



CERTIFICATION TEST REPORT

Report Number : 11882202-E3V2

Applicant : MICROSOFT CORP
ONE MICROSOFT WAY
REDMOND, WA 98052, U.S.A.

Model : 1832

FCC ID : C3K1832

IC : 3048A-1832

EUT Description : PORTABLE COMPUTING DEVICE

Test Standard(s) : FCC 47 CFR PART 15 SUBPART C
INDUSTRY CANADA RSS - 247 ISSUE 2

Date Of Issue:
September 28, 2017

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	09/07/17	Initial Release	---
V2	09/28/17	- Updated output power measurement method in section 8.1	C. Susa

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1. ATTESTATION OF TEST RESULTS

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

EUT DESCRIPTION: PORTABLE COMPUTING DEVICE

MODEL: 1832

SERIAL NUMBER: Radiated: 012813672657
Conducted: 009698372657

DATE TESTED: AUGUST 11– AUGUST 24, 2017

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-247 Issue 2	Pass
INDUSTRY CANADA RSS-GEN Issue 4	Pass

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

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

Approved & Released For
UL Verification Services Inc. By:



FRANCISCO DE ANDA
WiSE Program Manager
UL VERIFICATION SERVICES INC.

Prepared By:



ERIC YU
WiSE LAB ENGINEER
UL VERIFICATION SERVICES INC.

2. TEST METHODOLOGY

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

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: 22541-1)
☒ Chamber B(IC: 2324B-2)	☐ Chamber E(IC: 22541-2)
☒ Chamber C(IC: 2324B-3)	☐ Chamber F(IC: 22541-3)
	☐ Chamber G(IC: 22541-4)
	☐ Chamber H(IC: 22541-5)

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. Chambers A through C are covered under Industry Canada company address code 2324B with site numbers 2324B -1 through 2324B-3, respectively. Chambers D through H are covered under Industry Canada company address code 22541 with site numbers 22541 -1 through 22541-5, respectively.

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:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

4.3. MEASUREMENT UNCERTAINTY

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

Parameter	Uncertainty
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.84 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.65 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	3.15 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	5.36 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.32 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.45 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.24 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a portable computing device with 802.11 2x2, a/b/g/n/ac WLAN, Bluetooth, Bluetooth LE.

5.2. MAXIMUM OUTPUT POWER

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

Frequency Range	Mode	Output Power (dBm)	Output Power (mW)
2402 - 2480	BLE	2.34	1.71

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

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2402 - 2480	BLE	2.18	1.65

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes integrated antenna, with the maximum gains:

Frequency Band (GHz)	Antenna Gain (dBi)
2402-2480	3.26

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was 14.2.201.159

The test utility software used during testing was Wifi tool v2.7.5

5.5. WORST-CASE CONFIGURATION AND MODE

Radiated band edge, harmonics, and spurious emissions from 1 GHz to 18GHz were performed with the EUT was set to transmit at the Low/Middle/High channels.

Radiated emission below 30MHz, below 1GHz, above 18GHz, and power line conducted emission were performed with the EUT was set to transmit at the channel with highest output power as worst-case scenario.

The fundamental of the EUT was investigated in four orientations X/Y/Z and display tilted at 45degrees, it was determined that Y orientation was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in Y orientation.

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

BLE: 1 Mbps.

5.6. DESCRIPTION OF TEST SETUP

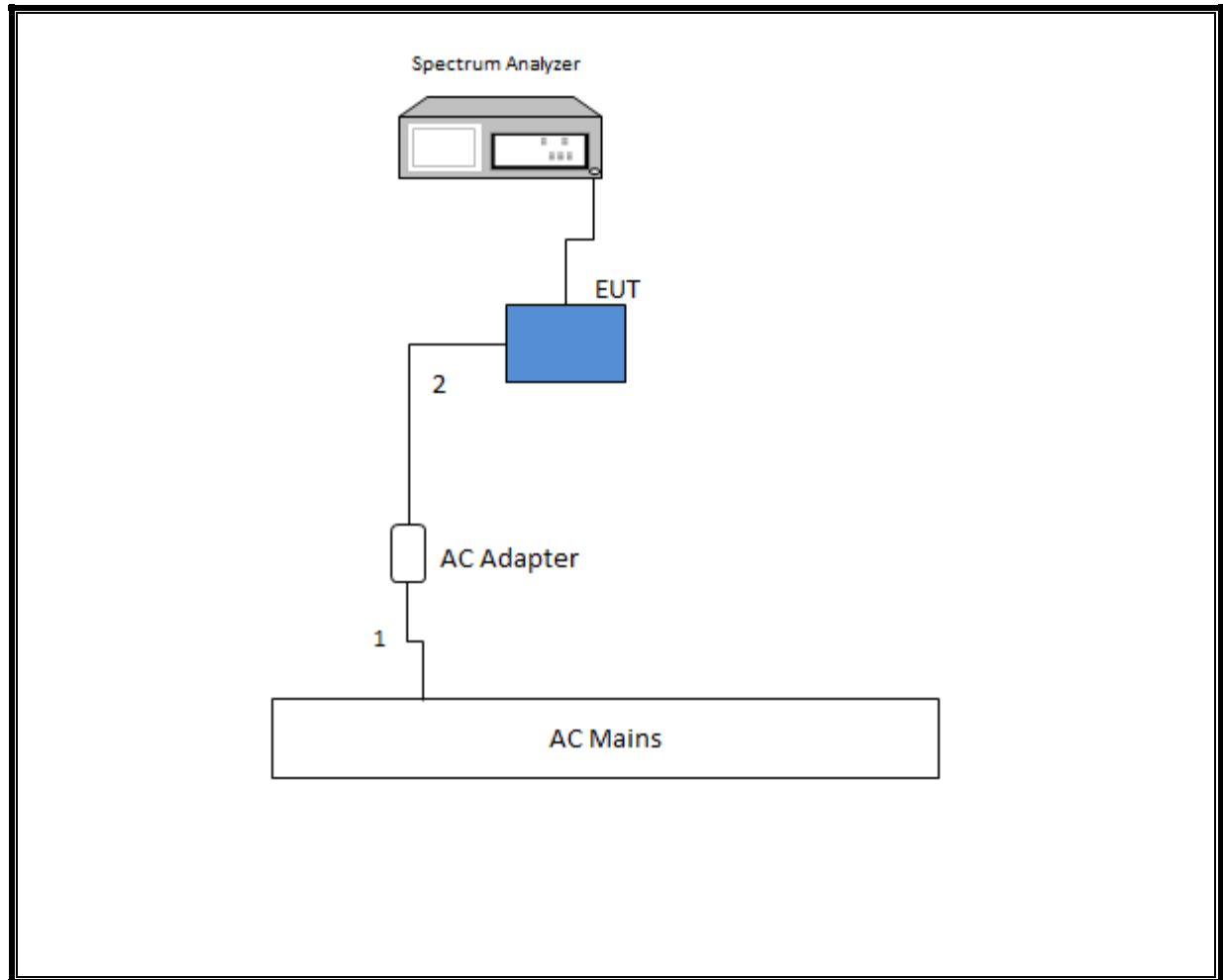
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	USB	1	USB	Un-Shielded	0.17	
2	DC	1	Proprietary	Un-Shielded	1.75	

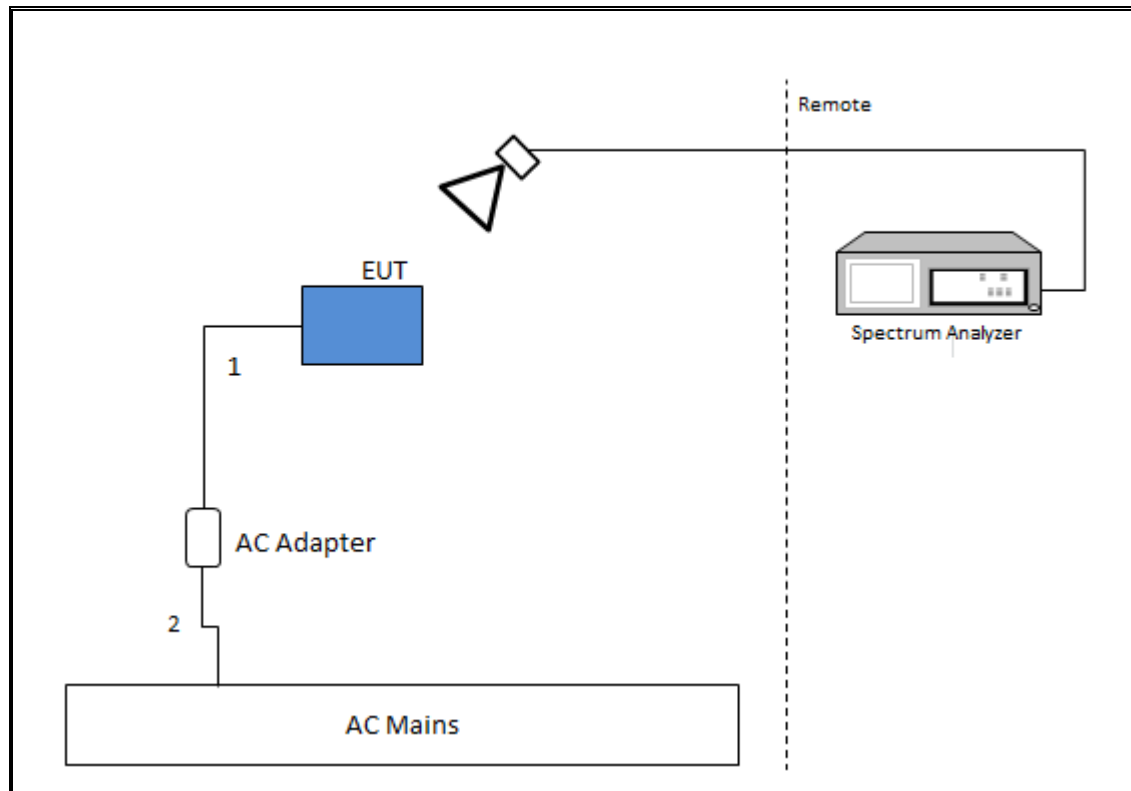
TEST SETUP

Test software is installed on the EUT that exercises the radio. During all tests the EUT is connected to the AC adapter.

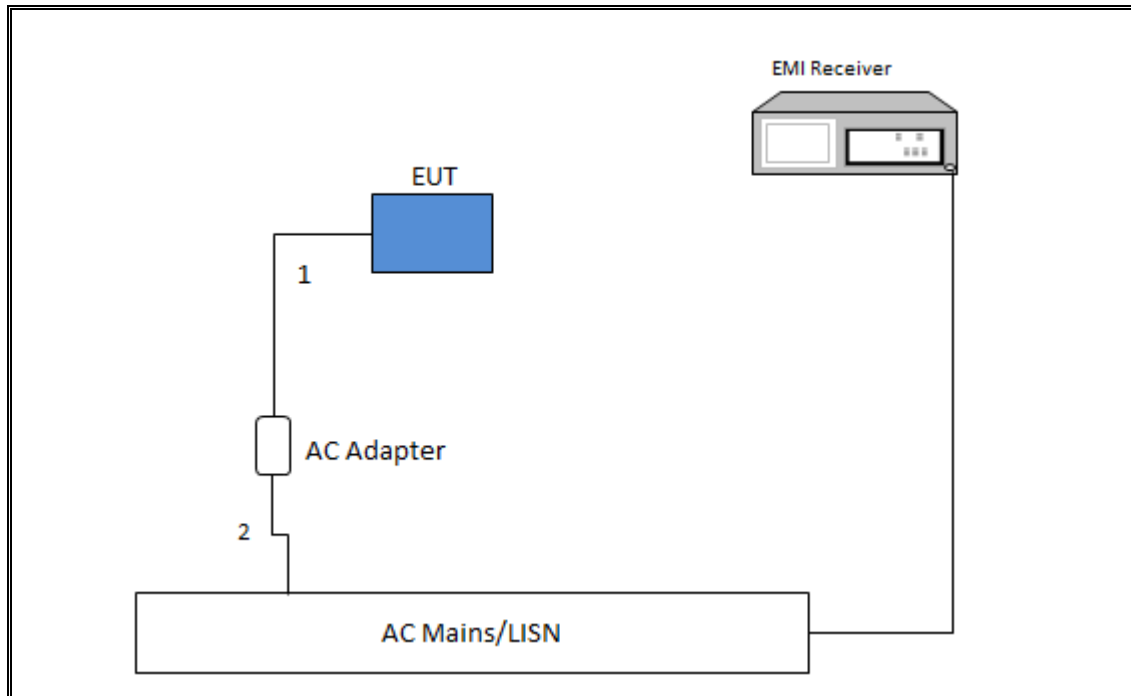
SETUP DIAGRAM FOR ANTENNA PORT CONDUCTED TESTS



SETUP DIAGRAM FOR RADIATED TESTS



SETUP DIAGRAM FOR AC LINE CONDUCTED 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	Keysight	N9030A	T1210	07/17/18
Spectrum Analyzer	Keysight	N9030A	T1466	04/11/18
Antenna, Biconolog, 30-1GHz	Sunol Sciences	JB1	T130	09/23/17
RF Preamplifier, 10kHz – 1GHz	Sonoma	310N	T300	11/10/17
Antenna, Horn, 1-18GHz	ETS Lindgren	3117	T862	06/09/18
RF Preamplifier, 1-18GHz	Miteq	AFS42-00101800-25-S-42	T1165	06/24/18
RF Preamplifier, 1-8GHz	Miteq	AMF-4D-01000800-30-29P	T1573	06/24/18
Low Pass Filter, 5GHz	Micro-Tronics	LPS17541	T481	06/24/18
High Pass Filter, 6GHz	Micro-Tronics	HPS17542	T484	06/24/18
Spectrum Analyzer	Keysight	N9030A	T907	01/23/18
RF Preamplifier, 1-18GHz	Miteq	AFS42-00101800-25-S-42	T493	02/15/18
RF Preamplifier, 1-8GHz	Miteq	AMF-4D-01000800-30-29P	T1156	02/15/18
Antenna, Horn, 1-18GHz	ETS Lindgren	3117	T863	06/09/18
Low Pass Filter, 5GHz	Micro-Tronics	LPS17541	T482	02/15/18
High Pass Filter, 6GHz	Micro-Tronics	HPS17542	T483	02/15/18
Antenna, Horn, 18-26GHz	ARA	MWH-1826/B	T449	06/12/18
RF Preamplifier, 1-26GHz	Agilent	8499B	T404	07/23/18
Antenna, Horn, 26-40GHz	ARA	MWH-2640	T90	08/25/18
RF Preamplifier, 26-40GHz	Miteq	NSP4000-SP2	T88	04/29/18
Spectrum Analyzer	Keysight	N9030A	T1454	12/15/17
EMI Receiver	Rohde & Schwarz	ESR	T1436	01/06/18
LISN	Fischer Custom Communications	FCC-LSN-50/250-25-2-01	T1310	06/15/18

Test Software List			
Description	Manufacturer	Model	Version
Radiated Software	UL	UL EMC	9.5, 12/01/16
Antenna Port Software	UL	UL RF	7.1, 8/6/17
Conducted Emissions Software	UL	UL EMC	9.5, 5/26/15

7. SUMMARY TABLE

FCC Part Section	Test Description	Test Limit	Test Condition	Test Result
15.247 (a)(2)	Occupied Band width (6dB)	>500KHz	Conducted	Pass
2.1051, 15.247 (d)	Band Edge / Conducted Spurious Emission	-20dBc		Pass
15.247	TX conducted output power	<30dBm		Pass
15.247	PSD	<8dBm/3kHz		Pass
15.207 (a)	AC Power Line conducted emissions	Section 10		Pass
15.205, 15.209, 15.247(d)	Radiated Spurious Emission	< 54dBuV/m	Radiated	Pass
		< 74dBuV/m		

8. ANTENNA PORT TEST RESULTS

8.1. MEASUREMENT METHODS

On Time and Duty Cycle: KDB 558074 D01 v04, Section 6.

6 dB BW: KDB 558074 D01 v04, Section 8.1.

Output Power: KDB 558074 D01 v04, Section 9.1.3.

Power Spectral Density: KDB 558074 D01 v04, Section 10.2.

Out-of-band emissions in non-restricted bands: KDB 558074 D01 v04, Section 11.0.

Out-of-band emissions in restricted bands: KDB 558074 D01 v04, Section 12.1.

Band-edge: KDB 558074 D01 v04, Section 12.1.

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

8.2. ON TIME, DUTY CYCLE

LIMITS

None; for reporting purposes only.

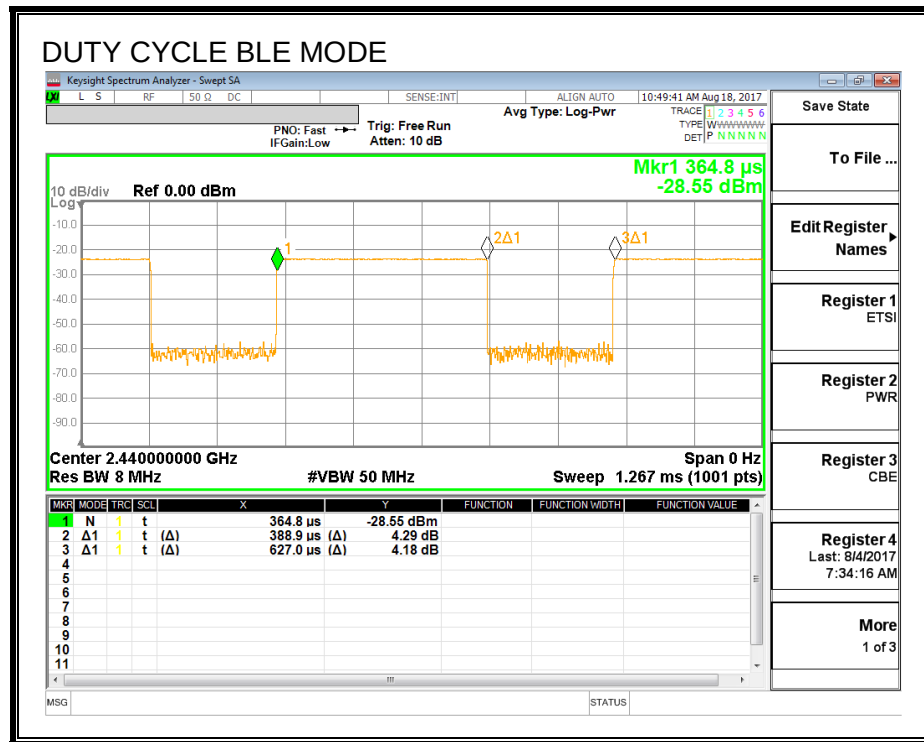
PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

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/T Minimum VBW (kHz)
BLE	0.389	0.627	0.620	62.03%	2.07	2.571

DUTY CYCLE PLOT



8.3. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

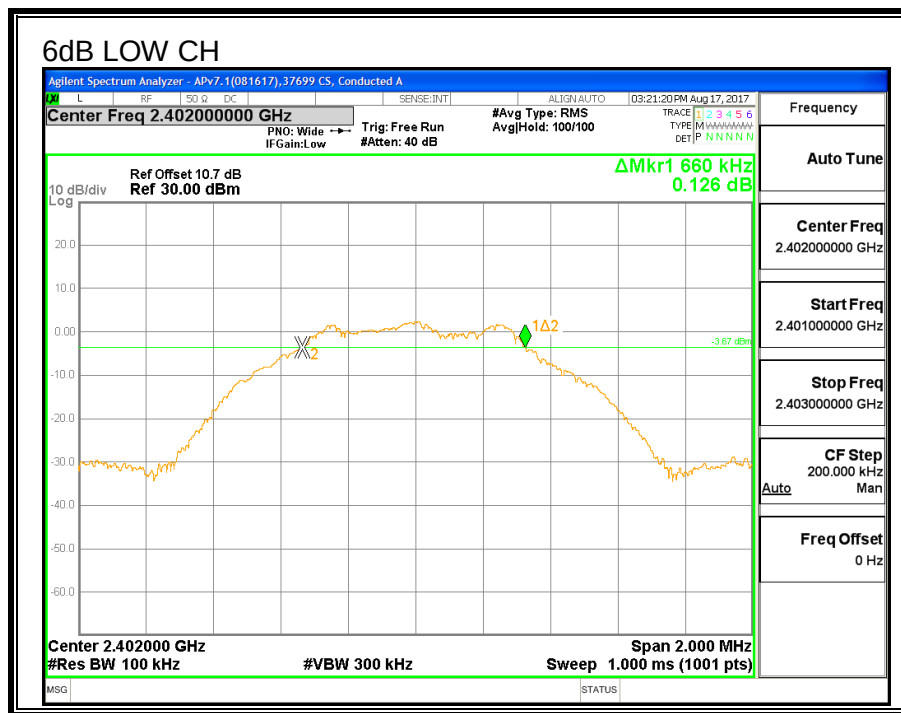
IC RSS-247 (5.2) (a)

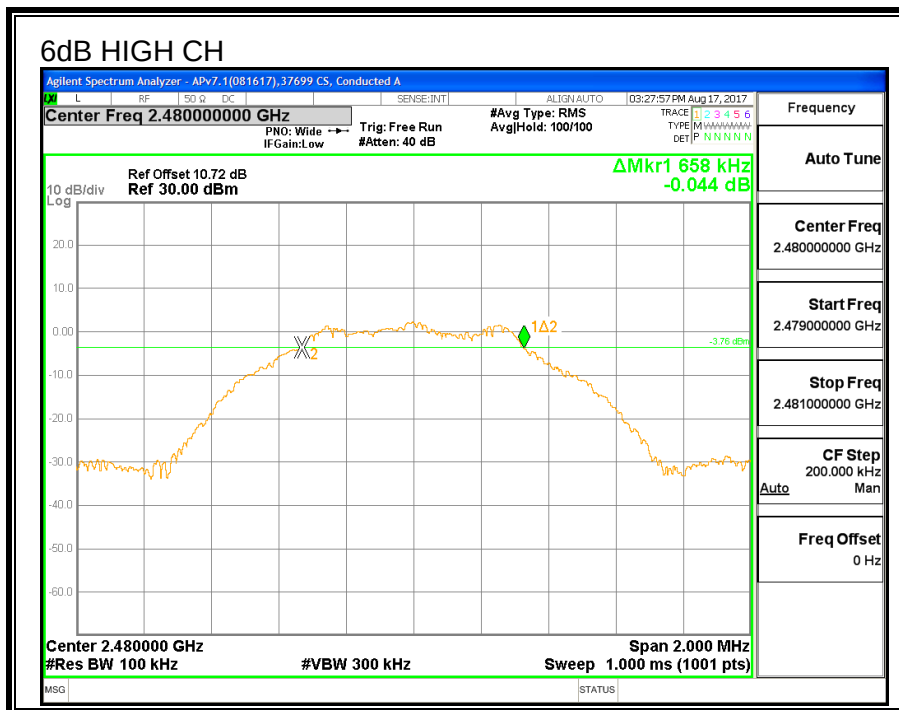
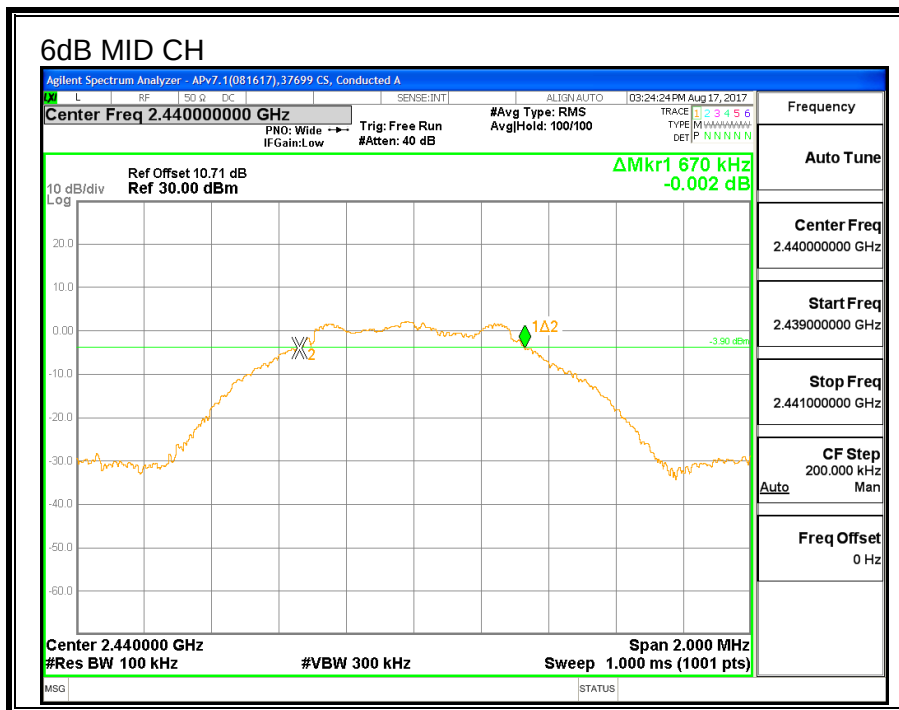
The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

6 dB BANDWIDTH

Channel	Frequency	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.660	0.5
Middle	2440	0.670	0.5
High	2480	0.658	0.5





8.4. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

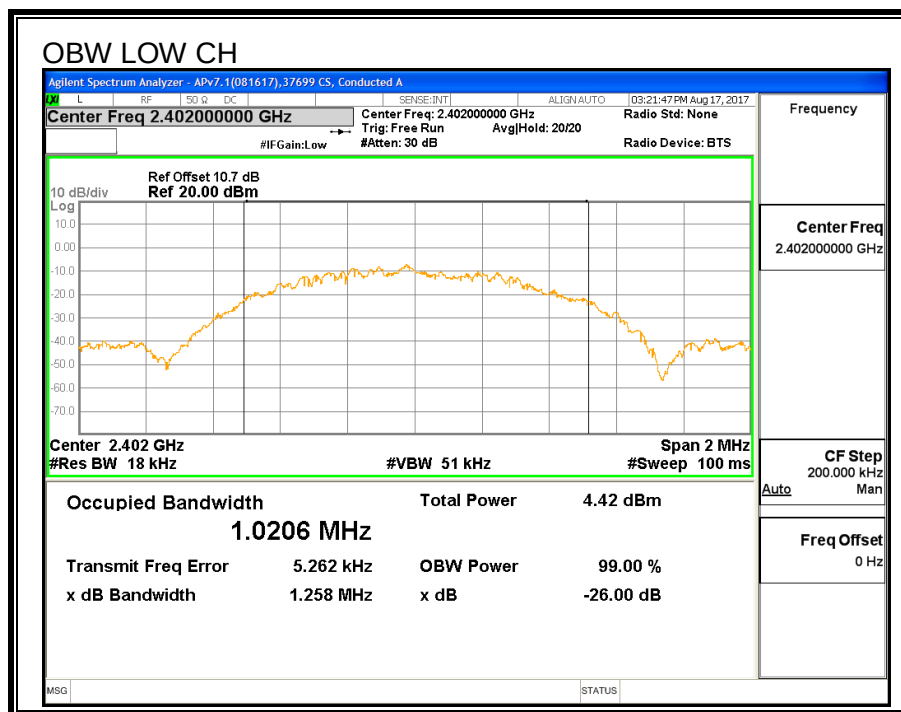
Test Procedure

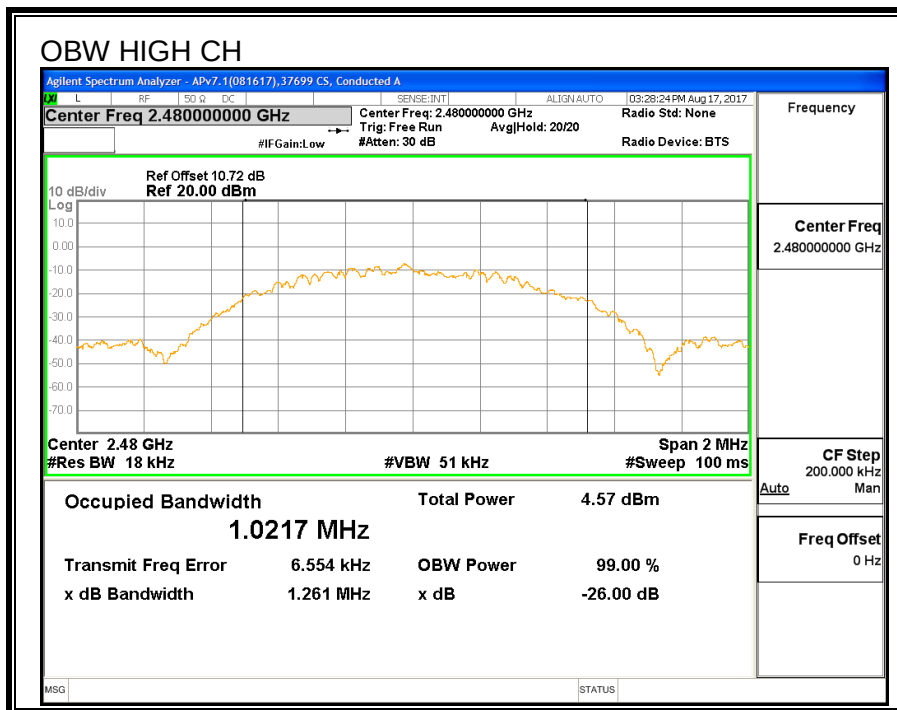
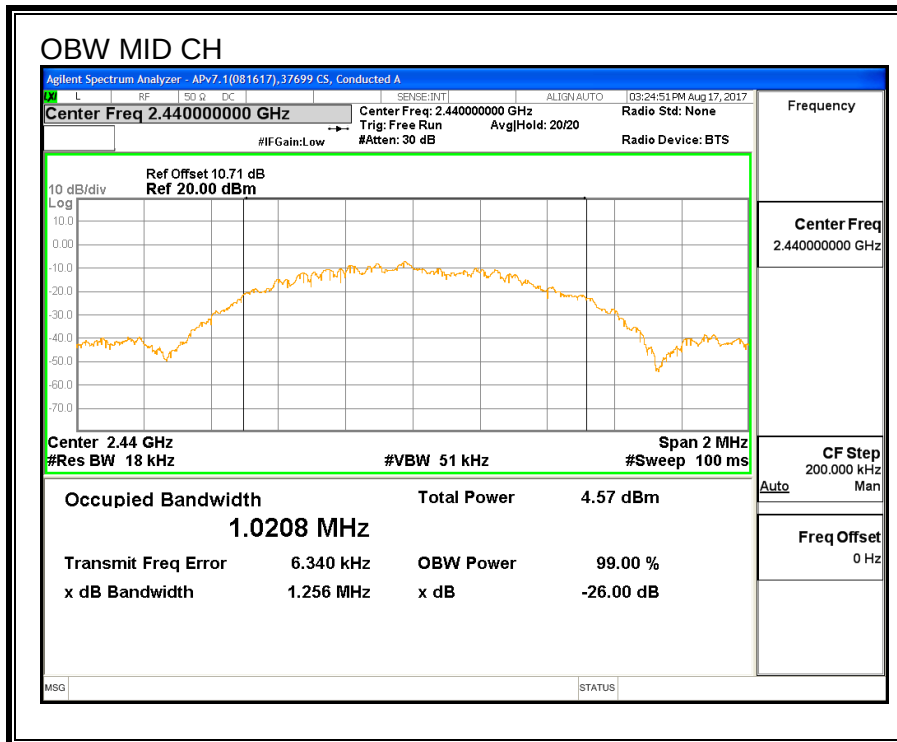
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth and to 1% of the span. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

99% BANDWIDTH

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.021
Middle	2440	1.021
High	2480	1.022





8.5. AVERAGE POWER

LIMITS

None; for reporting purposes only.

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

TEST PROCEDURE

The transmitter output is connected to a power meter.

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

RESULTS

TEST ENGINEER:	37699	Date:	08/11/17
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1Mbps

Channel	Frequency (MHz)	AV Power (dBm)
Low	2402	2.18
Middle	2440	2.14
High	2480	2.05

8.6. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-247 (5.4) (d)

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

The transmitter output is connected to a power meter.

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

RESULTS

OUTPUT POWER

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	2.34	30	-27.66
Middle	2440	2.31	30	-27.69
High	2480	2.23	30	-27.77

8.7. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

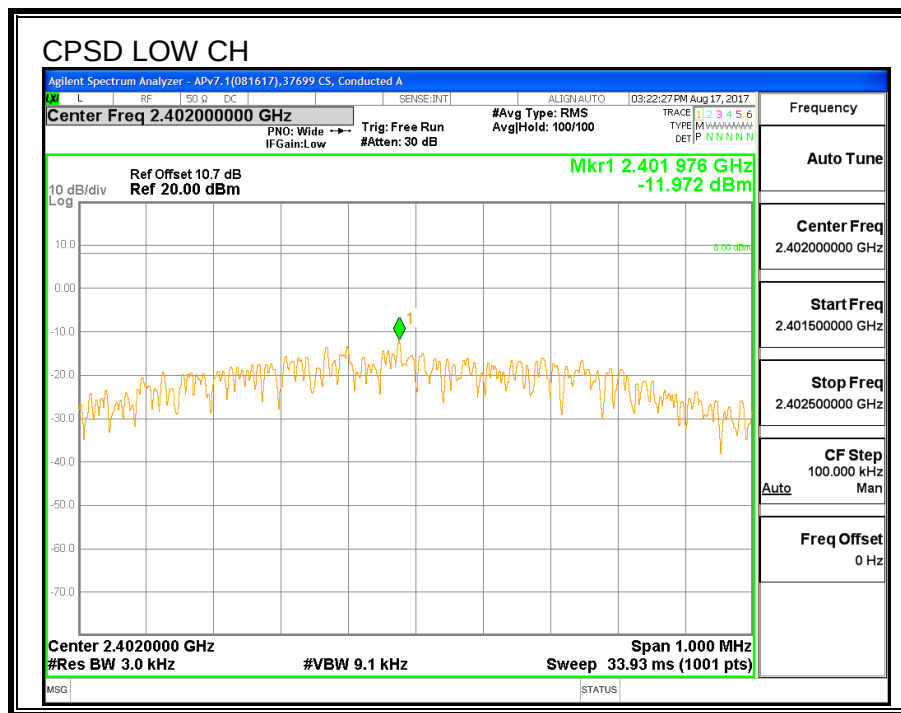
IC RSS-247 (5.2) (b)

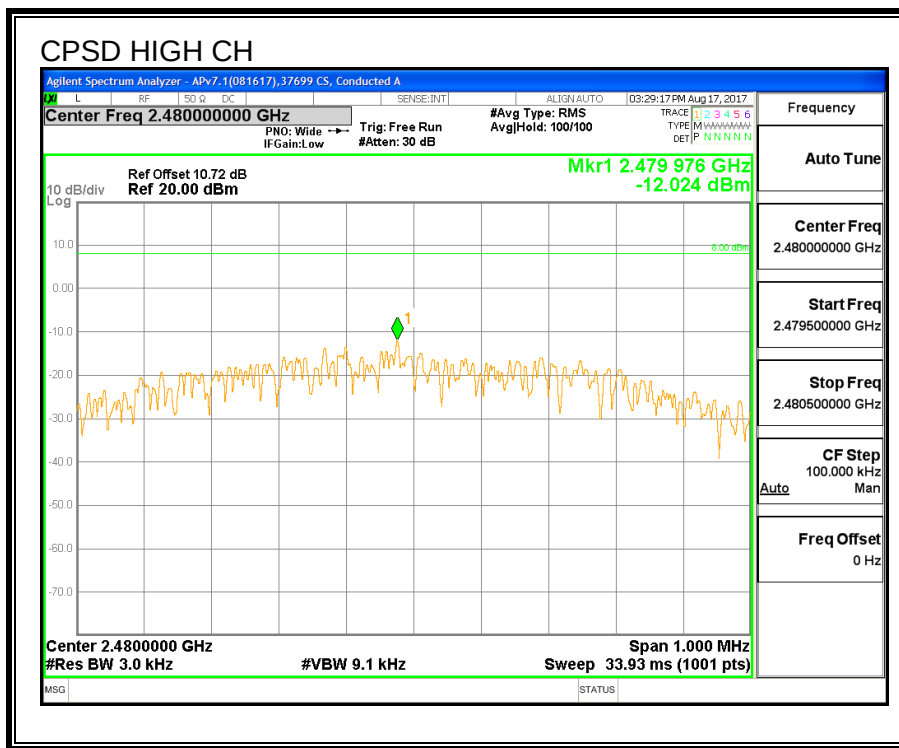
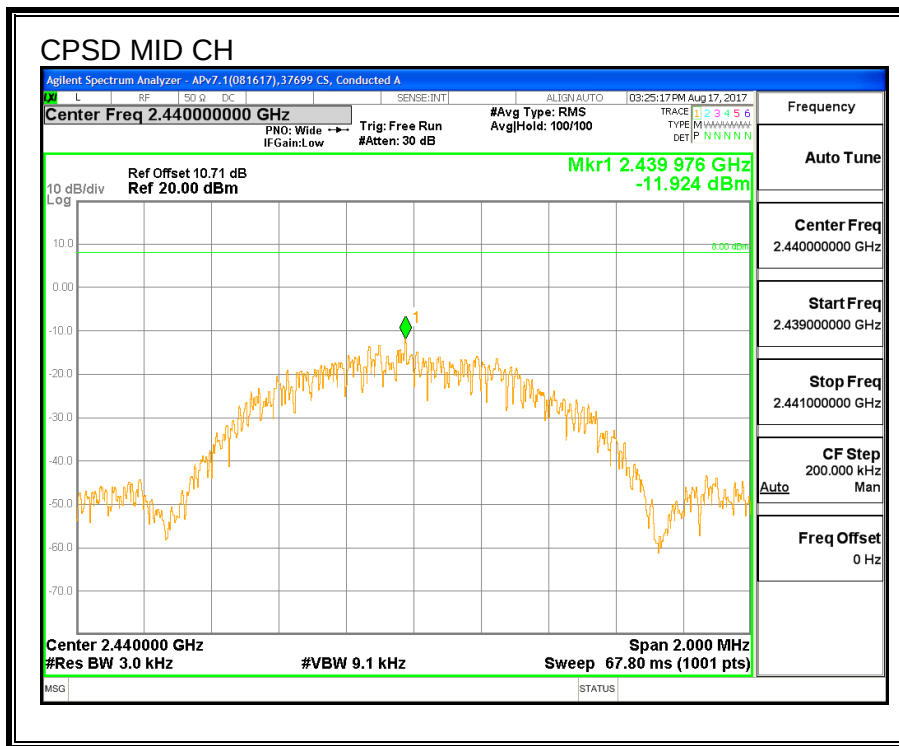
The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

RESULTS

POWER SPECTRAL DENSITY

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-11.972	8	-19.972
Middle	2440	-11.924	8	-19.924
High	2480	-12.024	8	-20.024





8.8. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS

LIMITS

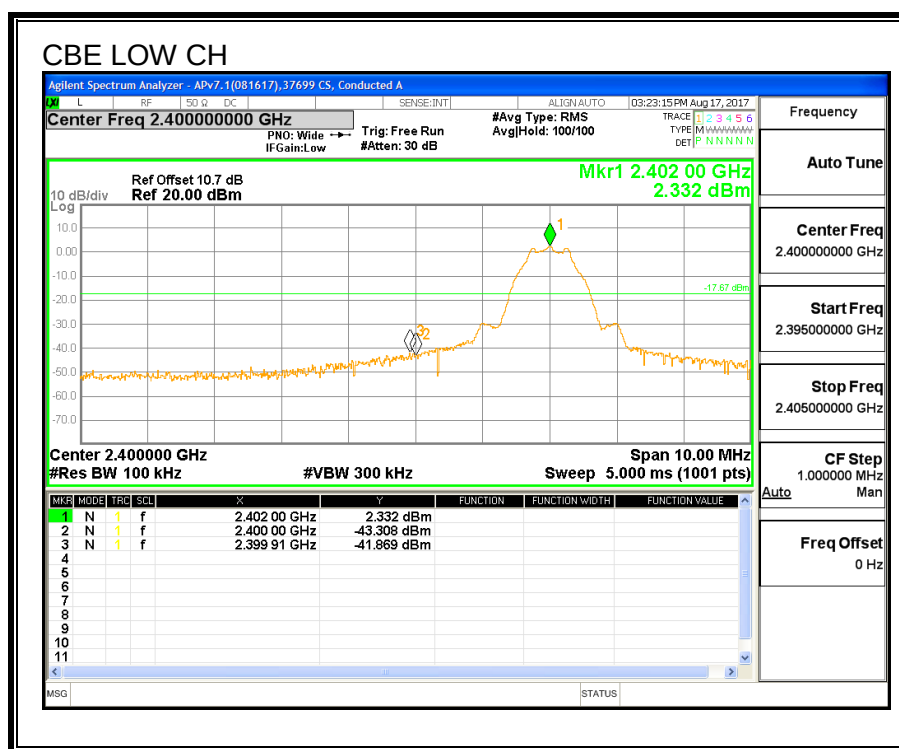
FCC §15.247 (d)

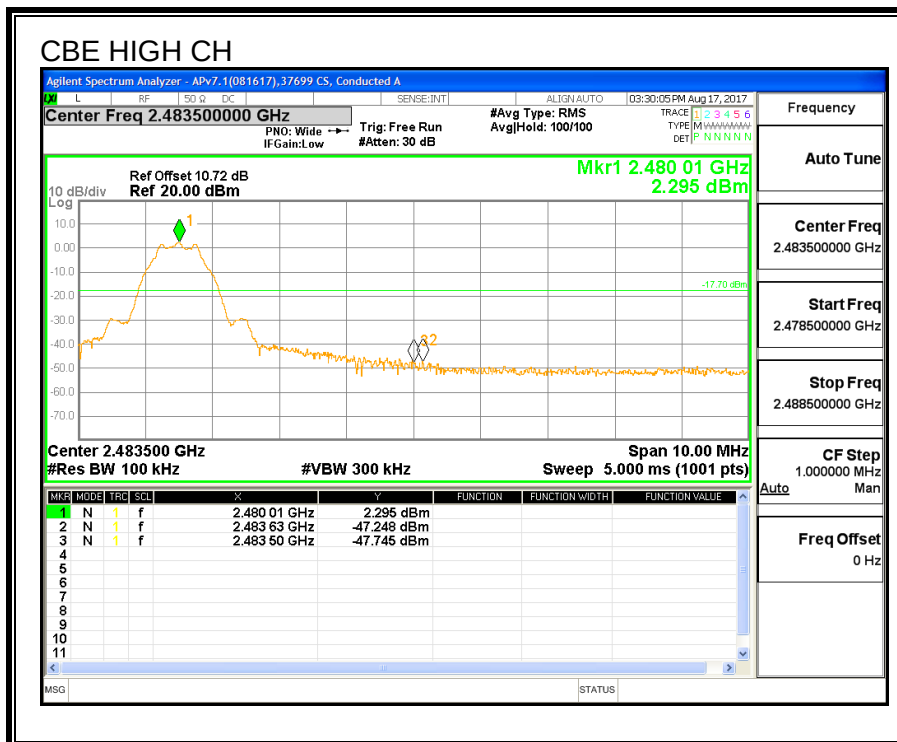
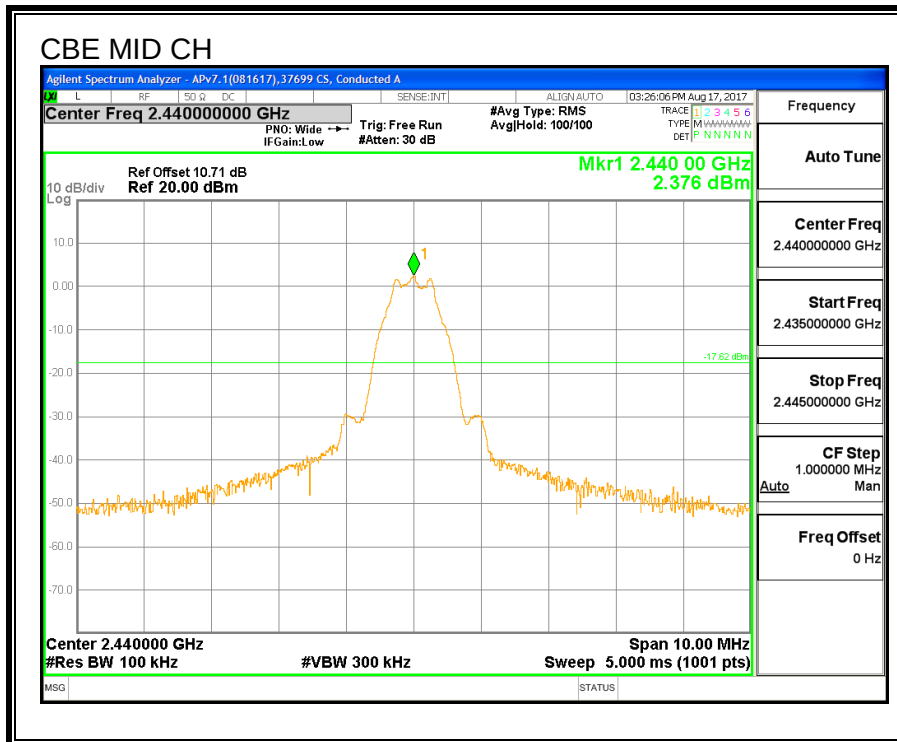
IC RSS-247 (5.5)

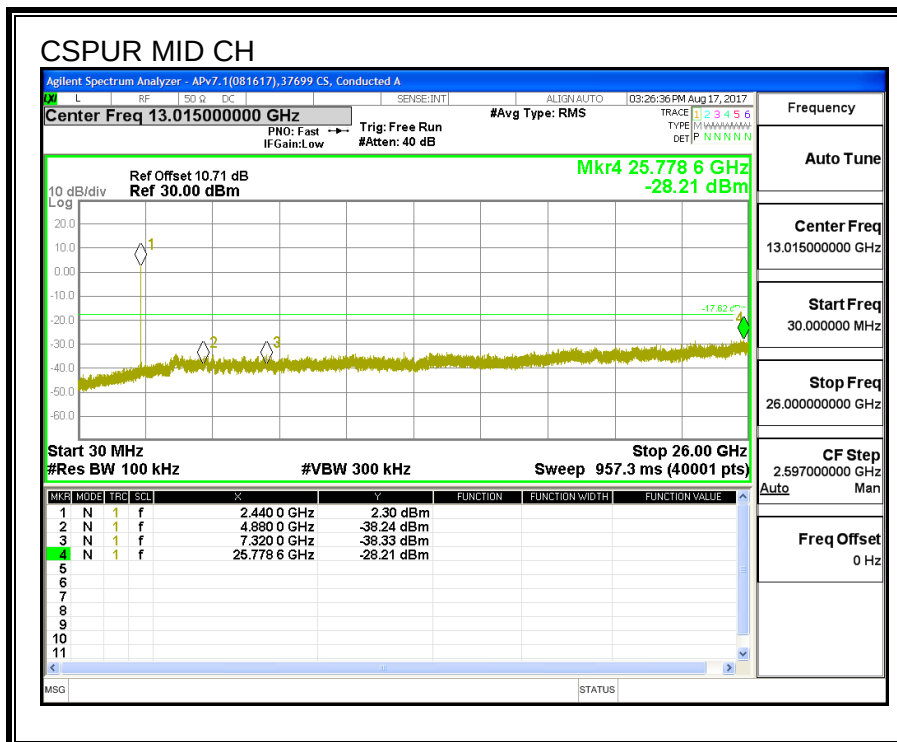
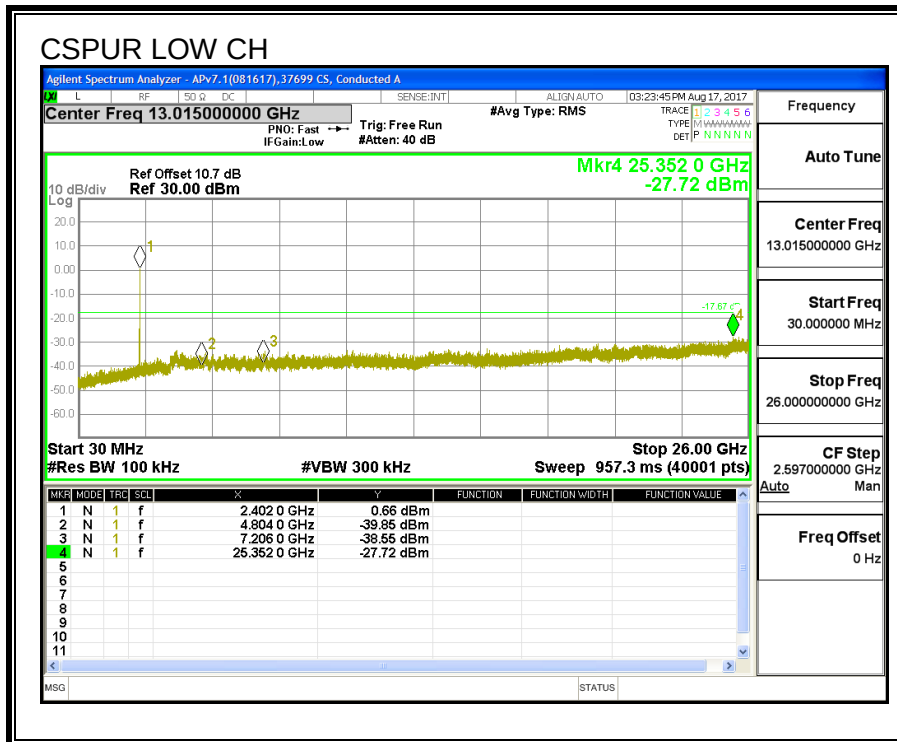
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

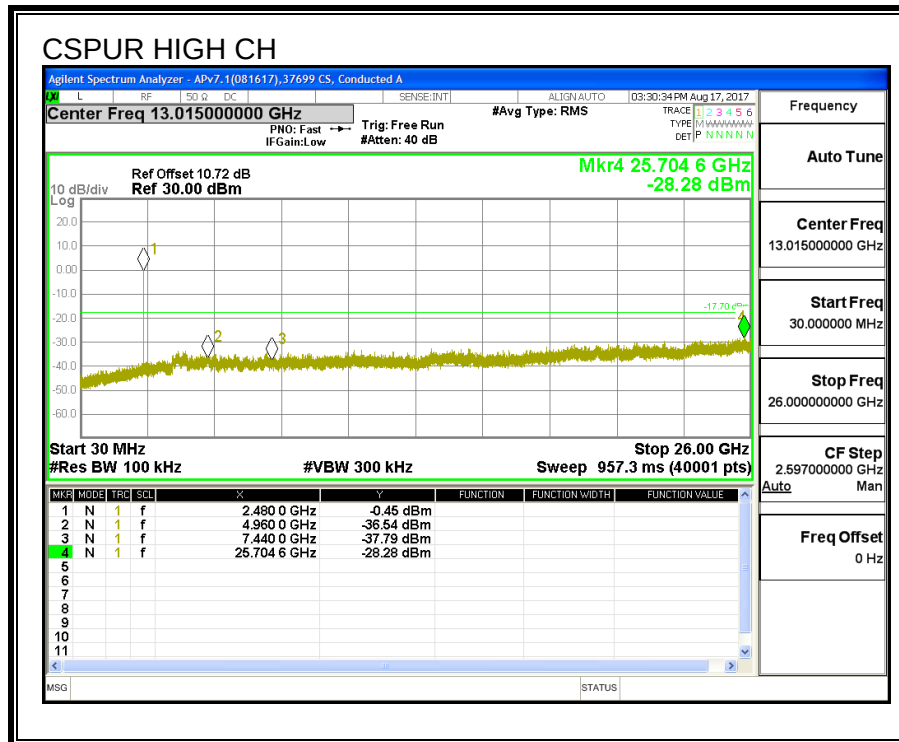
RESULTS

CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS









9. RADIATED TEST RESULTS

9.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-GEN, Section 8.9 and 8.10.

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
0.009-0.490	2400/F(kHz) @ 300 m	-
0.490-1.705	24000/F(kHz) @ 30 m	-
1.705 - 30	30 @ 30m	-
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 measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

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

For pre-scans above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 KHz for peak measurements.

For final measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and as applicable for average measurements.

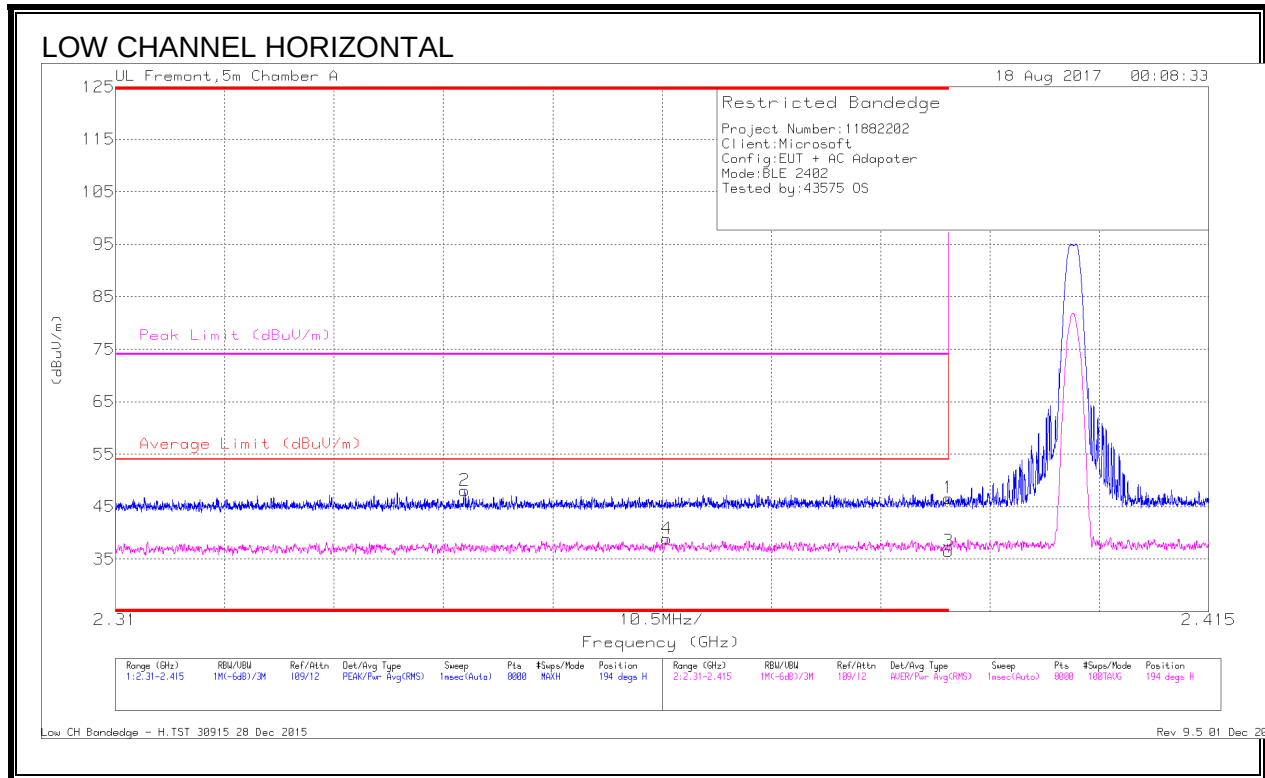
The spectrum from 1 GHz to 18 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band. Below 1GHz and above 18GHz emissions, the channel with the highest output power was tested.

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.

Results

9.2. TRANSMITTER ABOVE 1 GHz

9.2.1. RESTRICTED BANDEDGE (LOW CHANNEL)



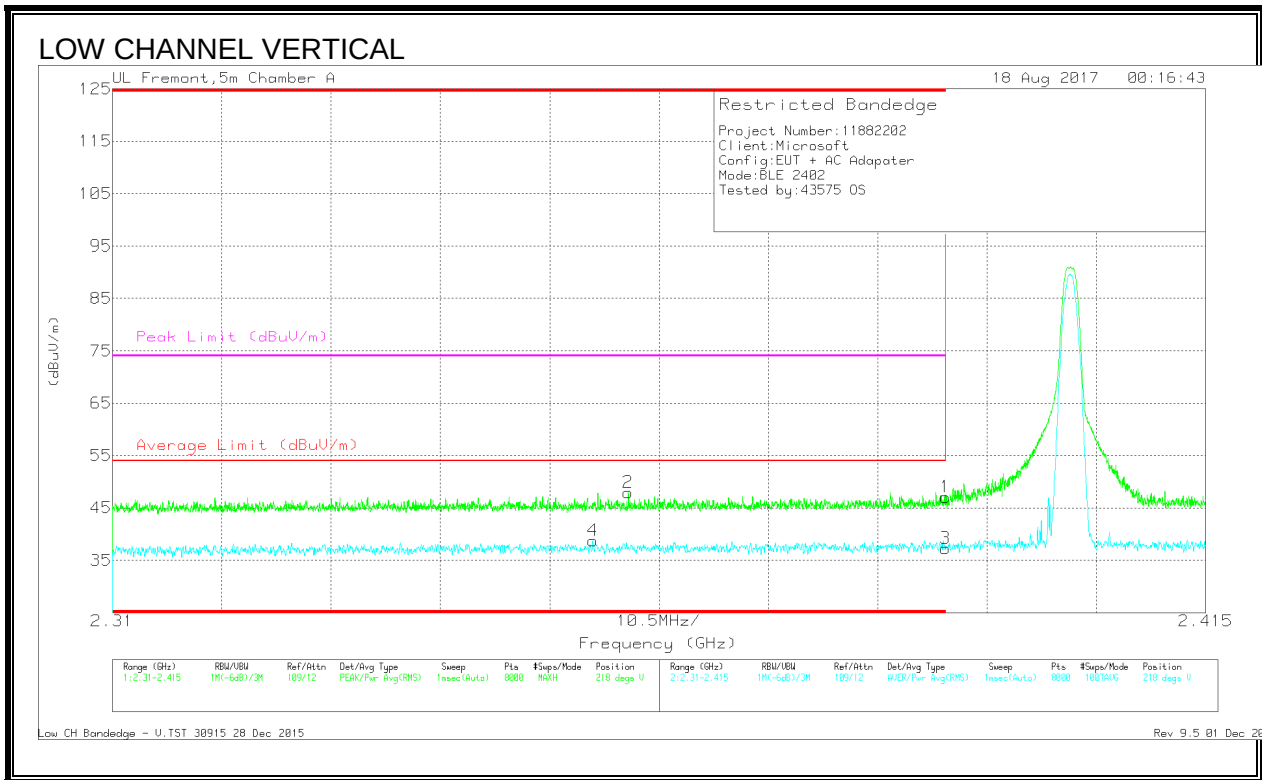
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cb/Filt/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	38.03	Pk	31.8	-23.2	0	46.63	-	-	74	-27.37	194	273	H
2	* 2.344	39.67	Pk	31.6	-23.2	0	48.07	-	-	74	-25.93	194	273	H
3	* 2.39	25.85	RMS	31.8	-23.2	2.07	36.52	54	-17.48	-	-	194	273	H
4	* 2.363	28.38	RMS	31.6	-23.2	2.07	38.85	54	-15.15	-	-	194	273	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection



Trace Markers

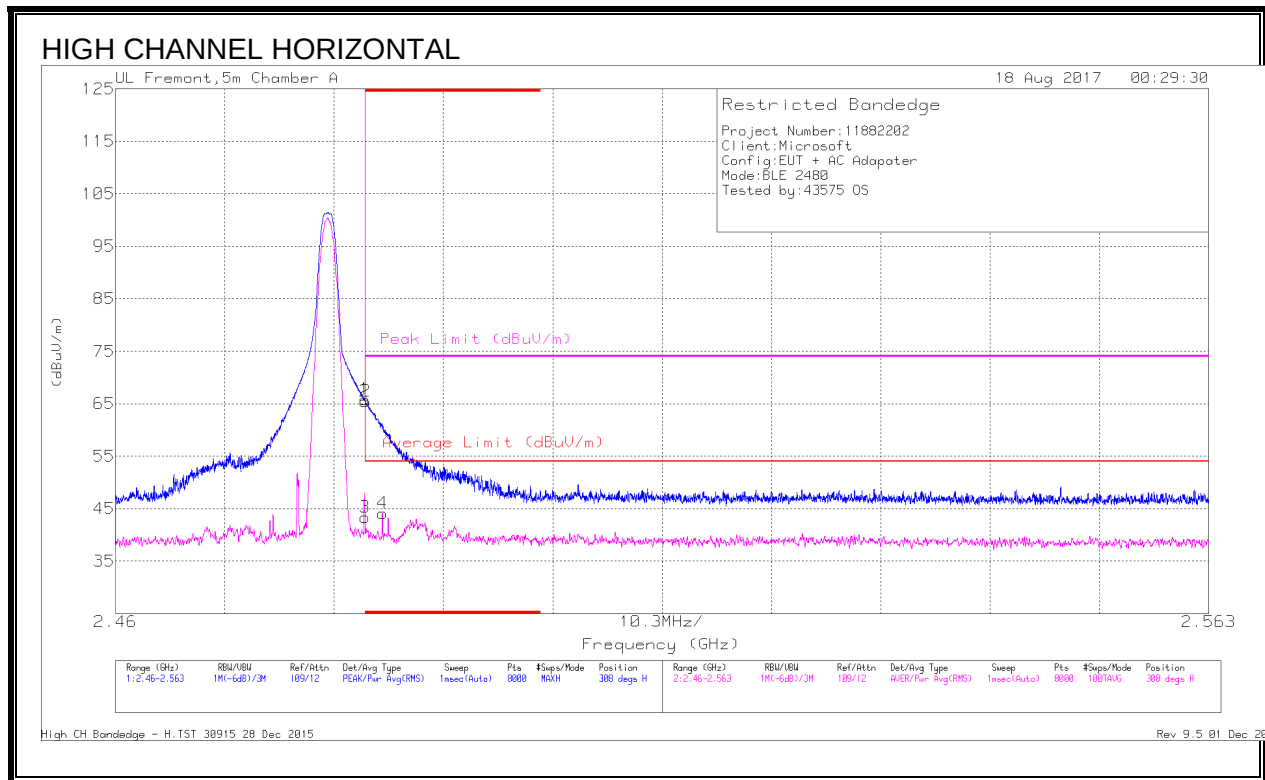
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Ch/Filt/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* 2.356	28.29	RMS	31.6	-23.2	2.07	38.76	54	-15.24	-	-	218	99	V
2	* 2.36	39.56	Pk	31.6	-23.2	0	47.96	-	-	74	-26.04	218	99	V
1	* 2.39	38.42	Pk	31.8	-23.2	0	47.02	-	-	74	-26.98	218	99	V
3	* 2.39	26.54	RMS	31.8	-23.2	2.07	37.21	54	-16.79	-	-	218	99	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

9.2.2. AUTHORIZED BANDEDGE (HIGH CHANNEL)



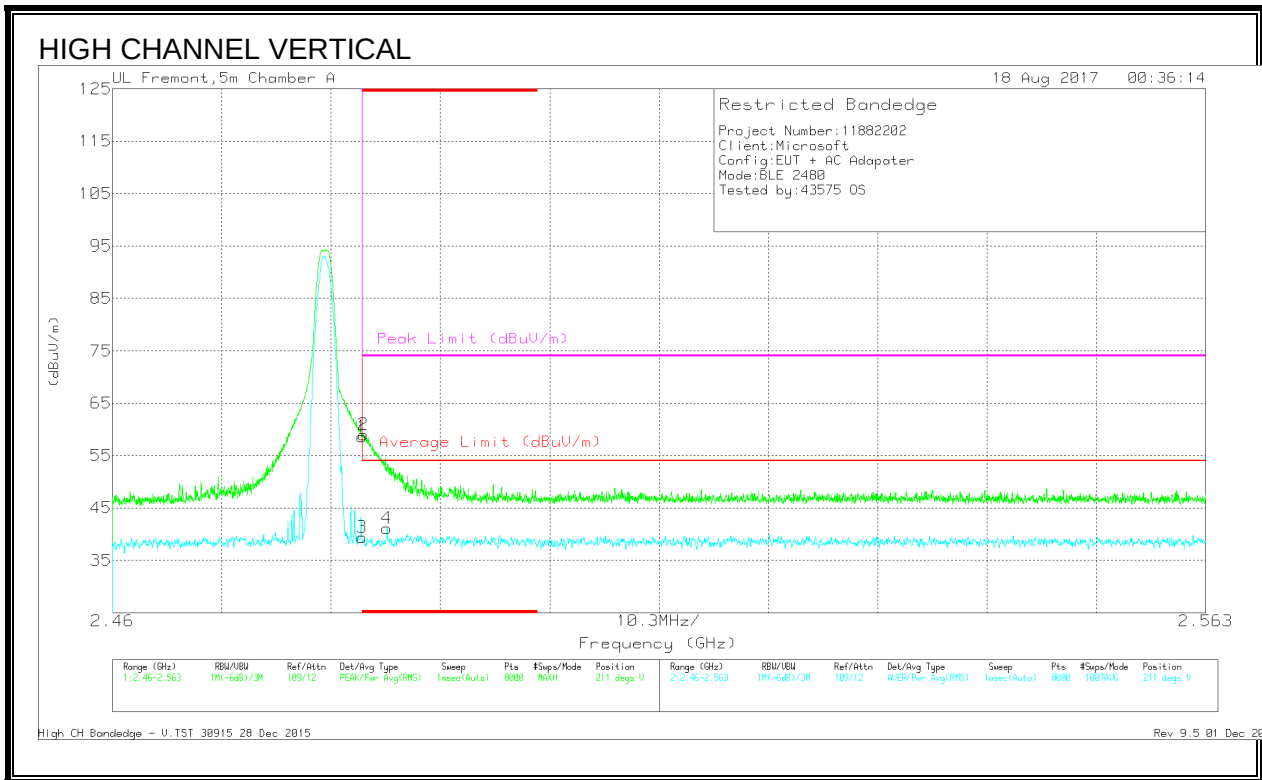
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF TBE2 (dB/m)	Amp/Chl/Filt/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	56.65	Pk	32.3	-23.1	0	65.85	-	-	74	-8.15	308	135	H
2	* 2.484	56.29	Pk	32.3	-23.1	0	65.49	-	-	74	-8.51	308	135	H
3	* 2.484	32.04	RMS	32.3	-23.1	2.07	43.31	54	-10.69	-	-	308	135	H
4	* 2.485	32.79	RMS	32.3	-23.1	2.07	44.06	54	-9.94	-	-	308	135	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection



Trace Markers

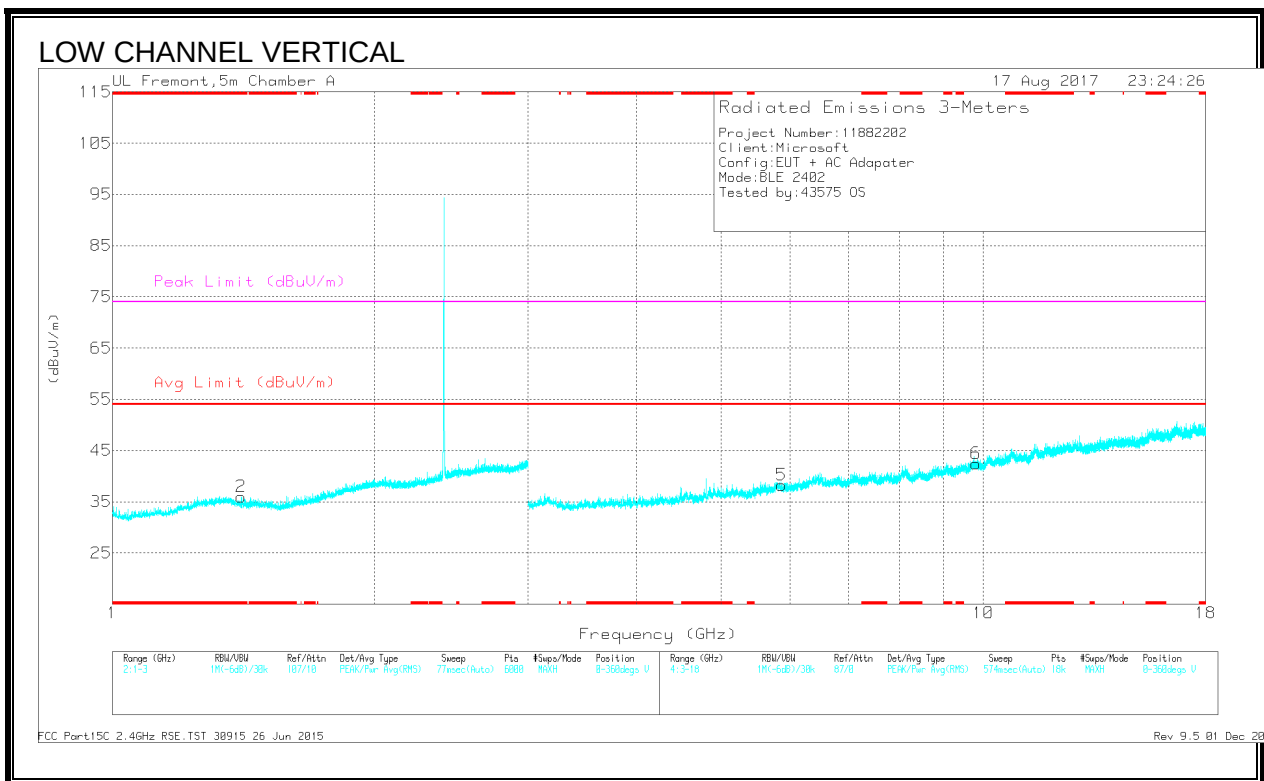
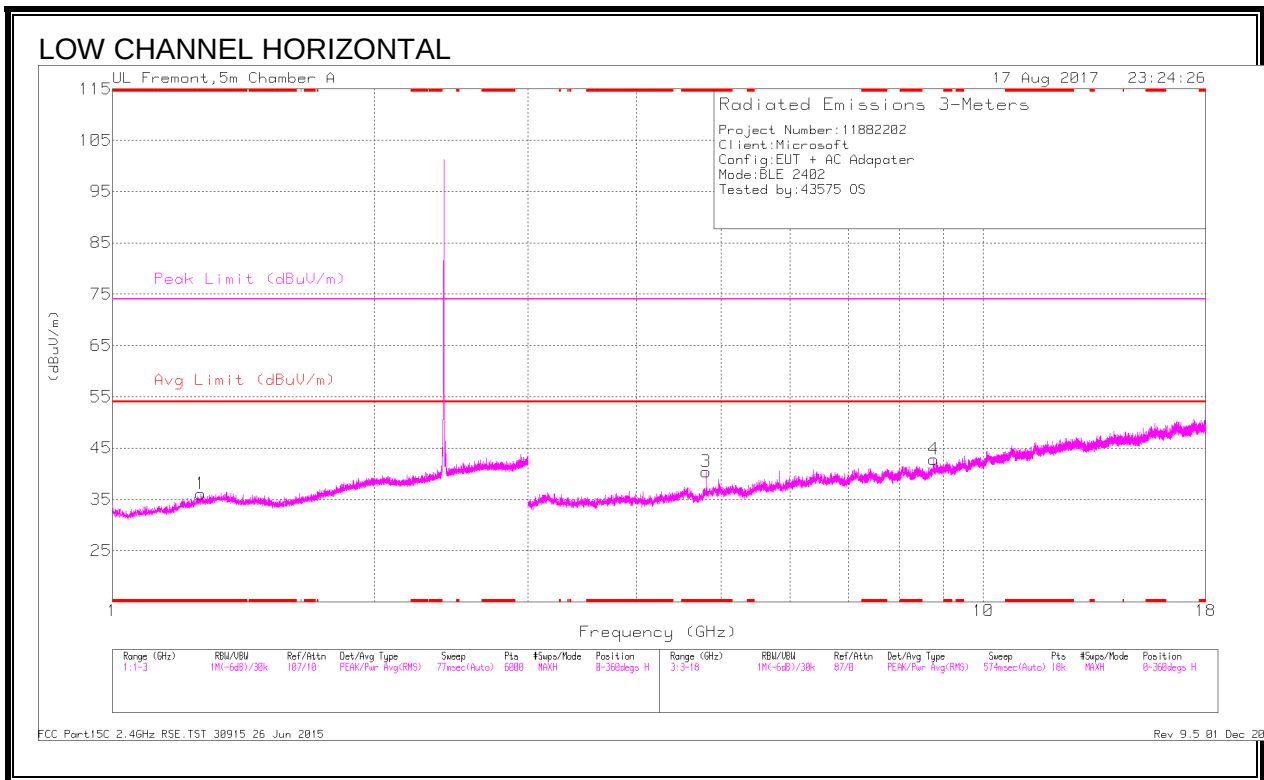
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Ch/Filt/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	49.39	PK	32.3	-23.1	0	58.59	-	-	74	-15.41	211	347	V
2	* 2.484	49.8	PK	32.3	-23.1	0	59	-	-	74	-15	211	347	V
3	* 2.484	28.12	RMS	32.3	-23.1	2.07	39.39	54	-14.61	-	-	211	347	V
4	* 2.486	29.85	RMS	32.3	-23.1	2.07	41.12	54	-12.88	-	-	211	347	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK - Peak detector

RMS - RMS detection

9.2.3. HARMONICS AND SPURIOUS EMISSIONS



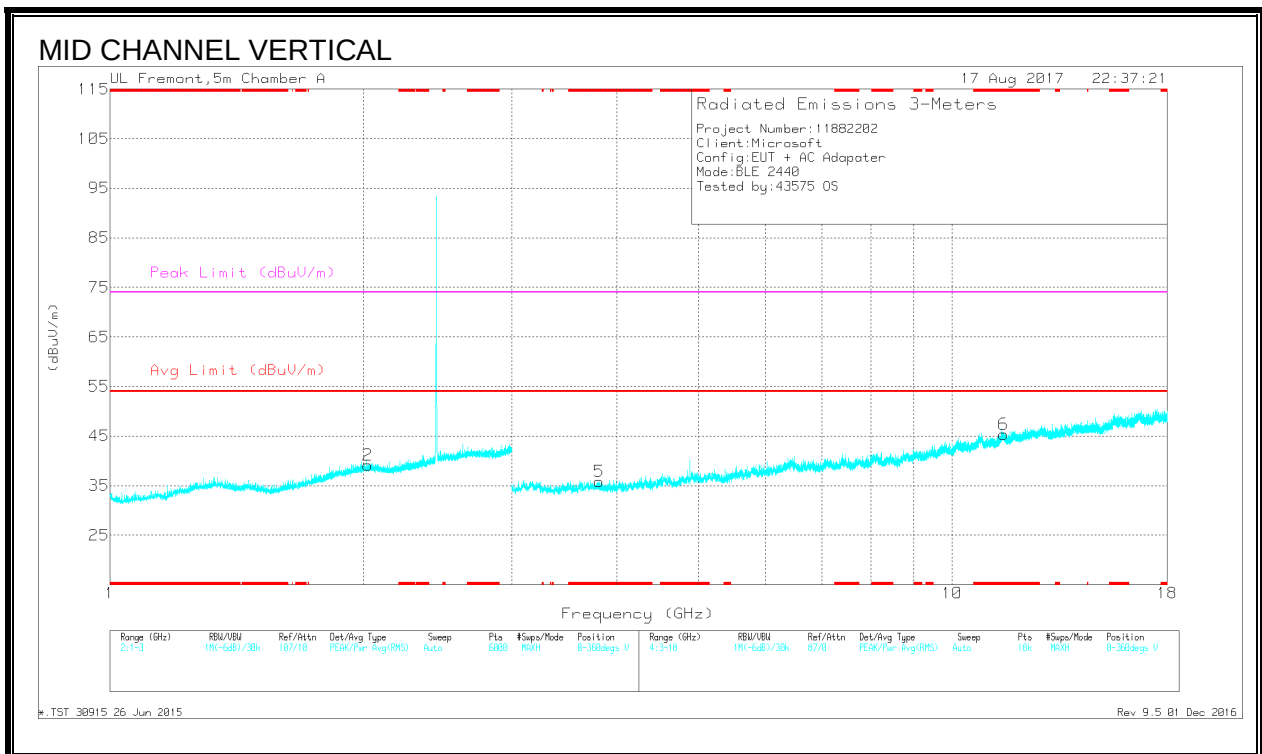
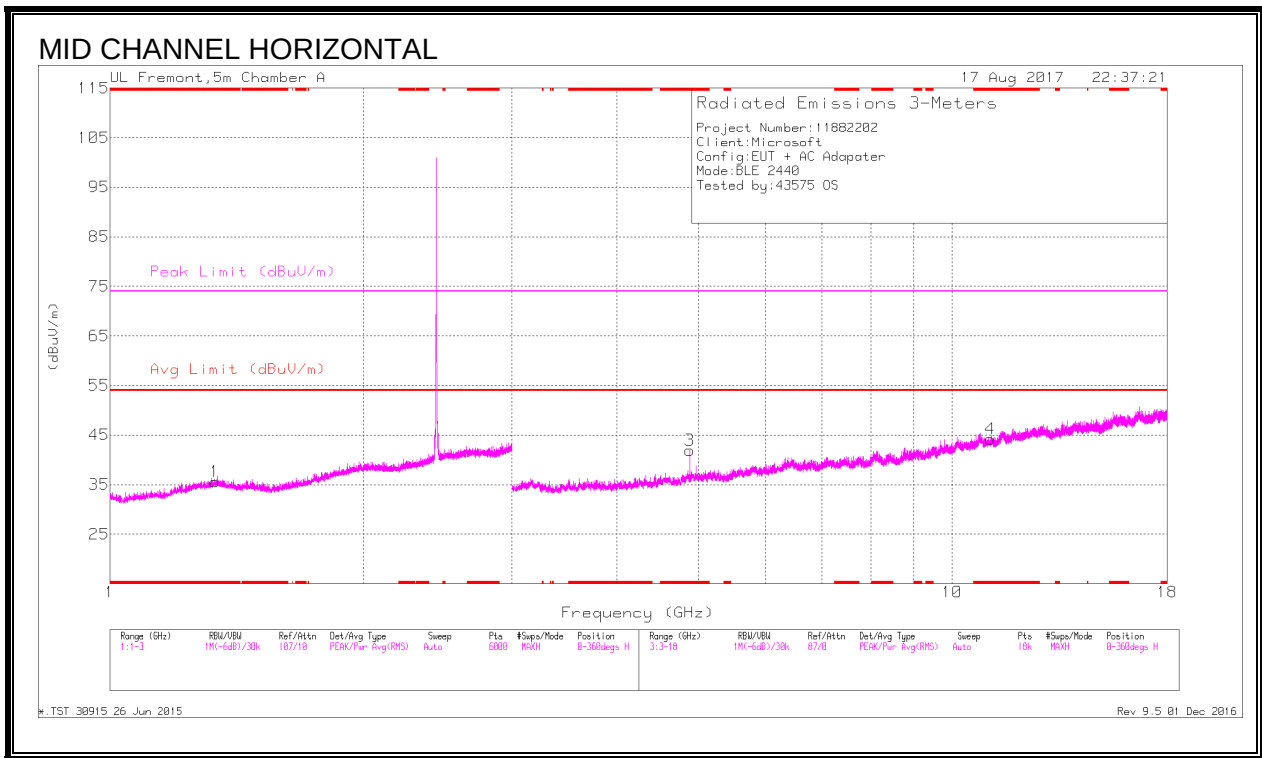
Radiated Emissions

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cb/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.264	35.9	PK2	29.2	-23.6	0	41.5	-	-	74	-32.5	360	301	H
	* 1.263	24.12	MAv1	29.2	-23.6	2.07	31.79	54	-22.21	-	-	360	301	H
2	* 1.405	35.94	PK2	28.6	-23.3	0	41.24	-	-	74	-32.76	188	178	V
	* 1.405	24.01	MAv1	28.6	-23.3	2.07	31.38	54	-22.62	-	-	188	178	V
3	* 4.804	38.89	PK2	34.2	-27.7	0	45.39	-	-	74	-28.61	4	165	H
	* 4.804	28.92	MAv1	34.2	-27.7	2.07	37.49	54	-16.51	-	-	4	165	H
	5.861	23.79	MAv1	35.2	-26	2.07	35.06	-	-	-	-	203	327	V
5	5.862	35.64	PK2	35.2	-26	0	44.84	-	-	-	-	203	327	V
4	8.769	33.04	PK2	36	-21.2	0	47.84	-	-	-	-	221	206	H
6	9.806	32.81	PK2	37	-20.6	0	49.21	-	-	-	-	288	193	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average



Radiated Emissions

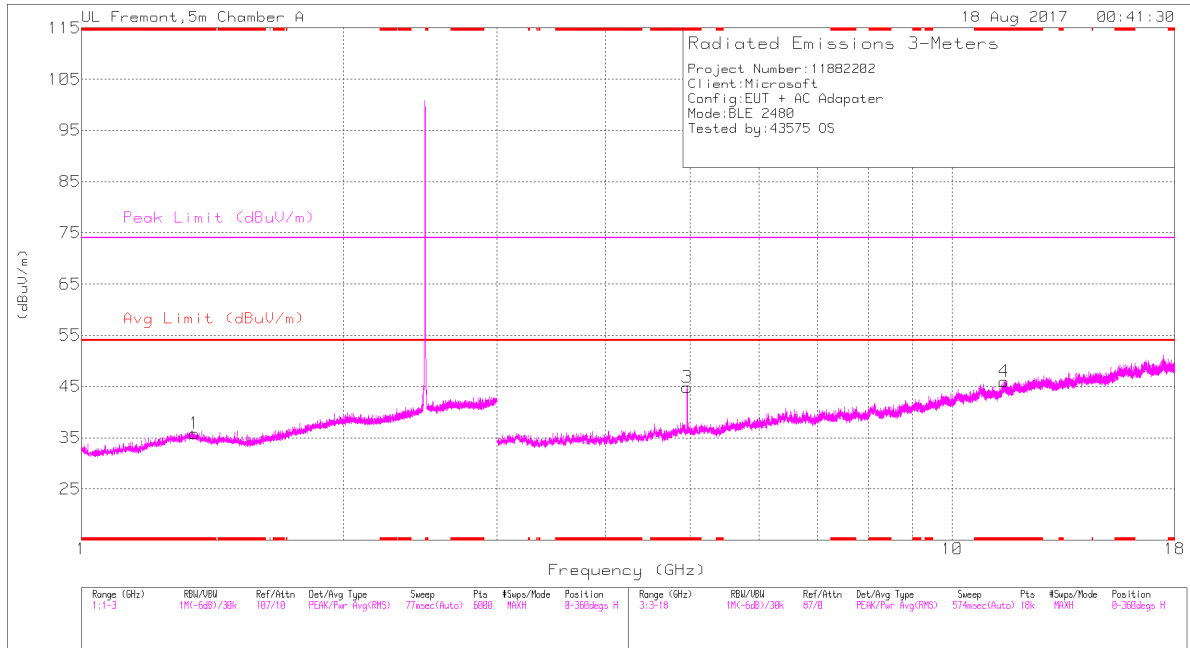
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cb/Ftr/ Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.332	36.1	PK2	29.5	-23.5	0	42.1	-	-	74	-31.9	279	358	H
	* 1.333	24.16	MAv1	29.5	-23.5	2.07	32.23	54	-21.77	-	-	279	358	H
3	* 4.88	40.55	PK2	34.1	-27.3	0	47.35	-	-	74	-26.65	356	213	H
	* 4.88	31.3	MAv1	34.1	-27.3	2.07	40.17	54	-13.83	-	-	356	213	H
4	* 11.094	32.46	PK2	37.9	-19.7	0	50.66	-	-	74	-23.34	352	104	H
	* 11.094	20.73	MAv1	37.9	-19.7	2.07	41	54	-13	-	-	352	104	H
5	* 3.806	37.81	PK2	33.2	-29.4	0	41.61	-	-	74	-32.39	193	244	V
	* 3.806	26.71	MAv1	33.2	-29.4	2.07	32.58	54	-21.42	-	-	193	244	V
6	* 11.502	32.31	PK2	38.3	-18.6	0	52.01	-	-	74	-21.99	101	170	V
	* 11.504	20.51	MAv1	38.3	-18.7	2.07	42.18	54	-11.82	-	-	101	170	V
2	2.021	36.59	PK2	31.4	-23	0	44.99	-	-	-	-	266	104	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

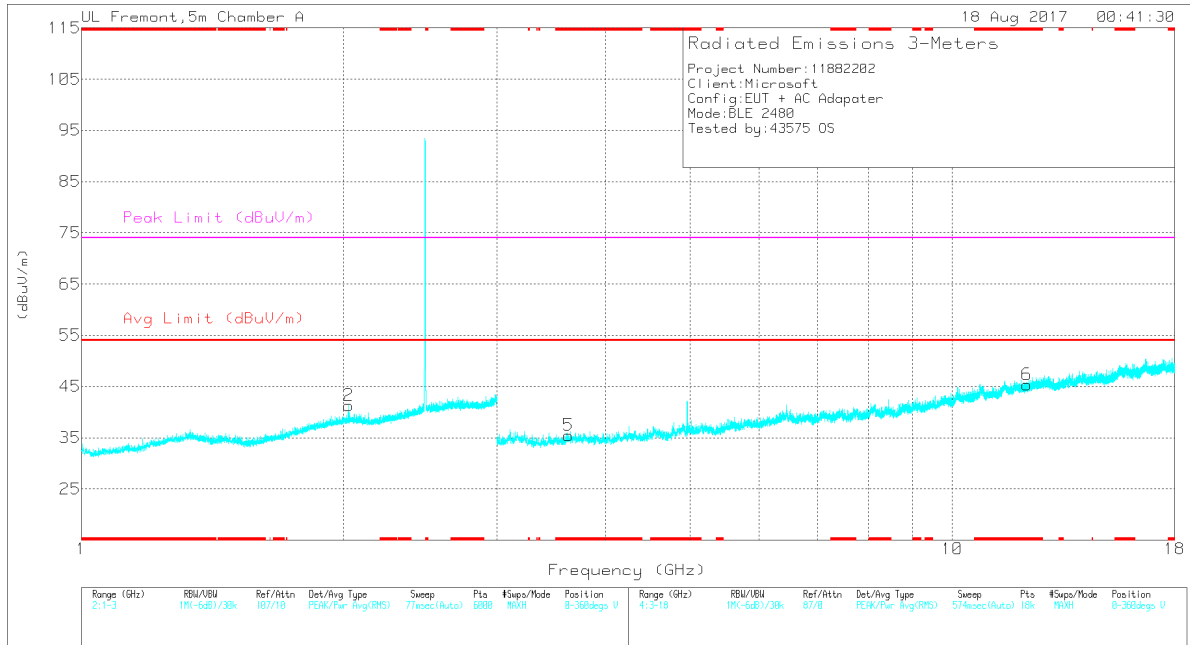
HIGH CHANNEL HORIZONTAL



FCC Part15C 2.4GHz RSE.TST 30915 26 Jun 2015

Rev 9.5 01 Dec 20

HIGH CHANNEL VERTICAL



FCC Part15C 2.4GHz RSE.TST 30915 26 Jun 2015

Rev 9.5 01 Dec 20

Radiated Emissions

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Filtr/Pa d (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.35	36.58	PK2	29.5	-23.3	0	42.78	-	-	74	-31.22	198	371	H
	* 1.348	23.96	MAv1	29.5	-23.3	2.07	32.23	54	-21.77	-	-	198	371	H
3	* 4.96	43.91	PK2	34.2	-27.9	0	50.21	-	-	74	-23.79	355	198	H
	* 4.96	36.05	MAv1	34.2	-27.9	2.07	44.42	54	-9.58	-	-	355	198	H
4	* 11.471	31.72	PK2	38.3	-18.4	0	51.62	-	-	74	-22.38	252	194	H
	* 11.471	20.33	MAv1	38.3	-18.4	2.07	42.3	54	-11.7	-	-	252	194	H
5	* 3.623	38.43	PK2	33	-29.7	0	41.73	-	-	74	-32.27	226	241	V
	* 3.627	26.71	MAv1	33	-29.7	2.07	32.08	54	-21.92	-	-	226	241	V
6	* 12.179	31.96	PK2	39	-19.1	0	51.86	-	-	74	-22.14	292	227	V
	* 12.178	20.41	MAv1	39	-19.1	2.07	42.38	54	-11.62	-	-	292	227	V
2	2.029	36.9	PK2	31.4	-23	0	45.3	-	-	-	-	37	127	V

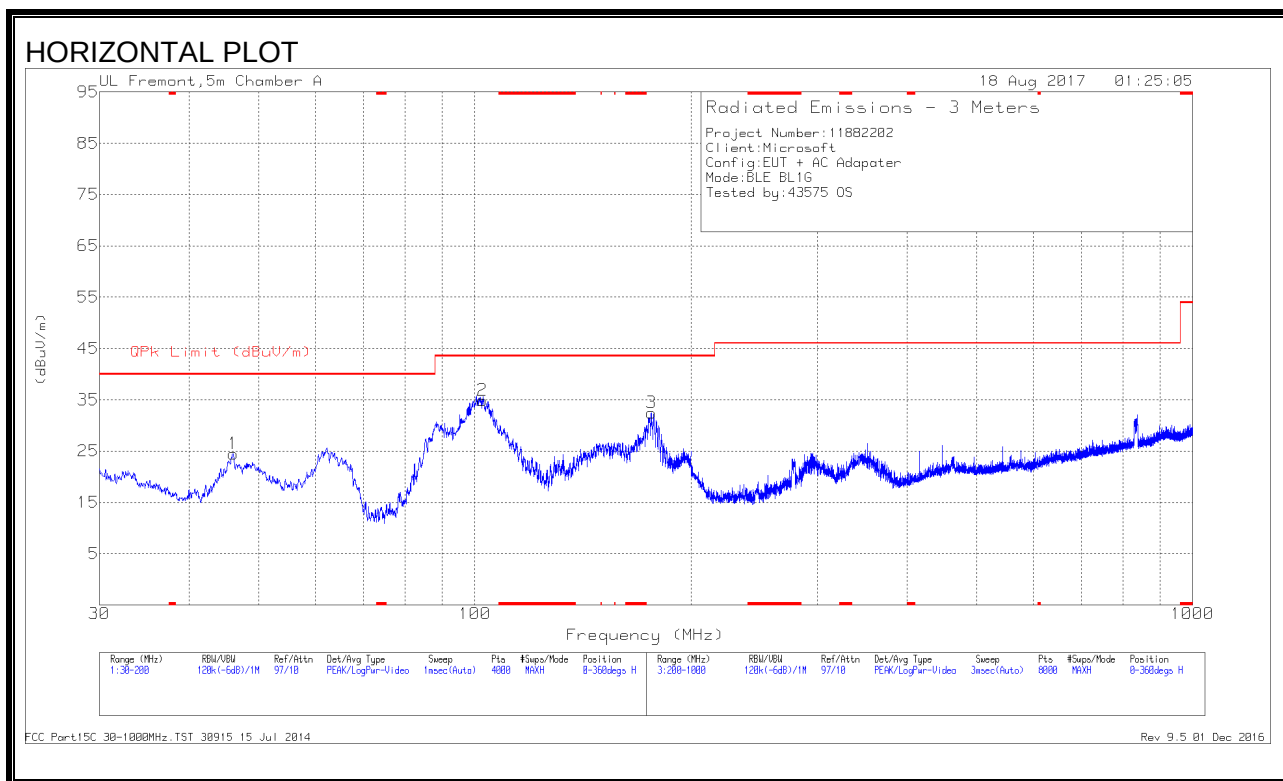
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

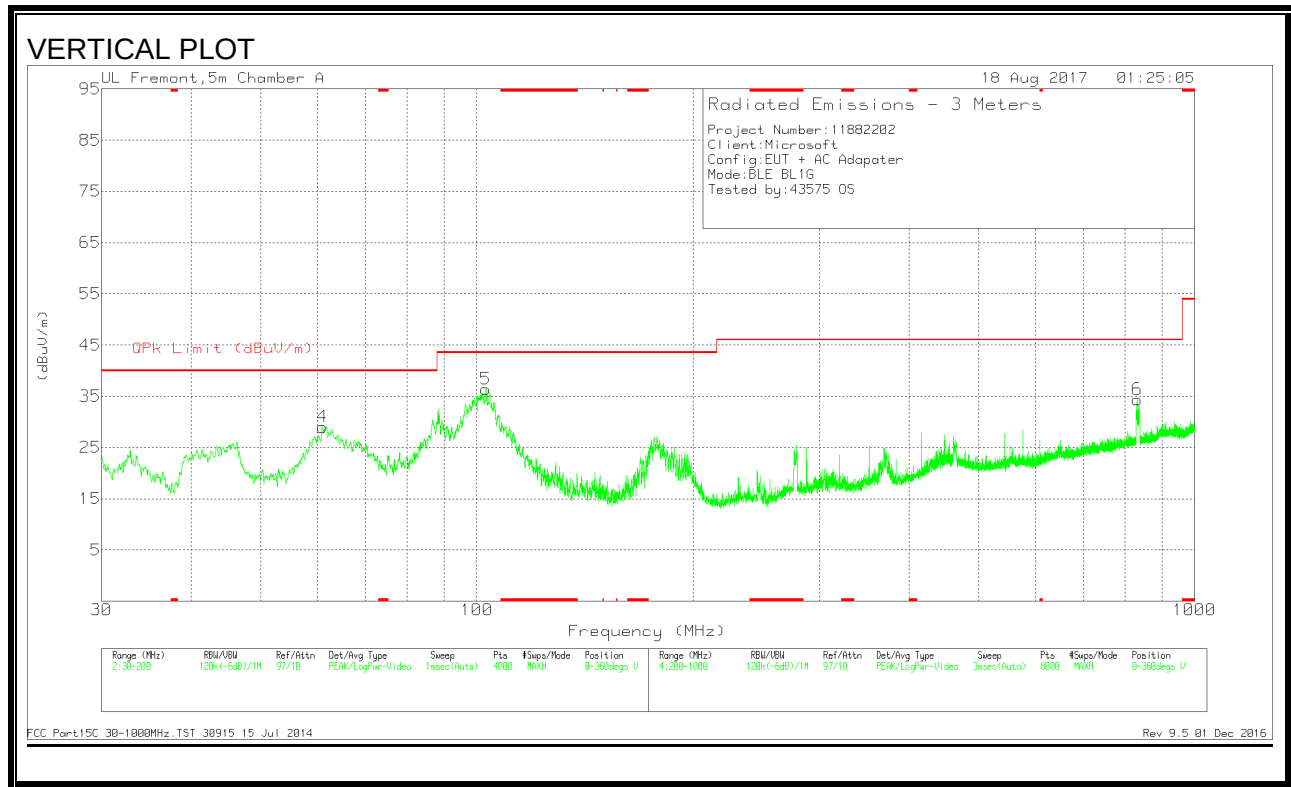
PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

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

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





DATA

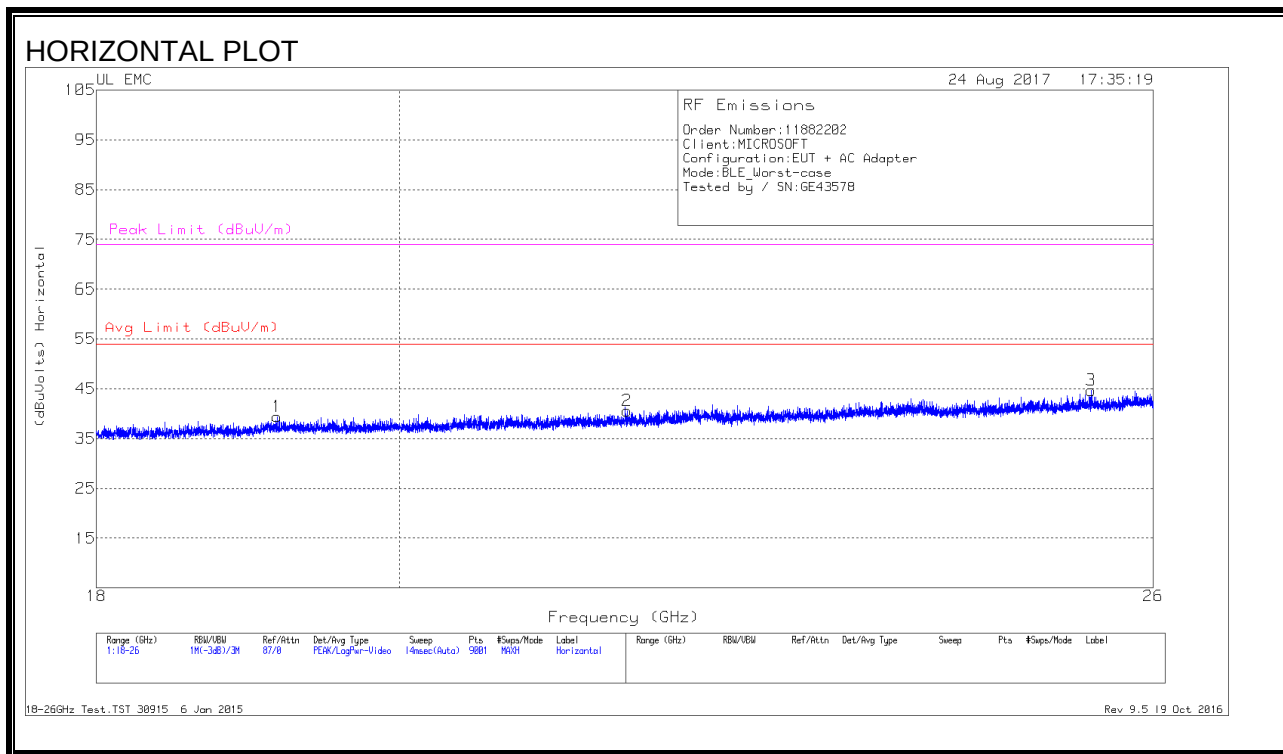
Trace Markers

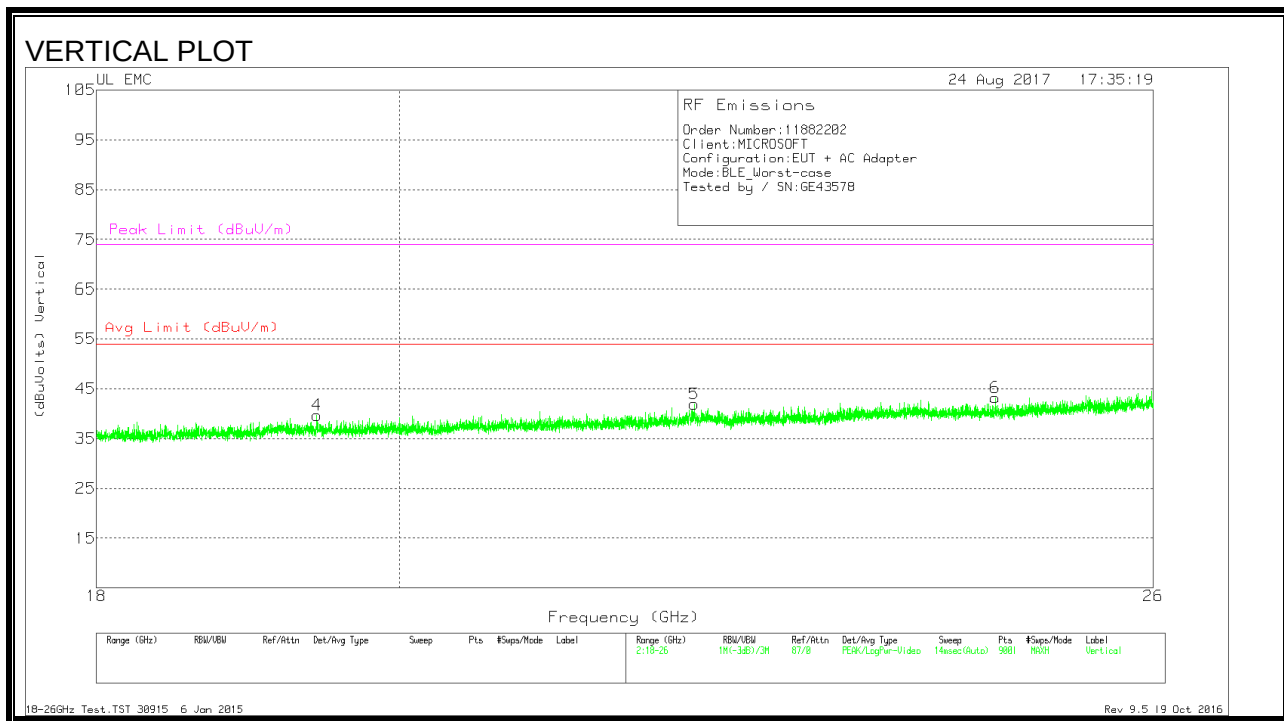
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T130 (dB/m)	Amp/Cbl (dB/m)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	46.0692	41.94	Pk	13.5	-31	24.44	40	-15.56	0-360	400	H
4	60.948	47.87	Pk	11.9	-30.8	28.97	40	-11.03	0-360	100	V
2	102.4813	50.6	Pk	14.8	-30.5	34.9	43.52	-8.62	0-360	300	H
5	102.9914	51.9	Pk	15	-30.5	36.4	43.52	-7.12	0-360	100	V
3	176.1103	47.05	Pk	15.5	-30.1	32.45	43.52	-11.07	0-360	100	H
6	831.4821	36.68	Pk	25.7	-28	34.38	46.02	-11.64	0-360	200	V

Pk - Peak detector

9.4. WORST-CASE 18 to 26 GHz

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





DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T449 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	19.166	38.01	Pk	32.6	-21.7	-9.5	39.41	54	-14.59	74	-34.59
2	21.65	38.2	Pk	33.2	-21.3	-9.5	40.6	54	-13.4	74	-33.4
3	25.444	39.98	Pk	34.4	-20.2	-9.5	44.68	54	-9.32	74	-29.32
4	19.435	38.28	Pk	32.7	-21.8	-9.5	39.68	54	-14.32	74	-34.32
5	22.161	38.64	Pk	33.4	-20.6	-9.5	41.94	54	-12.06	74	-32.06
6	24.609	38.9	Pk	34.1	-20.3	-9.5	43.2	54	-10.8	74	-30.8

Pk - Peak detector

10. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	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

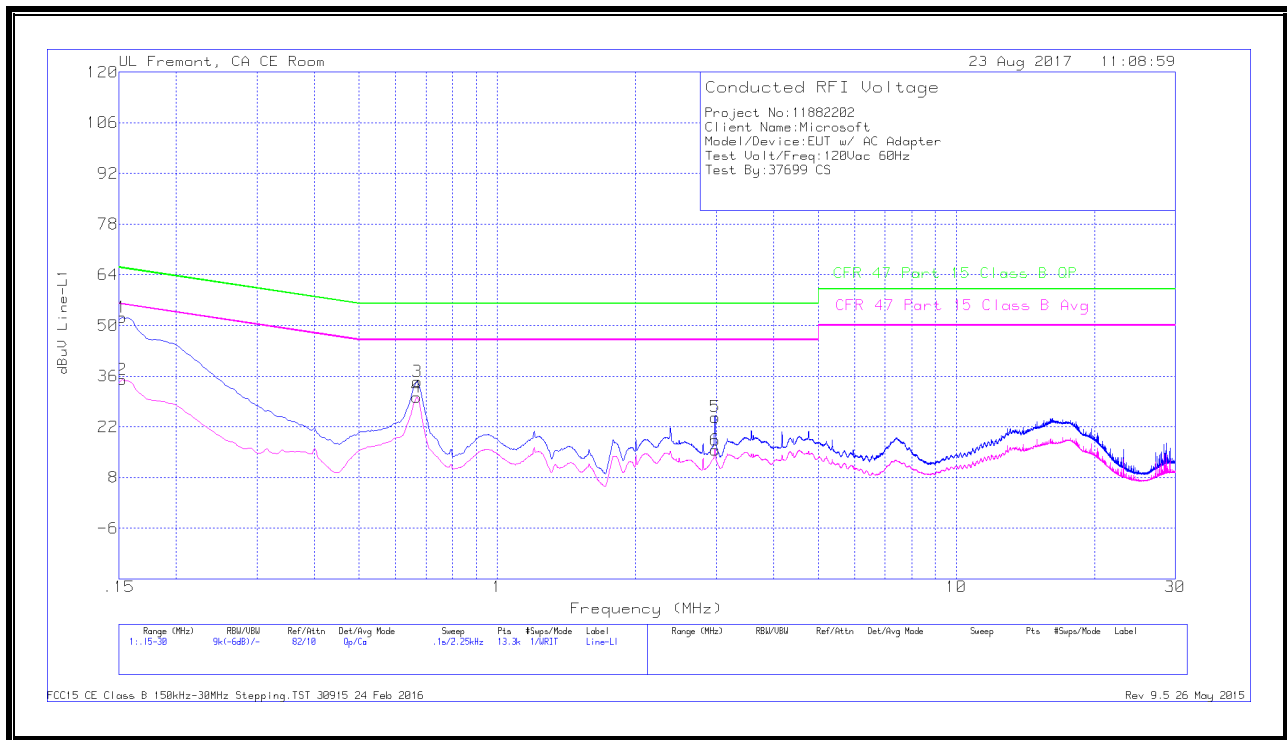
The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

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

LINE 1 RESULTS



WORST EMISSIONS

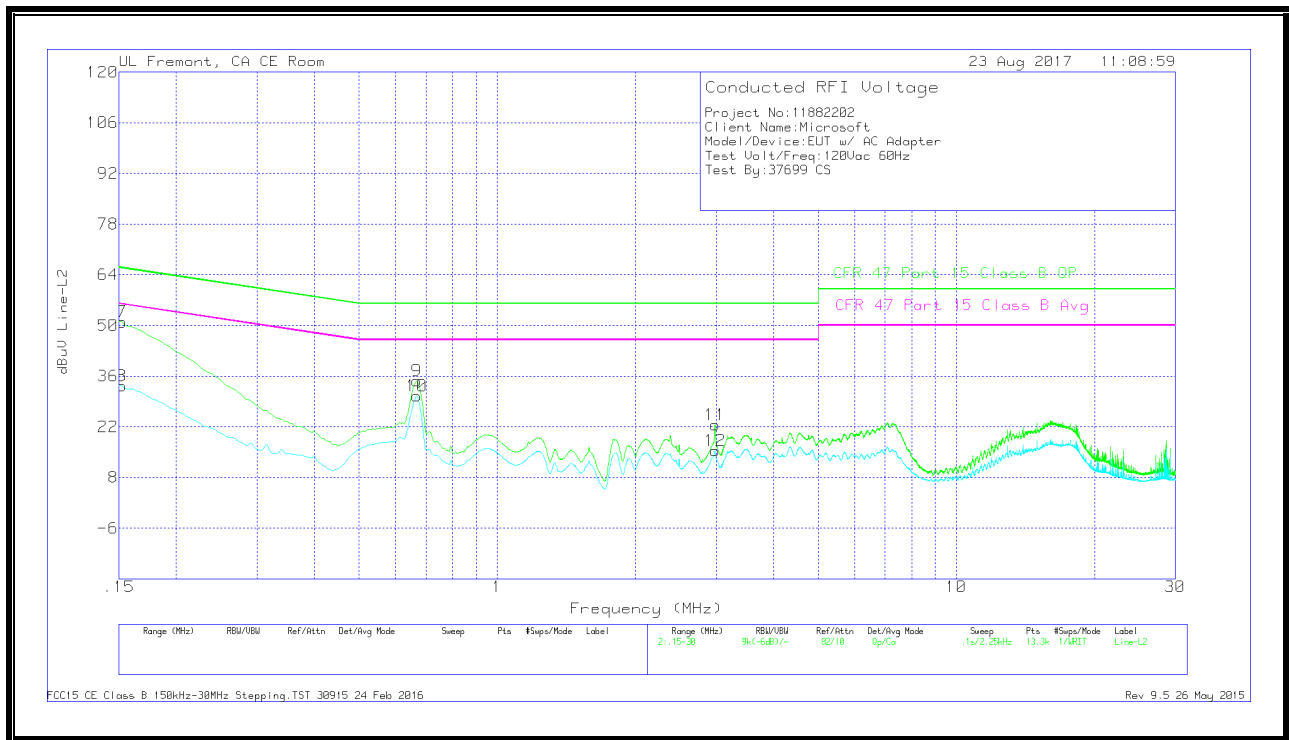
Range 1: Line-L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
1	.15225	42.02	Qp	.1	.1	10.1	52.32	65.88	-13.56	-	-
2	.15225	24.72	Ca	.1	.1	10.1	35.02	-	-	55.88	-20.86
3	.66975	24.25	Qp	0	.1	10.1	34.45	56	-21.55	-	-
4	.6675	20.07	Ca	0	.1	10.1	30.27	-	-	46	-15.73
5	2.98275	14.51	Qp	0	.1	10.1	24.71	56	-31.29	-	-
6	2.98275	5.4	Ca	0	.1	10.1	15.6	-	-	46	-30.4

Qp - Quasi-Peak detector

Ca - CISPR average detection

LINE 2 RESULTS



WORST EMISSIONS

Range 2: Line-L2 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L2	LC Cables C2&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
7	.15225	40.86	Qp	0	0	10.1	50.96	65.88	-14.92	-	-
8	.15225	23.26	Ca	0	0	10.1	33.36	-	-	55.88	-22.52
9	.6675	24.46	Qp	0	.1	10.1	34.66	56	-21.34	-	-
10	.6675	20.35	Ca	0	.1	10.1	30.55	-	-	46	-15.45
11	2.9805	12.26	Qp	0	.1	10.1	22.46	56	-33.54	-	-
12	2.9805	5.18	Ca	0	.1	10.1	15.38	-	-	46	-30.62

Qp - Quasi-Peak detector

Ca - CISPR average detection