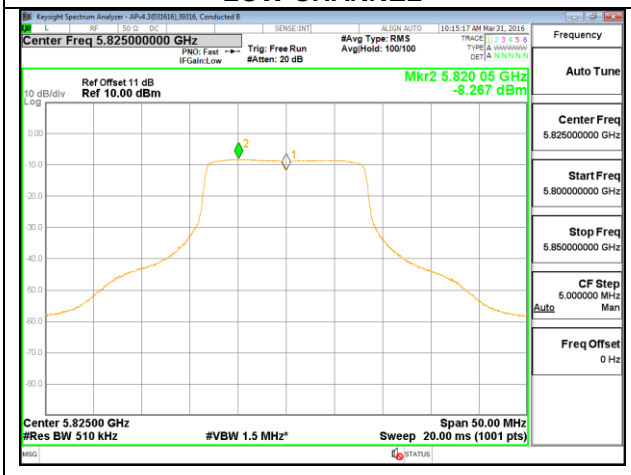


HIGH CHANNEL

4.5.2. 802.11n HT20 MODE IN THE 5.8 GHz BAND

Antenna Gain and Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC/IC Power Limit (dBm)	FCC/IC PSD Limit (dBm)
Low	5745	1.00	30.00	30.00
Mid	5785	1.00	30.00	30.00
High	5825	1.00	30.00	30.00

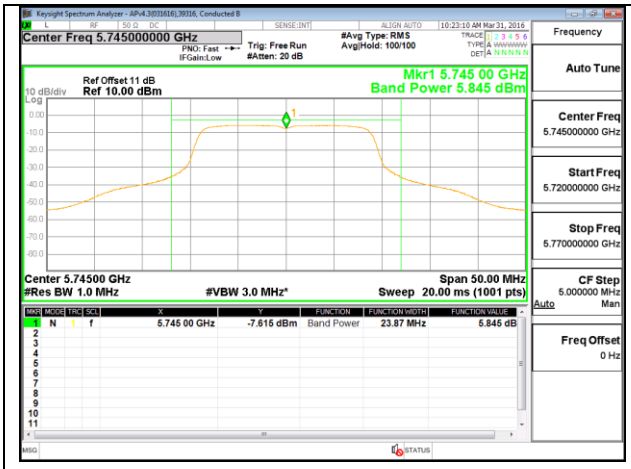
Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5745	5.85	5.85	30.00	-24.16
Mid	5785	5.73	5.73	30.00	-24.27
High	5825	5.96	5.96	30.00	-24.05

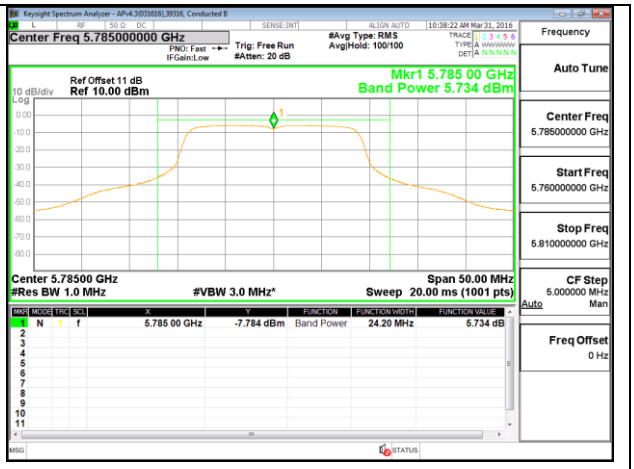
PSD Results

Channel	Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5745	-8.65	-8.65	30.00	-38.65
Mid	5785	-8.82	-8.82	30.00	-38.82
High	5825	-8.54	-8.54	30.00	-38.54

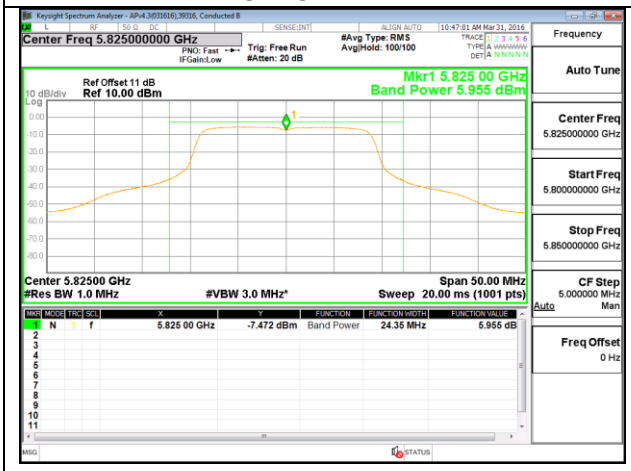
OUTPUT POWER PLOTS



LOW CHANNEL

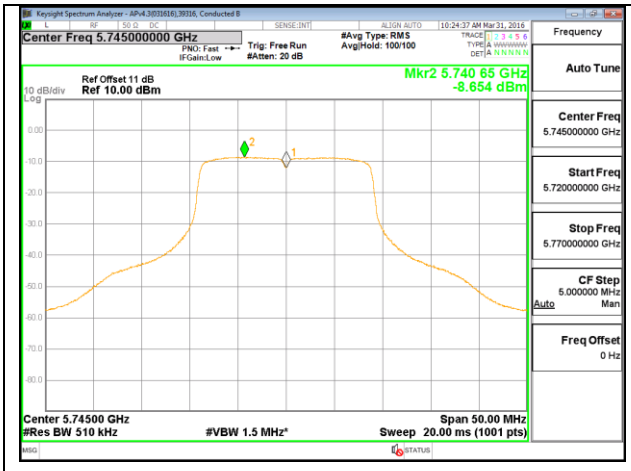


MID CHANNEL

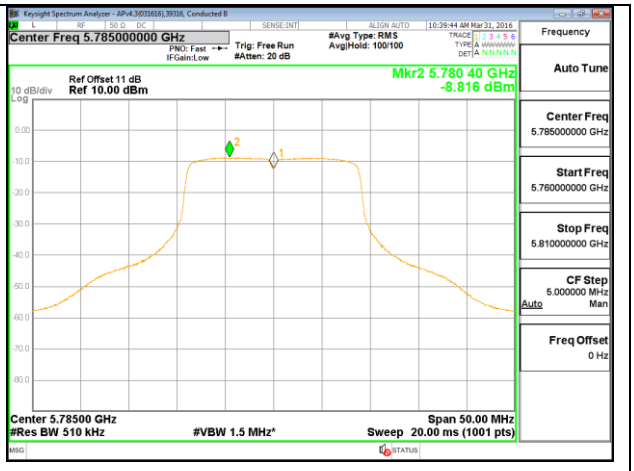


HIGH CHANNEL

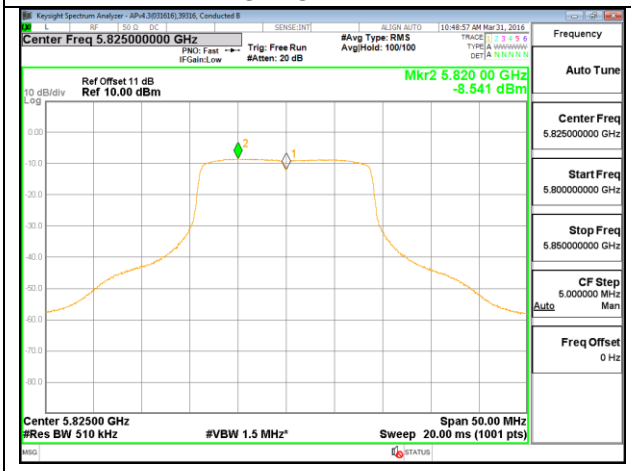
PSD PLOTS



LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

5. RADIATED TEST RESULTS

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 for below 1GHz and 150cm for above 1GHz. 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.

Reference to KDB 789033 UNII part G) 6) d) Method AD:
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 to the reading offset for average measurements.

The spectrum from 1GHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

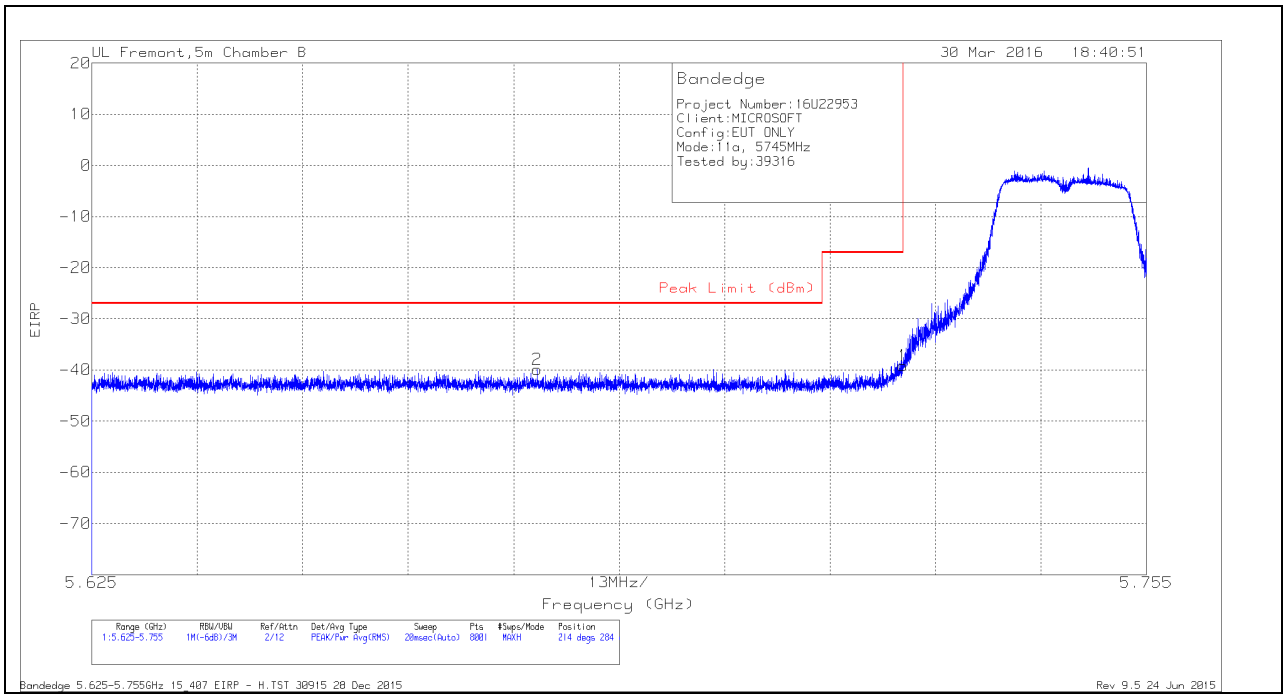
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

5.1. TRANSMITTER ABOVE 1 GHz

5.1.1. TX ABOVE 1 GHz 802.11a MODE IN THE 5.8 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL)

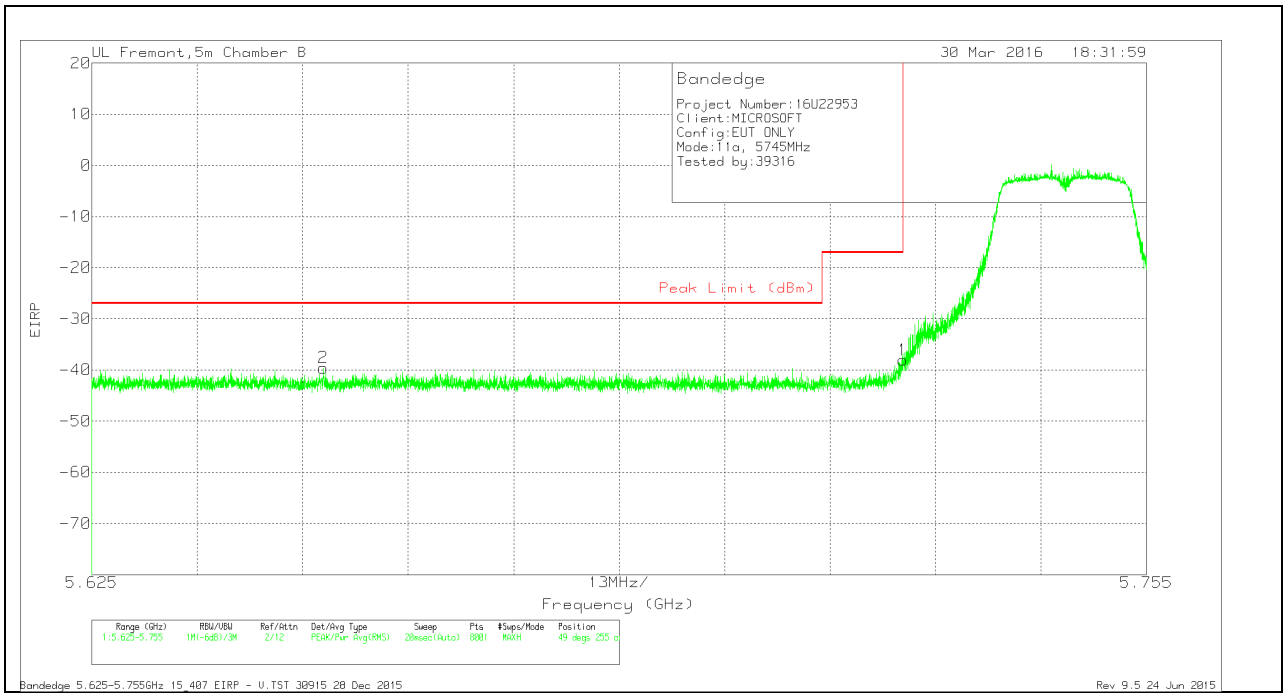
HORIZONTAL RESULTS



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T345 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	5.68	-65.07	Pk	34.8	-21.4	11.8	-39.87	-27	-12.87	214	284	H
1	5.725	-64.16	Pk	34.9	-21.7	11.8	-39.16	-17	-22.16	214	284	H

Pk - Peak detector

VERTICAL RESULTS

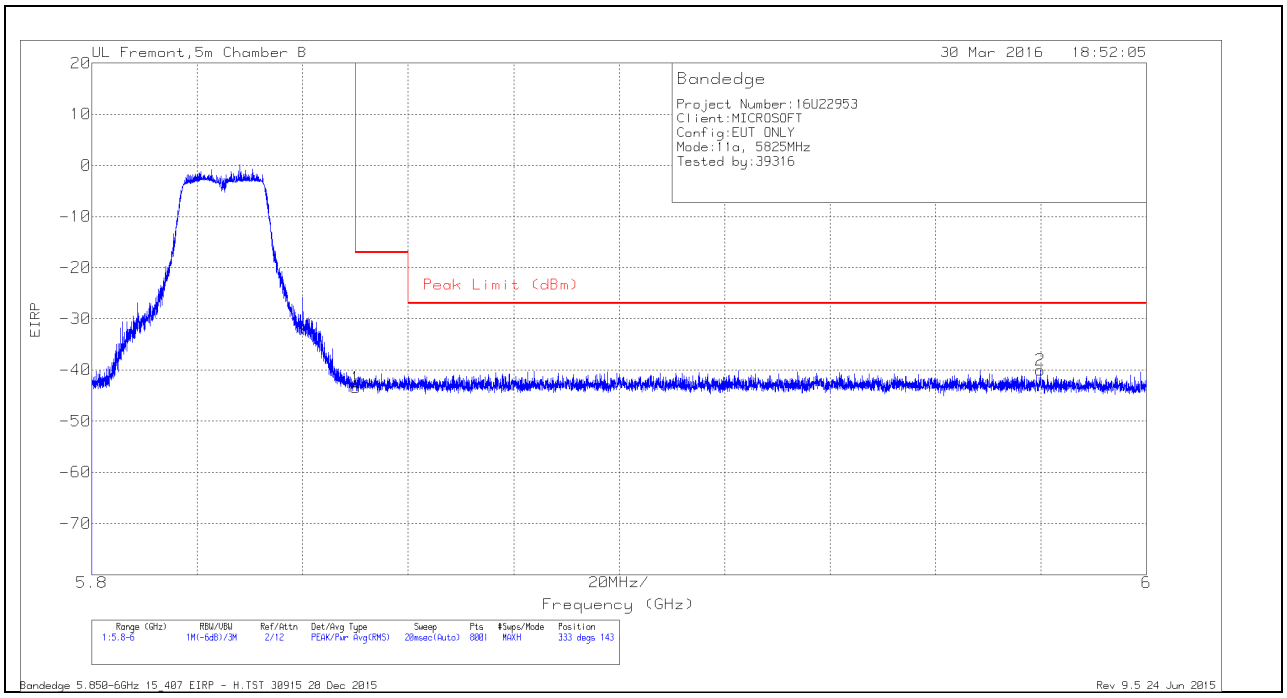


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T345 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	5.654	-64.69	Pk	34.7	-21.4	11.8	-39.59	-27	-12.59	49	255	V
1	5.725	-63.07	Pk	34.9	-21.7	11.8	-38.07	-17	-21.07	49	255	V

Pk - Peak detector

AUTHORIZED BANDEDGE (HIGH CHANNEL)

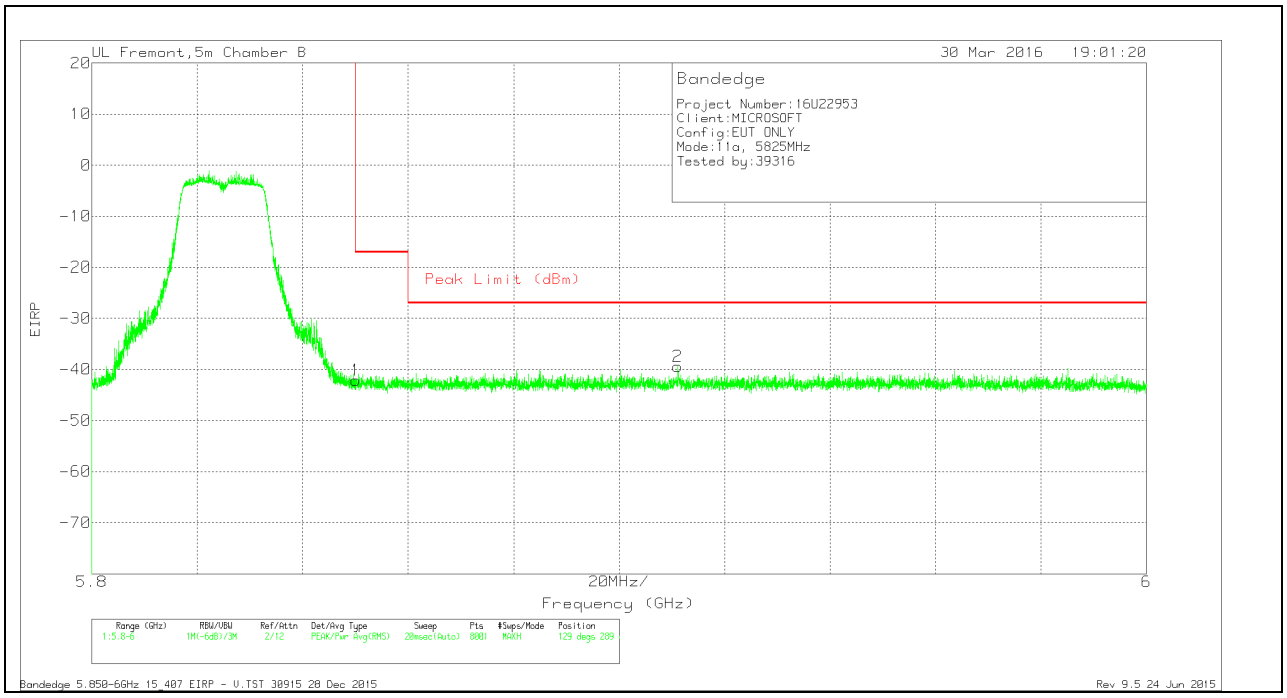
HORIZONTAL RESULTS



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T345 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.85	-68.87	Pk	35.2	-21.6	11.8	-43.47	-17	-26.47	333	143	H
2	5.98	-65.73	Pk	35.2	-21.3	11.8	-40.03	-27	-13.03	333	143	H

Pk - Peak detector

VERTICAL RESULTS

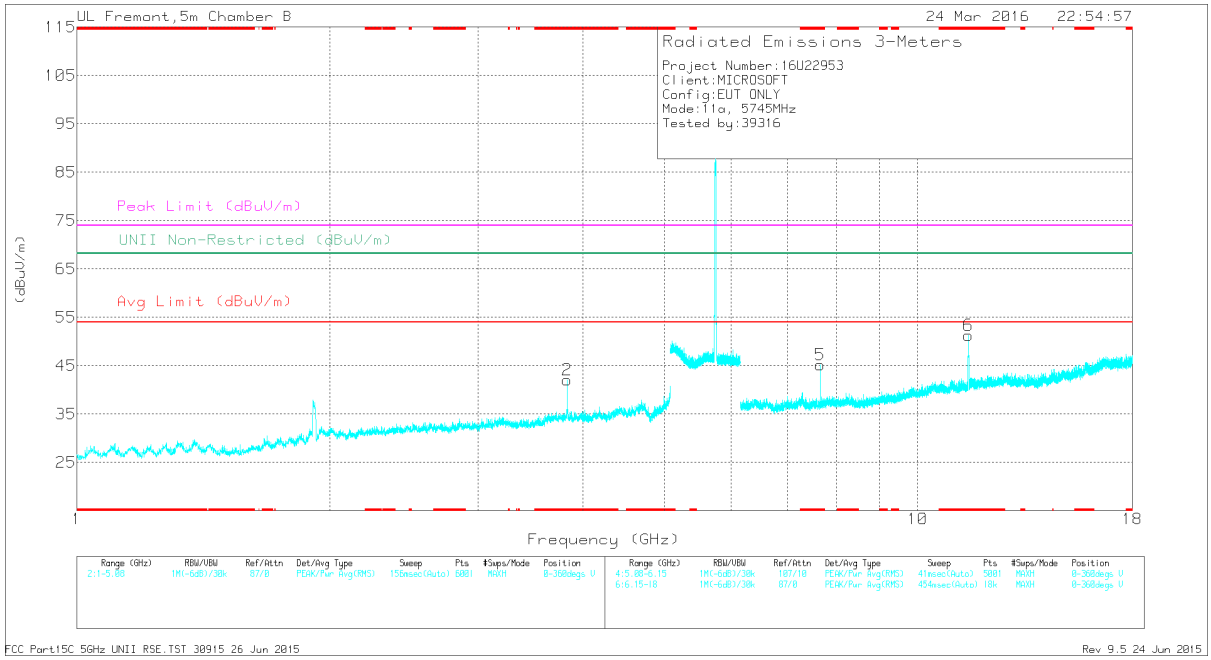


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T345 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.85	-67.54	Pk	35.2	-21.6	11.8	-42.14	-17	-25.14	129	289	V
2	5.911	-65.26	Pk	35.3	-21.2	11.8	-39.36	-27	-12.36	129	289	V

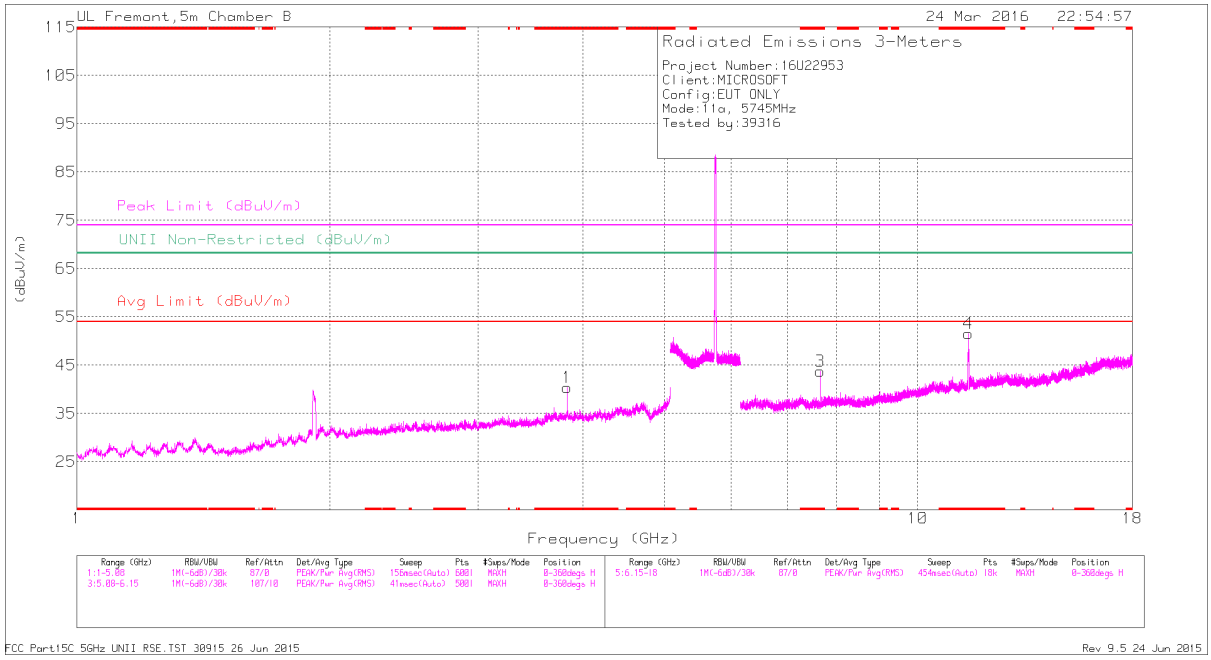
Pk - Peak detector

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZONTAL



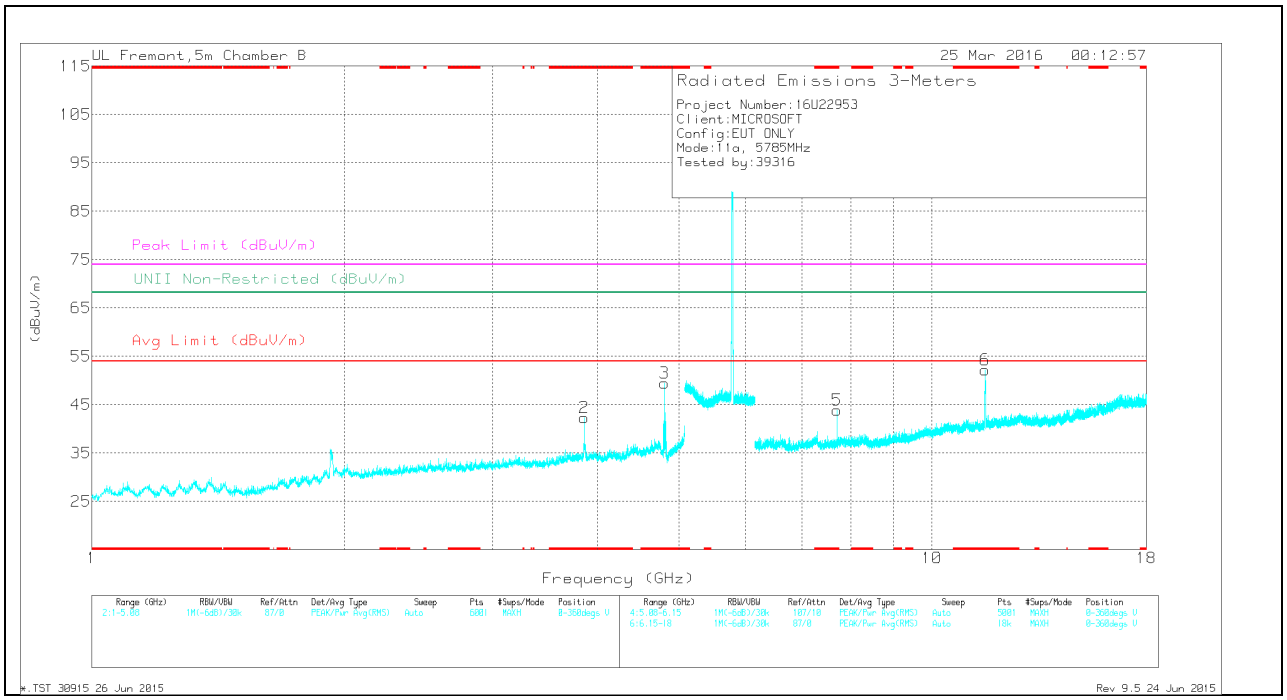
VERTICAL

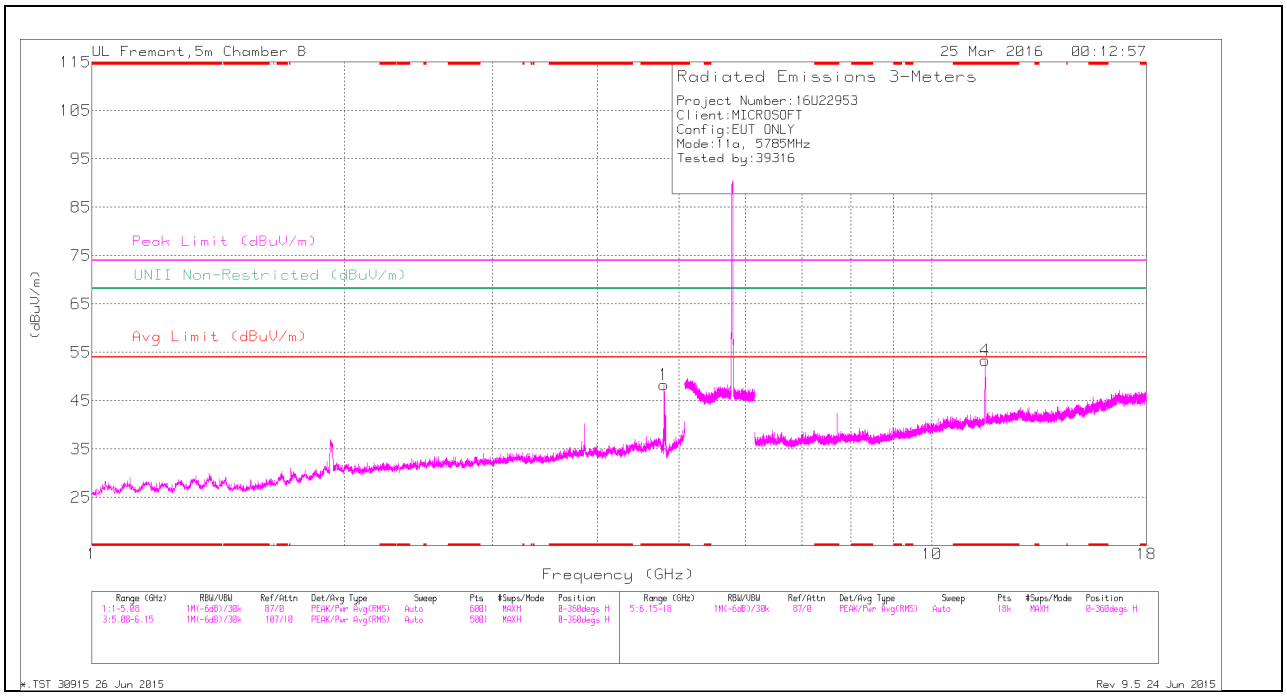
LOW CHANNEL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 3.83	47.61	PK-U	33.4	-33	48.01	-	-	74	-25.99	-	-	157	103	H
	* 3.83	39.37	ADR	33.4	-33	39.77	54	-14.23	-	-	-	-	157	103	H
2	* 3.83	49.44	PK-U	33.4	-33	49.84	-	-	74	-24.16	-	-	214	105	V
	* 3.83	41	ADR	33.4	-33	41.4	54	-12.6	-	-	-	-	214	105	V
3	* 7.66	44.18	PK-U	35.7	-30.2	49.68	-	-	74	-24.32	-	-	271	105	H
	* 7.66	37.65	ADR	35.7	-30.2	43.15	54	-10.85	-	-	-	-	271	105	H
4	* 11.492	51.69	PK-U	38.3	-25.8	64.19	-	-	74	-9.81	-	-	144	113	H
	* 11.49	37.91	ADR	38.3	-25.8	50.41	54	-3.59	-	-	-	-	144	113	H
5	* 7.66	45	PK-U	35.7	-30.2	50.5	-	-	74	-23.5	-	-	17	113	V
	* 7.66	38.91	ADR	35.7	-30.2	44.41	54	-9.59	-	-	-	-	17	113	V
6	* 11.486	52.15	PK-U	38.3	-25.8	64.65	-	-	74	-9.35	-	-	110	102	V
	* 11.489	38.82	ADR	38.3	-25.8	51.32	54	-2.68	-	-	-	-	110	102	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band
PK-U - U-NII: Maximum Peak
ADR - U-NII AD primary method, RMS average

MID CHANNEL RESULTS



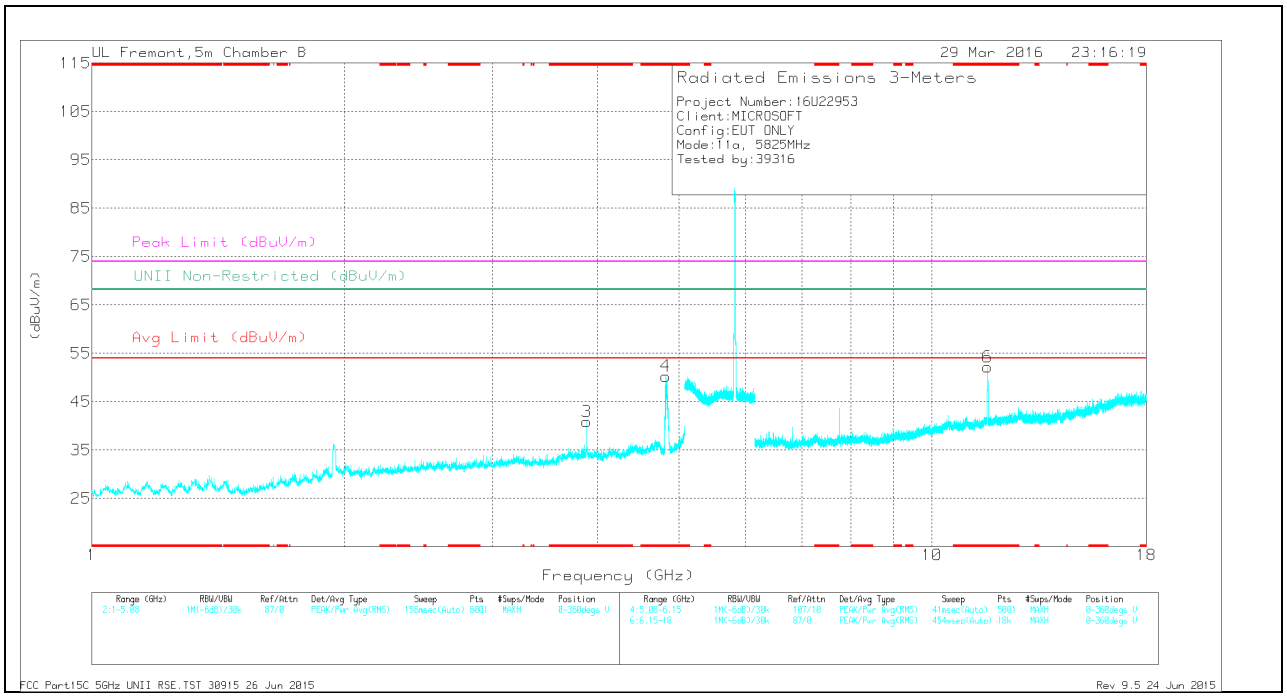


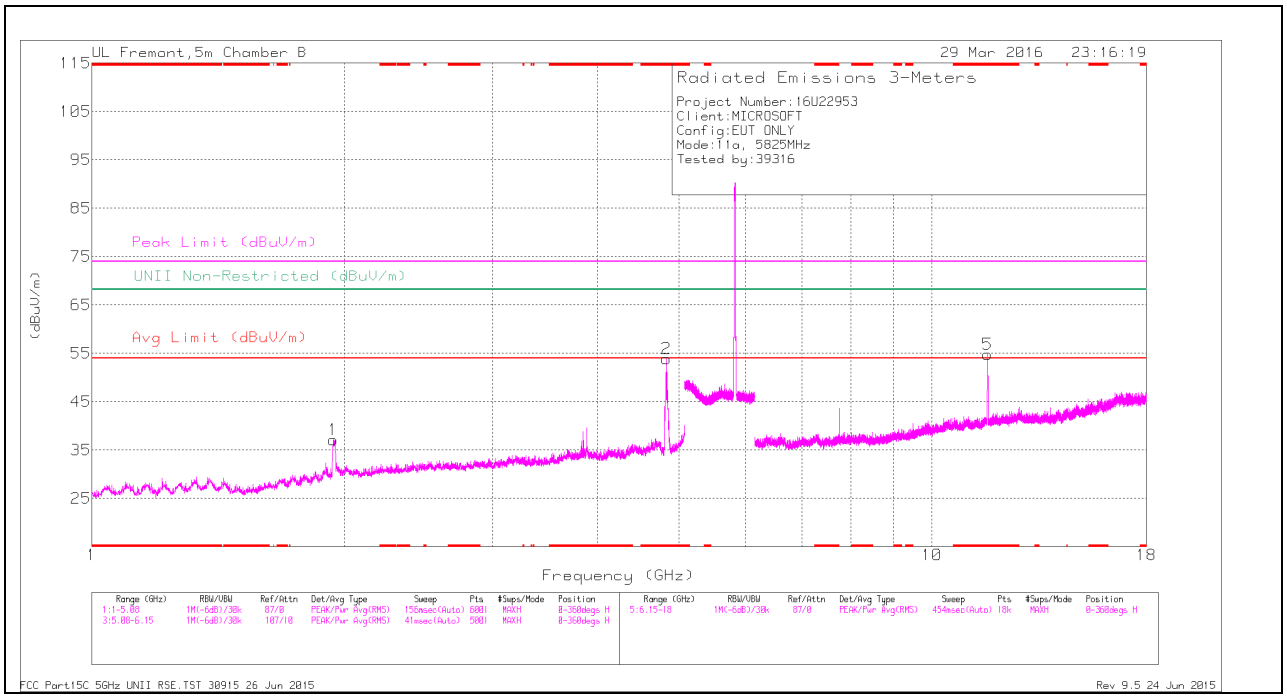
MID CHANNEL DATA

Marker	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)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.8	61.22	PK-U	33.8	-32.1	0	62.92	-	-	74	-11.08	-	-	188	183	H
	* 4.8	31.44	ADR	33.8	-32.1	0	33.14	54	-20.86	-	-	-	-	188	183	H
2	* 3.857	49.67	PK-U	33.4	-33.1	0	49.97	-	-	74	-24.03	-	-	208	120	V
	* 3.857	41.17	ADR	33.4	-33.1	0	41.47	54	-12.53	-	-	-	-	208	120	V
3	* 4.805	62.01	PK-U	33.8	-32.2	0	63.61	-	-	74	-10.39	-	-	213	206	V
	* 4.804	31.87	ADR	33.8	-32.2	0	33.47	54	-20.53	-	-	-	-	213	206	V
4	* 11.57	49.55	PK-U	38.4	-24.9	0	63.05	-	-	74	-10.95	-	-	221	114	H
	* 11.57	36.78	ADR	38.4	-24.9	0	50.28	54	-3.72	-	-	-	-	221	114	H
5	* 7.713	44.37	PK-U	35.8	-29.7	0	50.47	-	-	74	-23.53	-	-	20	116	V
	* 7.713	37.58	ADR	35.8	-29.7	0	43.68	54	-10.32	-	-	-	-	20	116	V
6	* 11.571	48.68	PK-U	38.4	-24.9	0	62.18	-	-	74	-11.82	-	-	98	108	V
	* 11.57	35.28	ADR	38.4	-24.9	0	48.78	54	-5.22	-	-	-	-	98	108	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band
PK-U - U-NII: Maximum Peak
ADR - U-NII AD primary method, RMS average

HIGH CHANNEL RESULTS





HIGH CHANNEL DATA

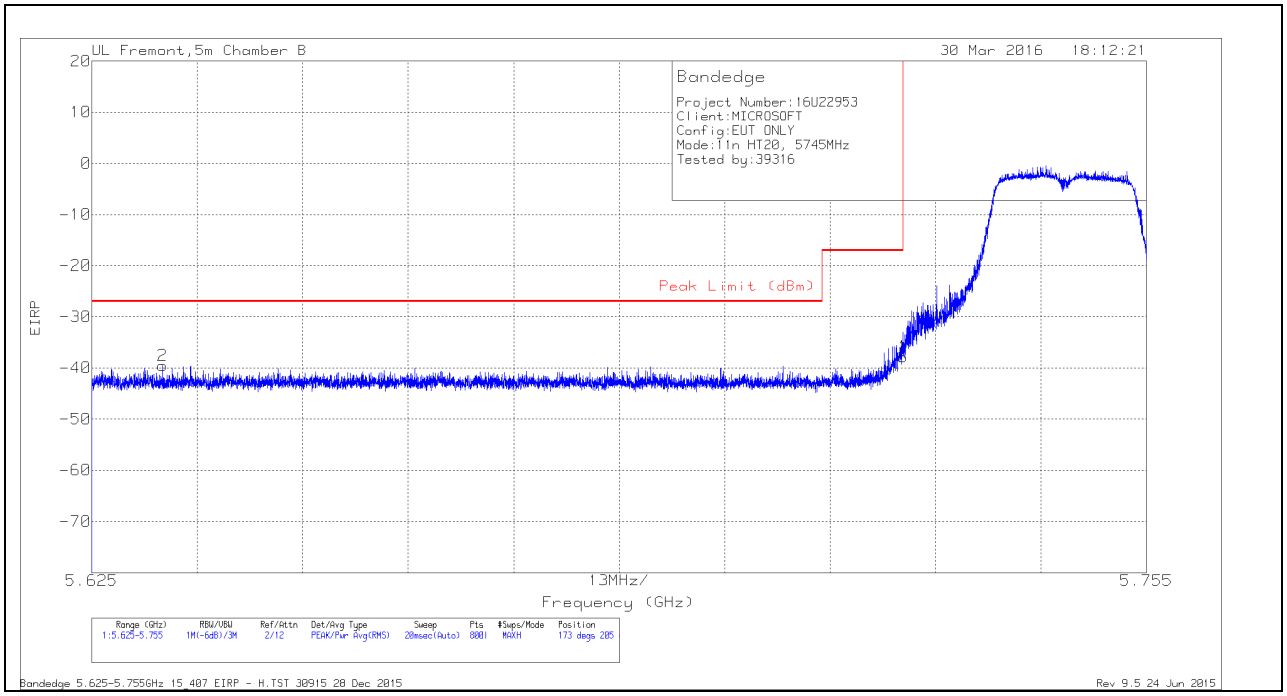
Markers	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 4.827	69.28	PK-U	33.8	-32.4	70.68	-	-	74	-3.32	-	-	330	108	H
	* 4.828	39.63	ADR	33.8	-32.4	41.03	54	-12.97	-	-	-	-	330	108	H
3	* 3.883	48.82	PK-U	33.3	-32.8	49.32	-	-	74	-24.68	-	-	205	103	V
	* 3.883	39.99	ADR	33.3	-32.8	40.49	54	-13.51	-	-	-	-	205	103	V
4	* 4.824	66.99	PK-U	33.8	-32.4	68.39	-	-	74	-5.61	-	-	153	196	V
	* 4.828	37.82	ADR	33.8	-32.4	39.22	54	-14.78	-	-	-	-	153	196	V
5	* 11.649	50.91	PK-U	38.5	-25.1	64.31	-	-	74	-9.69	-	-	222	103	H
	* 11.651	38.05	ADR	38.5	-25.1	51.45	54	-2.55	-	-	-	-	222	103	H
6	* 11.646	49.23	PK-U	38.5	-25	62.73	-	-	74	-11.27	-	-	91	102	V
	* 11.651	36.81	ADR	38.5	-25.2	50.11	54	-3.89	-	-	-	-	91	102	V
1	1.94	48.81	PK-U	31.1	-34.2	45.71	-	-	-	-	68.2	-22.49	149	204	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band
PK-U - U-NII: Maximum Peak
ADR - U-NII AD primary method, RMS average

5.1.2. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 5.8 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL)

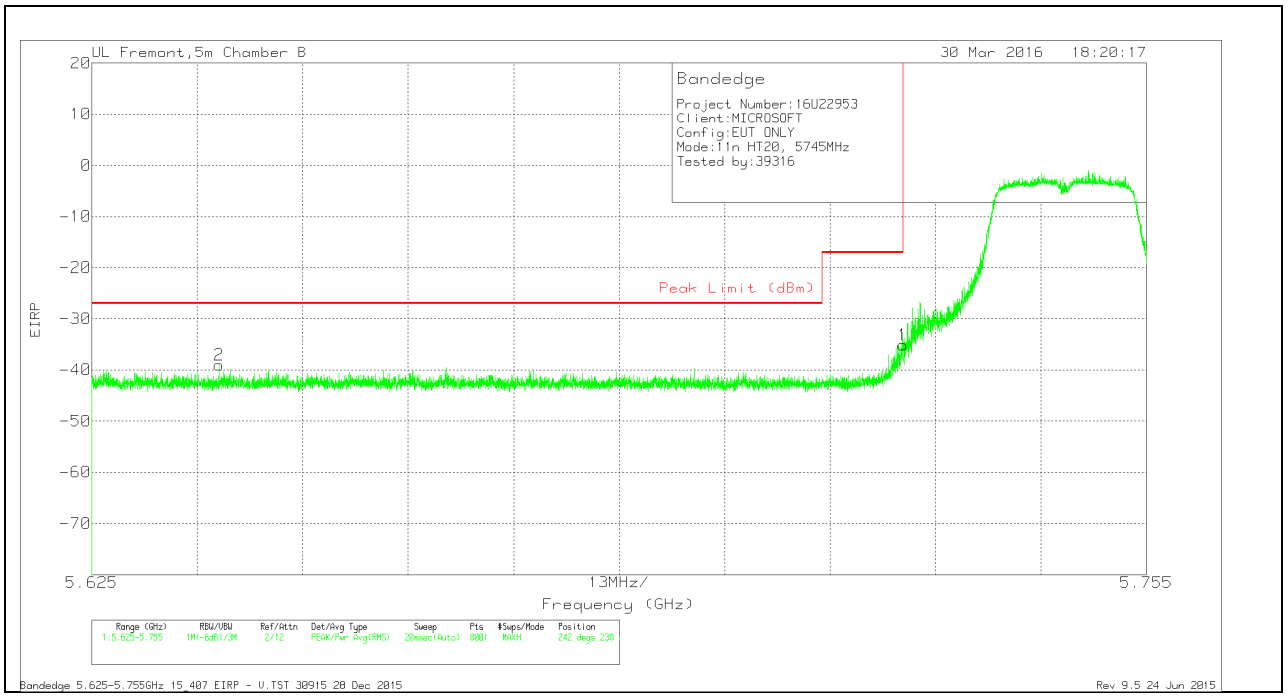
HORIZONTAL RESULTS



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T345 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	5.634	-64.4	Pk	34.6	-21.5	11.8	-39.5	-27	-12.5	173	205	H
1	5.725	-62.85	Pk	34.9	-21.7	11.8	-37.85	-17	-20.85	173	205	H

Pk - Peak detector

VERTICAL RESULTS

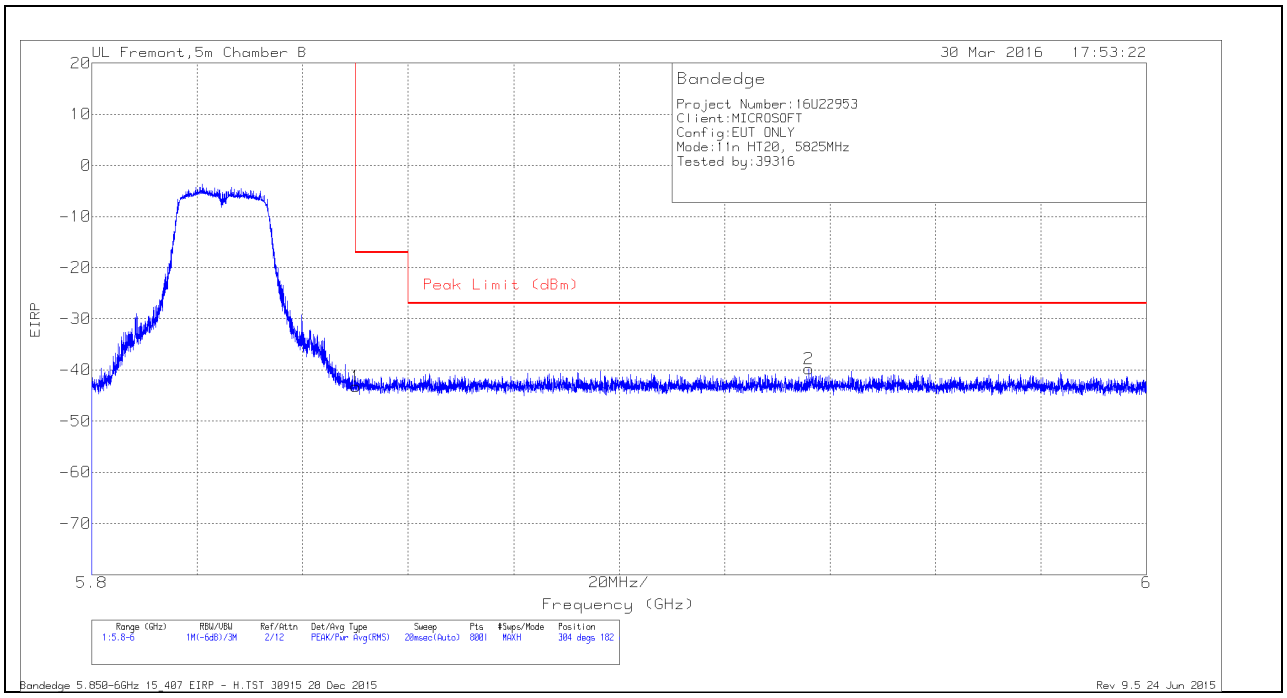


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T345 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	5.641	-64.06	Pk	34.7	-21.5	11.8	-39.06	-27	-12.06	242	238	V
1	5.725	-60.11	Pk	34.9	-21.7	11.8	-35.11	-17	-18.11	242	238	V

Pk - Peak detector

AUTHORIZED BANDEDGE (HIGH CHANNEL)

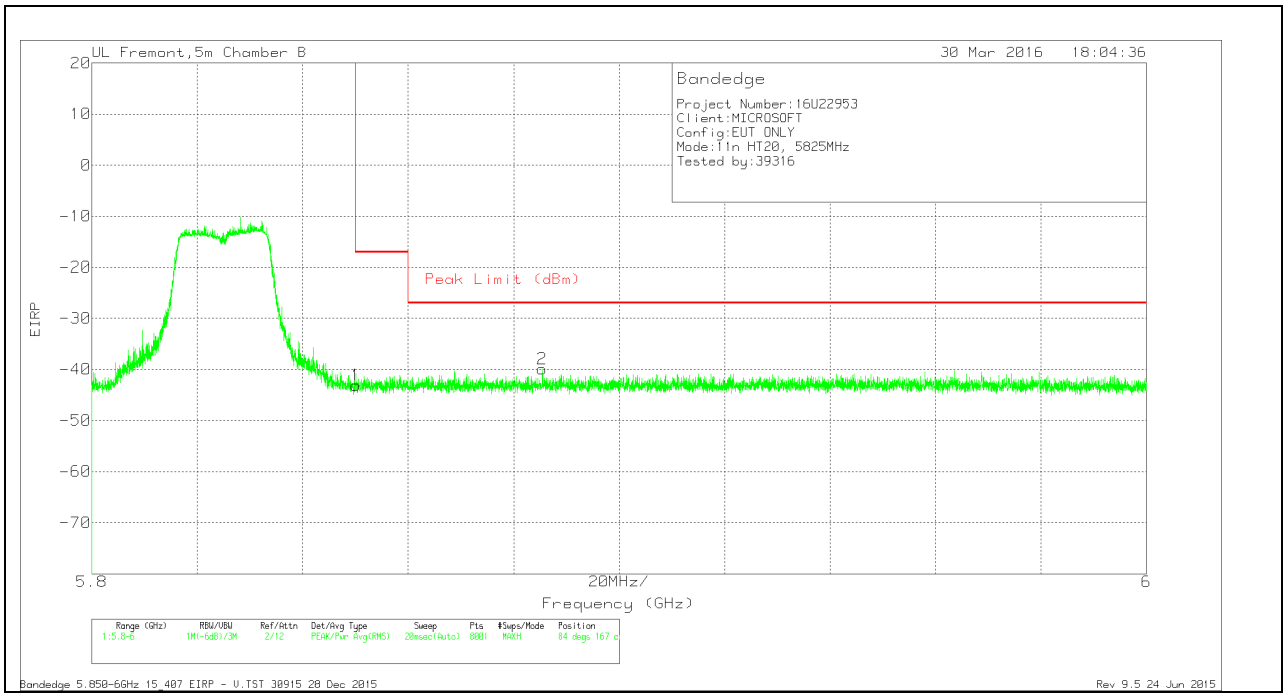
HORIZONTAL RESULTS



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T345 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.85	-68.61	Pk	35.2	-21.6	11.8	-43.21	-17	-26.21	304	182	H
2	5.936	-65.36	Pk	35.3	-21.5	11.8	-39.76	-27	-12.76	304	182	H

Pk - Peak detector

VERTICAL RESULTS

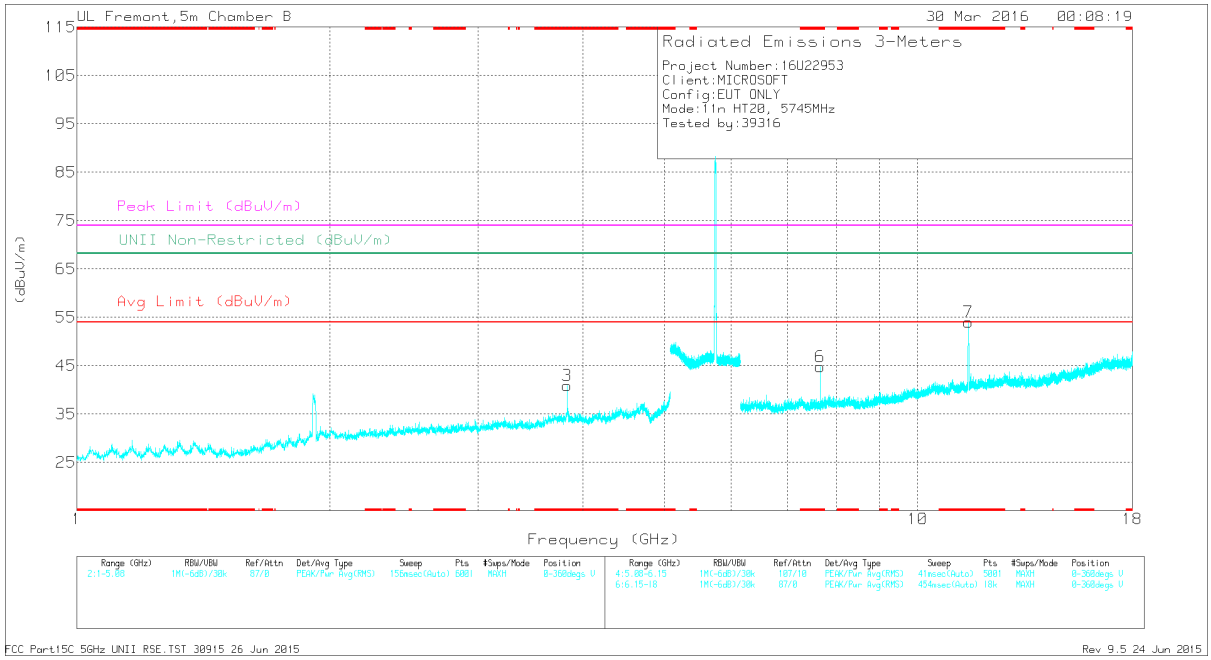


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T345 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.85	-68.44	Pk	35.2	-21.6	11.8	-43.04	-17	-26.04	84	167	V
2	5.885	-65.75	Pk	35.3	-21.3	11.8	-39.95	-27	-12.95	84	167	V

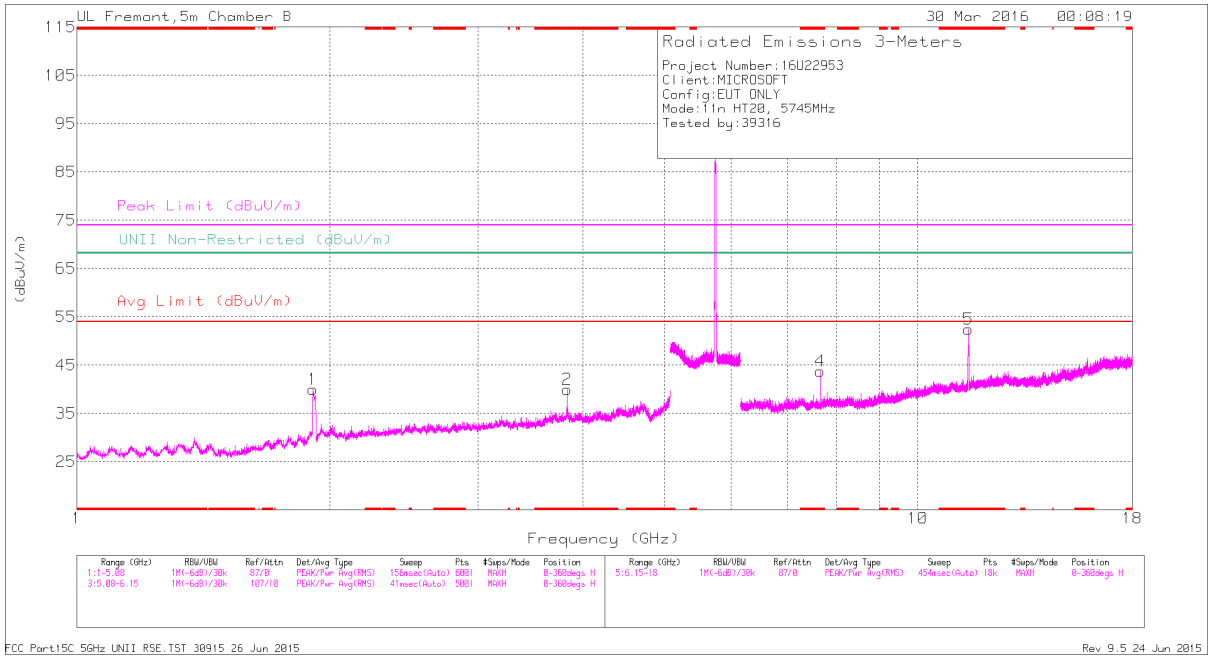
Pk - Peak detector

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZONTAL



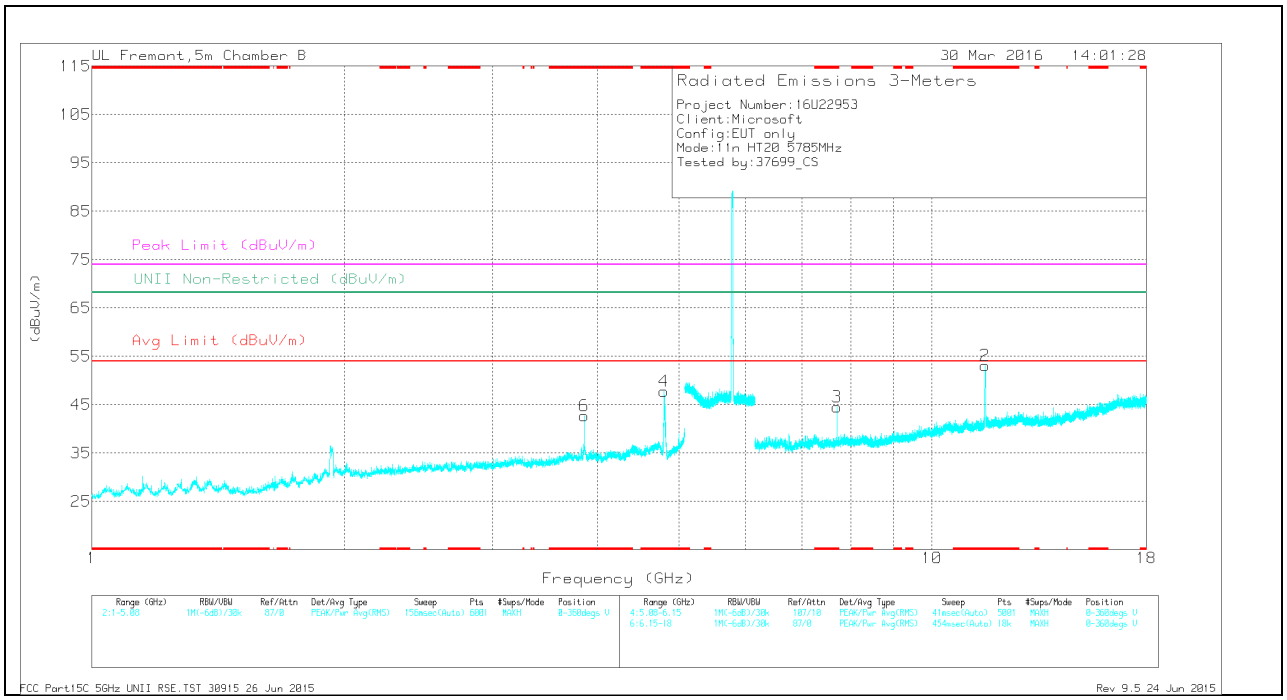
VERTICAL

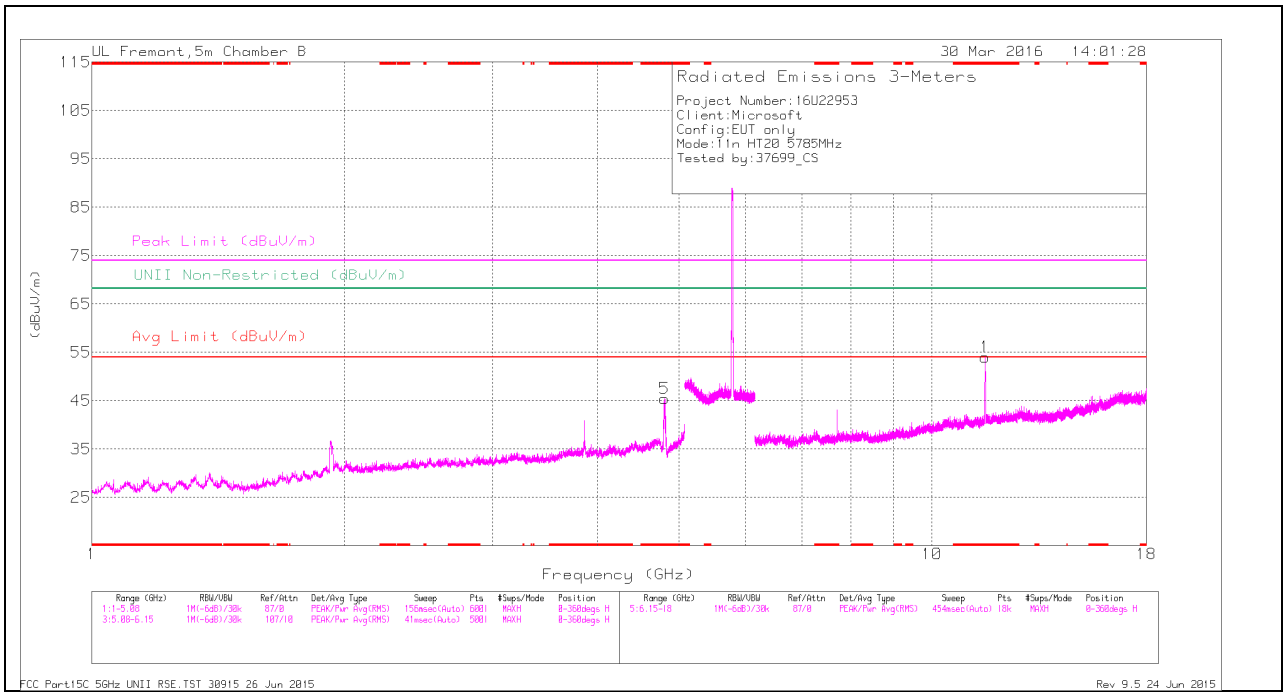
LOW CHANNEL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 3.83	46.77	PK-U	33.4	-33	47.17	-	-	74	-26.83	-	-	167	103	H
	* 3.83	38.16	ADR	33.4	-33	38.56	54	-15.44	-	-	-	-	167	103	H
3	* 3.83	49.11	PK-U	33.4	-33	49.51	-	-	74	-24.49	-	-	28	266	V
	* 3.83	39.96	ADR	33.4	-33	40.36	54	-13.64	-	-	-	-	28	266	V
4	* 7.66	44.6	PK-U	35.7	-30.2	50.1	-	-	74	-23.9	-	-	265	102	H
	* 7.66	38.03	ADR	35.7	-30.2	43.53	54	-10.47	-	-	-	-	265	102	H
5	* 11.488	50.58	PK-U	38.3	-25.8	63.08	-	-	74	-10.92	-	-	139	104	H
	* 11.489	37.71	ADR	38.3	-25.8	50.21	54	-3.79	-	-	-	-	139	104	H
6	* 7.66	44.69	PK-U	35.7	-30.2	50.19	-	-	74	-23.81	-	-	165	221	V
	* 7.66	38.52	ADR	35.7	-30.2	44.02	54	-9.98	-	-	-	-	165	221	V
7	* 11.49	52.3	PK-U	38.3	-25.8	64.8	-	-	74	-9.2	-	-	104	101	V
	* 11.488	38.51	ADR	38.3	-25.8	51.01	54	-2.99	-	-	-	-	104	101	V
1	1.91	51.97	PK-U	30.9	-34.1	48.77	-	-	-	-	68.2	-19.43	133	113	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band
PK-U - U-NII: Maximum Peak
ADR - U-NII AD primary method, RMS average

MID CHANNEL RESULTS



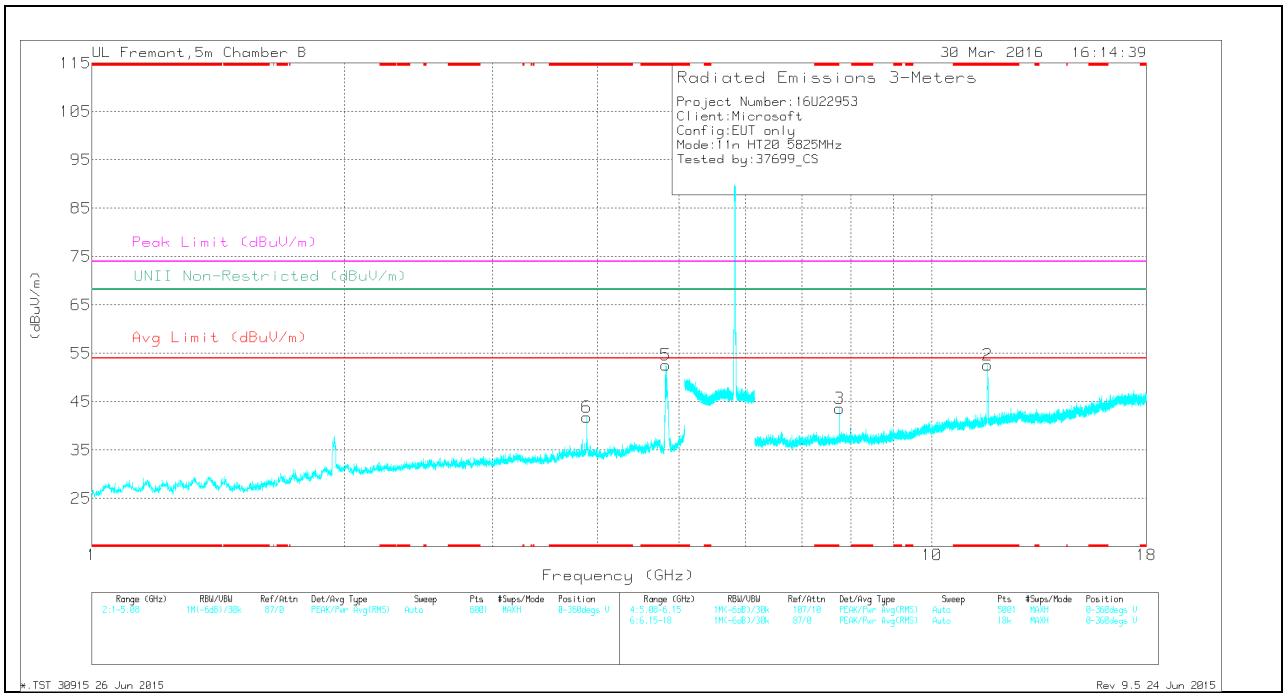


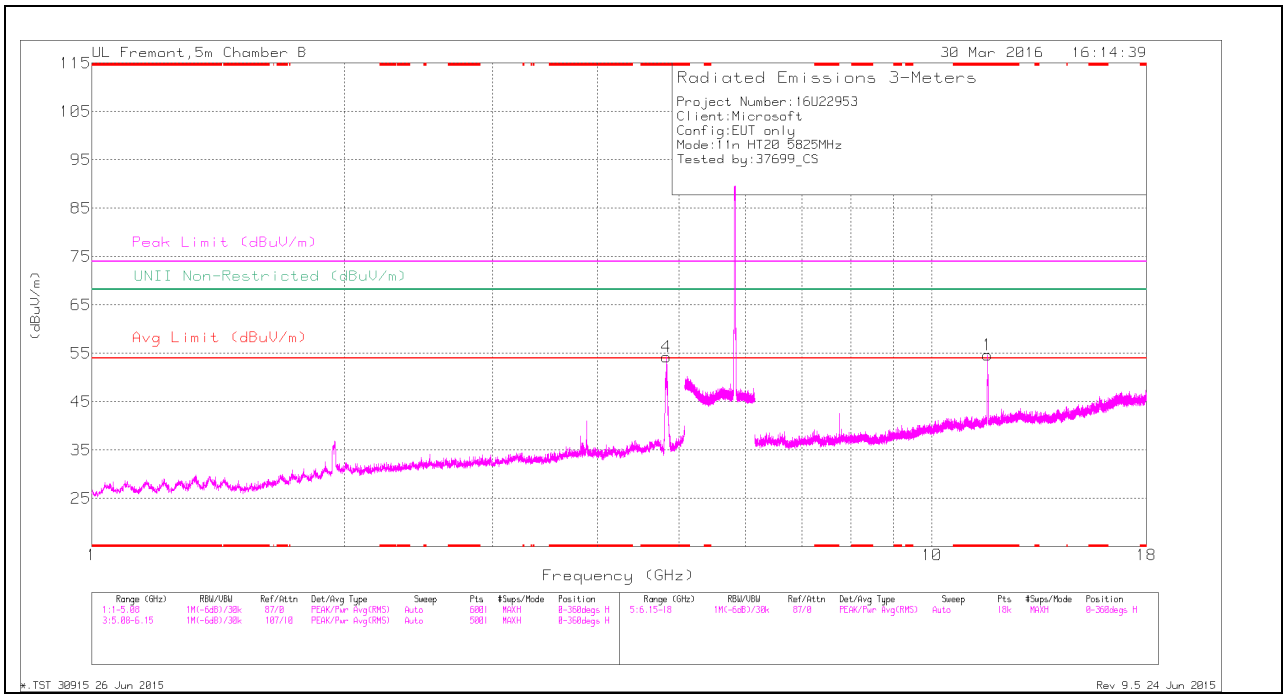
MID CHANNEL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
5	* 4.801	62.87	PK-U	33.8	-32.1	64.57	-	-	74	-9.43	-	-	326	105	H
	* 4.802	33.73	ADR	33.8	-32.1	35.43	54	-18.57	-	-	-	-	326	105	H
4	* 4.801	63.72	PK-U	33.8	-32.1	65.42	-	-	74	-8.58	-	-	342	269	V
	* 4.801	33.26	ADR	33.8	-32.1	34.96	54	-19.04	-	-	-	-	342	269	V
6	* 3.857	49.47	PK-U	33.4	-33.1	49.77	-	-	74	-24.23	-	-	218	275	V
	* 3.857	40.4	ADR	33.4	-33.1	40.7	54	-13.3	-	-	-	-	218	275	V
1	* 11.569	50.62	PK-U	38.4	-24.9	64.12	-	-	74	-9.88	-	-	322	110	H
	* 11.57	37.35	ADR	38.4	-24.9	50.85	54	-3.15	-	-	-	-	322	110	H
2	* 11.569	49.98	PK-U	38.4	-24.9	63.48	-	-	74	-10.52	-	-	300	108	V
	* 11.57	32.13	ADR	38.4	-24.9	45.63	54	-8.37	-	-	-	-	300	108	V
3	* 7.713	43.77	PK-U	35.8	-29.7	49.87	-	-	74	-24.13	-	-	198	115	H
	* 7.713	37.54	ADR	35.8	-29.7	43.64	54	-10.36	-	-	-	-	198	115	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band
PK-U - U-NII: Maximum Peak
ADR - U-NII AD primary method, RMS average

HIGH CHANNEL RESULTS





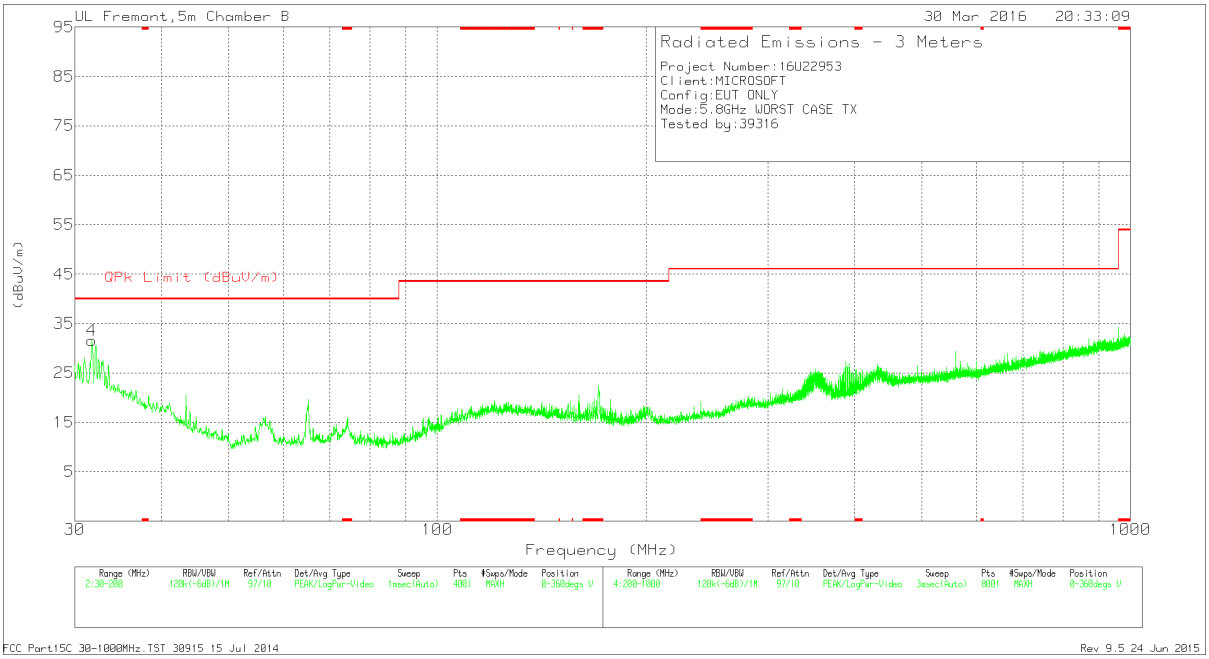
HIGH CHANNEL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* 4.823	65.43	PK-U	33.8	-32.4	66.83	-	-	74	-7.17	-	-	158	150	H
	* 4.825	35.68	ADR	33.8	-32.4	37.08	54	-16.92	-	-	-	-	158	150	H
5	* 4.825	69.41	PK-U	33.8	-32.4	70.81	-	-	74	-3.19	-	-	37	249	V
	* 4.826	39.4	ADR	33.8	-32.4	40.8	54	-13.2	-	-	-	-	37	249	V
6	* 3.884	49.57	PK-U	33.3	-32.8	50.07	-	-	74	-23.93	-	-	35	107	V
	* 3.883	41.02	ADR	33.3	-32.8	41.52	54	-12.48	-	-	-	-	35	107	V
1	* 11.651	50.9	PK-U	38.5	-25.2	64.2	-	-	74	-9.8	-	-	47	104	H
	* 11.65	38.24	ADR	38.5	-25.1	51.64	54	-2.36	-	-	-	-	47	104	H
2	* 11.652	48.55	PK-U	38.5	-25.2	61.85	-	-	74	-12.15	-	-	291	101	V
	* 11.651	36.48	ADR	38.5	-25.2	49.78	54	-4.22	-	-	-	-	291	101	V
3	7.767	44.3	PK-U	35.8	-29.5	50.6	-	-	-	-	68.2	-17.6	220	103	V

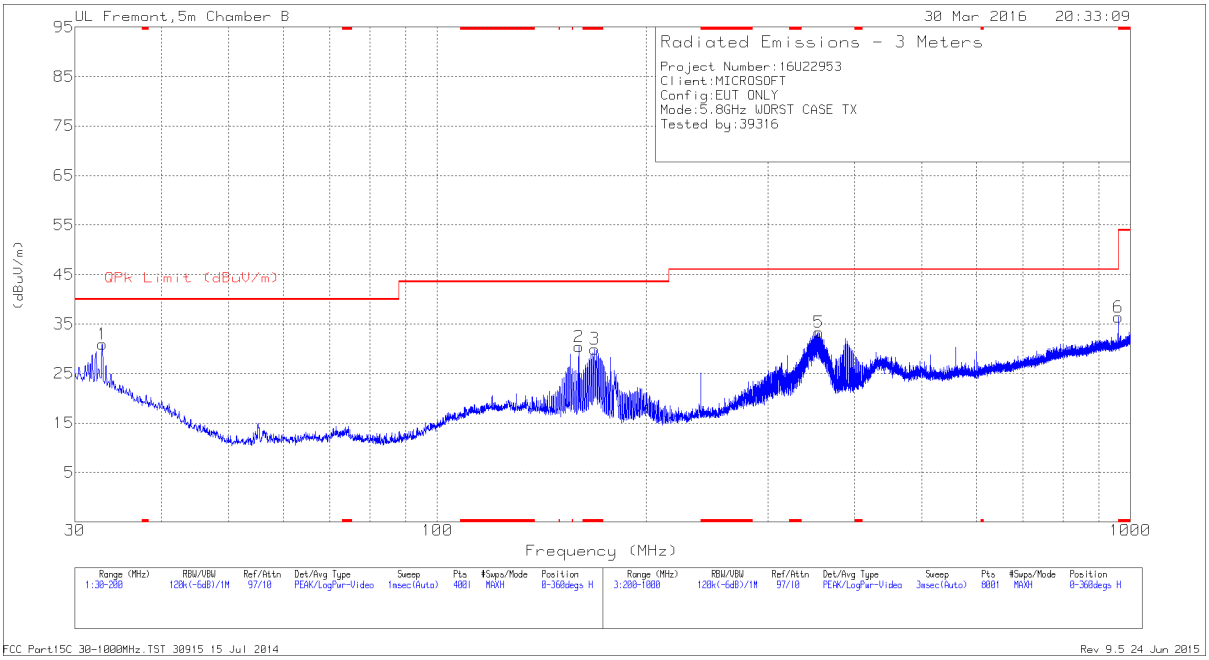
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band
PK-U - U-NII: Maximum Peak
ADR - U-NII AD primary method, RMS average

5.2. WORST-CASE BELOW 1 GHz

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



HORIZONTAL



VERTICAL

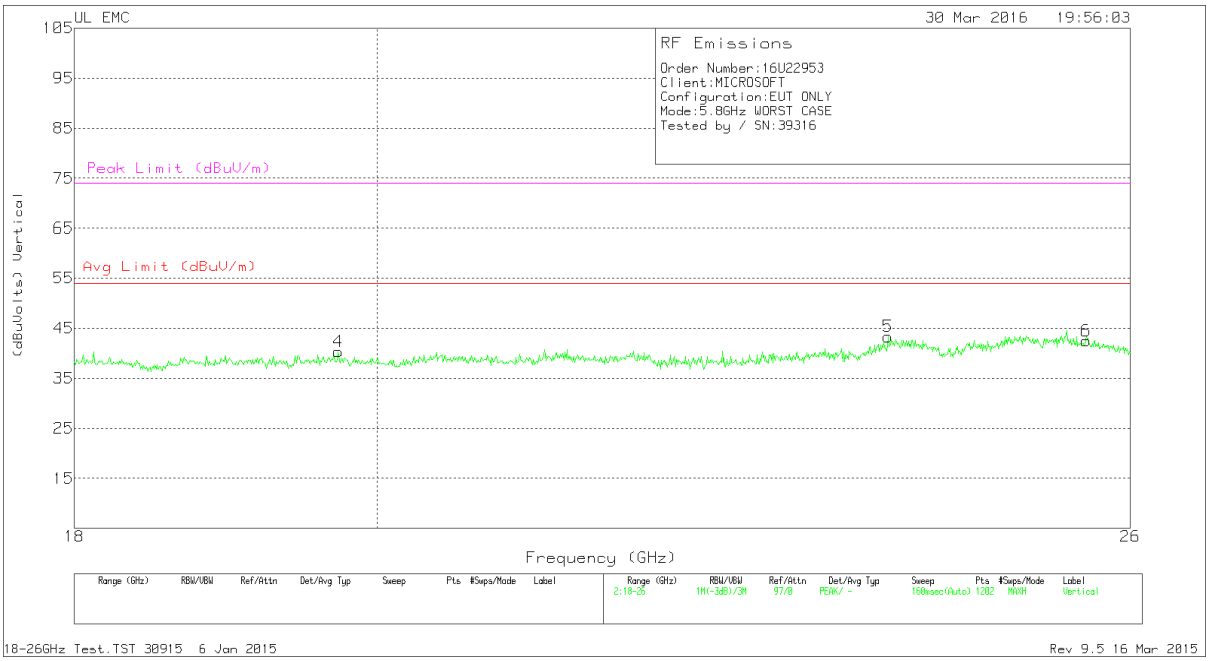
Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T130 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	* 168.7625	41.58	Pk	15.8	-27.4	29.98	43.52	-13.54	0-360	199	H
6	* 960	33.18	Pk	26.7	-23.5	36.38	46.02	-9.64	0-360	101	H
4	31.7425	36.48	Pk	24	-28.9	31.58	40	-8.42	0-360	101	V
1	32.8475	36.56	Pk	23.2	-28.8	30.96	40	-9.04	0-360	100	H
2	160.0075	41.82	Pk	16.1	-27.5	30.42	43.52	-13.1	0-360	199	H
5	355	40.91	Pk	18.5	-26.1	33.31	46.02	-12.71	0-360	101	H

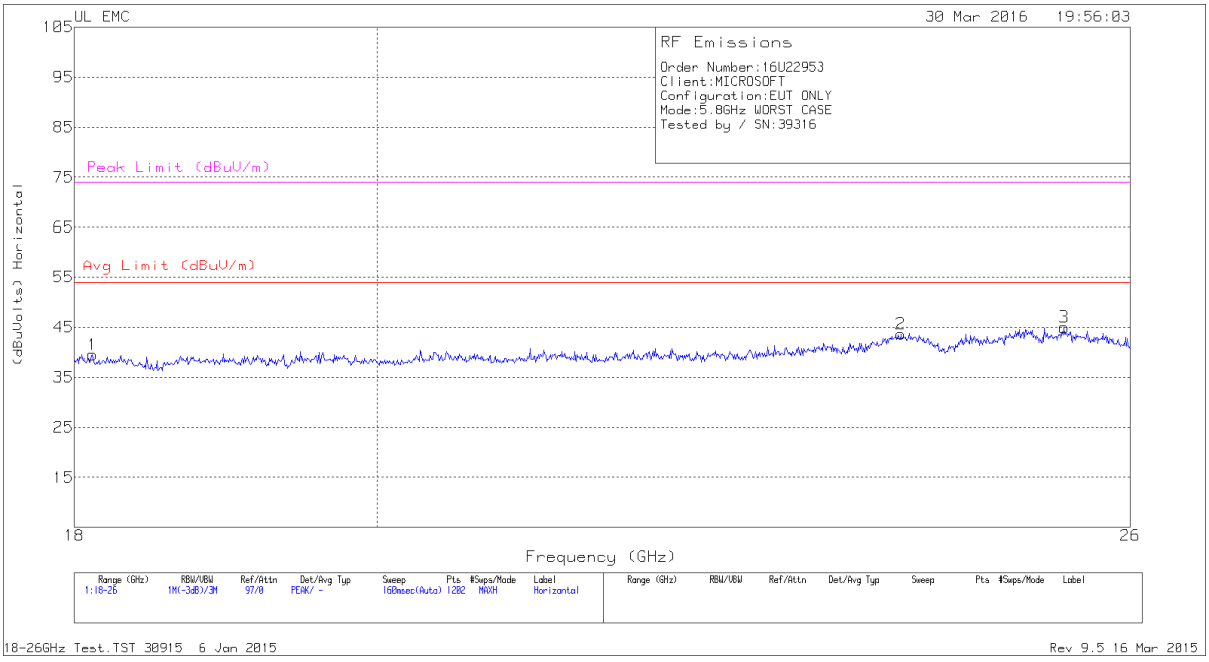
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band
Pk - Peak detector

5.3. WORST-CASE 18 GHz – 26 GHz

SPURIOUS EMISSIONS 18-26 GHz (WORST-CASE CONFIGURATION)



HORIZONTAL



VERTICAL

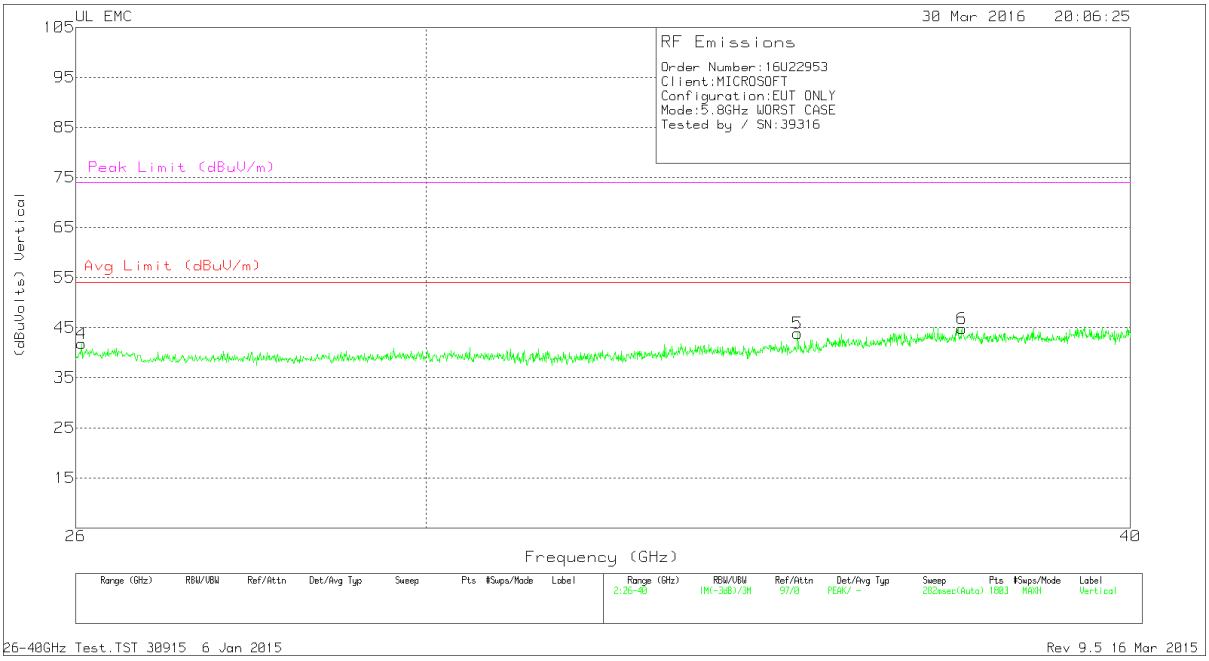
Data

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T477 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	18.113	42.2	Pk	32.3	-25.5	-9.5	39.5	54	-14.5	74	-34.5
2	24.002	43.97	Pk	33.6	-24.4	-9.5	43.67	54	-10.33	74	-30.33
3	25.407	44.7	Pk	34.2	-24.4	-9.5	45	54	-9	74	-29
4	19.732	41.93	Pk	32.8	-24.9	-9.5	40.33	54	-13.67	74	-33.67
5	23.895	42.93	Pk	33.7	-23.8	-9.5	43.33	54	-10.67	74	-30.67
6	25.6	42.6	Pk	34.3	-24.9	-9.5	42.5	54	-11.5	74	-31.5

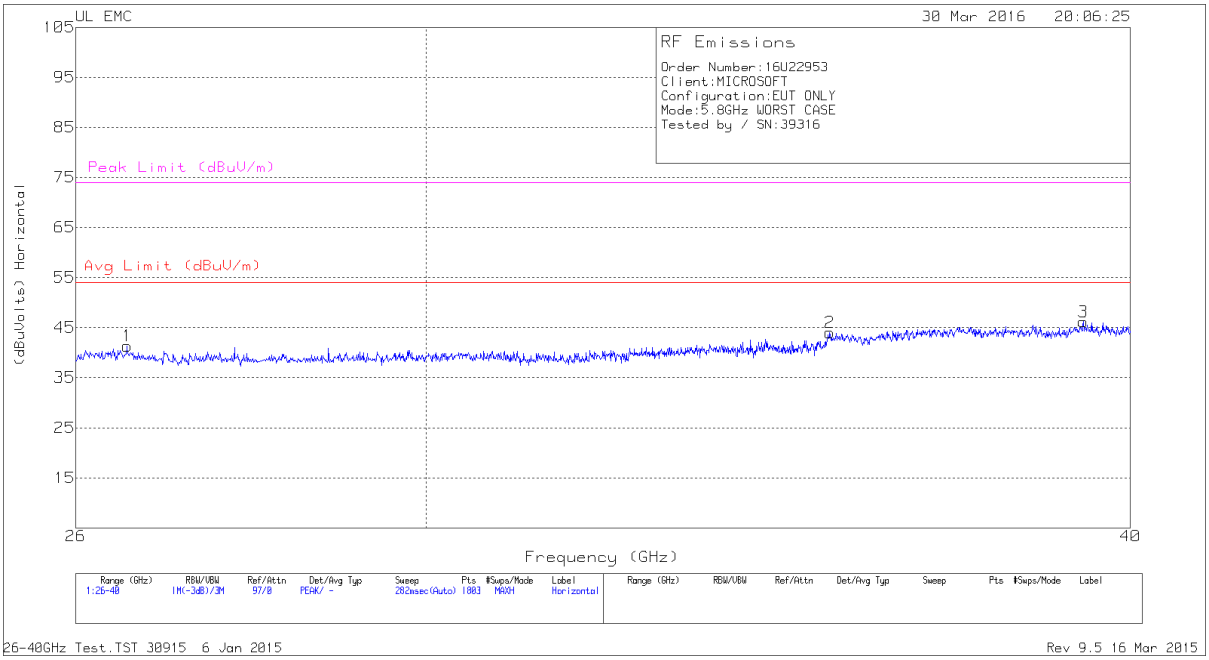
Pk - Peak detector

5.4. WORST-CASE 26 GHz – 40 GHz

SPURIOUS EMISSIONS 26-40 GHz (WORST-CASE CONFIGURATION)



HORIZONTAL



VERTICAL

Data

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T90 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	26.552	45.63	Pk	35.5	-30.3	-9.5	41.33	54	-12.67	74	-32.67
2	35.377	49.1	Pk	37.8	-33.4	-9.5	44	54	-10	74	-30
3	39.239	49.37	Pk	38.5	-32.2	-9.5	46.17	54	-7.83	74	-27.83
4	26.062	46.23	Pk	35.6	-30.5	-9.5	41.83	54	-12.17	74	-32.17
5	34.919	49.33	Pk	37.2	-33.2	-9.5	43.83	54	-10.17	74	-30.17
6	37.343	50.03	Pk	37.3	-33	-9.5	44.83	54	-9.17	74	-29.17

Pk - Peak detector