



CERTIFICATION TEST REPORT

Report Number. : 11789904-E4V3

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

Model : 1782

FCC ID : C3K1782

IC : 3048A-1782

EUT Description : PORTABLE COMPUTING DEVICE

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

Date Of Issue:

December 20, 2017

Prepared by:

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Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	06/30/17	Initial Issue	---
V2	12/13/17	Updated Section 5.5 and section 7.1	C. Susa
V3	12/20/17	Updated Section 5.5	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: 1782

SERIAL NUMBER: 158395400000226

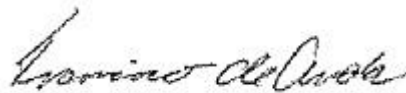
DATE TESTED: June 16th, 2017 – June 26th 2017

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 the U.S. government.

Approved & Released For
UL Verification Services Inc. By:



Francisco de Anda
Program Manager
UL Verification Services Inc.

Prepared By:



Clifford Susa
Project 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
<input checked="" type="checkbox"/> Chamber A	<input type="checkbox"/> Chamber D
<input type="checkbox"/> Chamber B	<input type="checkbox"/> Chamber E
<input type="checkbox"/> Chamber C	<input type="checkbox"/> Chamber F
	<input type="checkbox"/> Chamber G
	<input type="checkbox"/> Chamber H

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. 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.

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:

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

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 conducted output power as follows:

Frequency Range (MHz)	Mode	Average		Peak	
		Output Power (dBm)	Output Power (mW)	Output Power (dBm)	Output Power (mW)
2402 - 2480	BLE	2.26	1.68	2.45	1.76

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an integrated antenna, with a maximum gain of 3.1 dBi.

5.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was v14.201.151

The test utility software used during testing was WiFi tool v2.7.6.

5.5. WORST-CASE CONFIGURATION AND MODE

Radiated emissions below 1GHz, above 18GHz, 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 with the display in 90° and 45° orientations, it was determined that 90° orientation was the worst-case orientation. Therefore, all final radiated testing was performed with the display EUT at 90° orientation.

For simultaneous transmission of multiple channels in the BT/BLE and 2.4/5GHz bands, tests were conducted for various configurations having the highest power. No noticeable new emission was found. BT power was measured to be higher than BLE power therefore testing was done using BT transmission. Please refer to 11789904-E3V3 Report for data.

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

BLE: 1 Mbps.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop AC/DC adapter	Lenovo	ADLX45NCC2A	11S36200281ZZ20059W0H5	NA
Laptop	Lenovo	11e	LR-04N7BL	NA
USB Ethernet Adapter	Linksys	USB3GIGV1	15710S08406242	NA

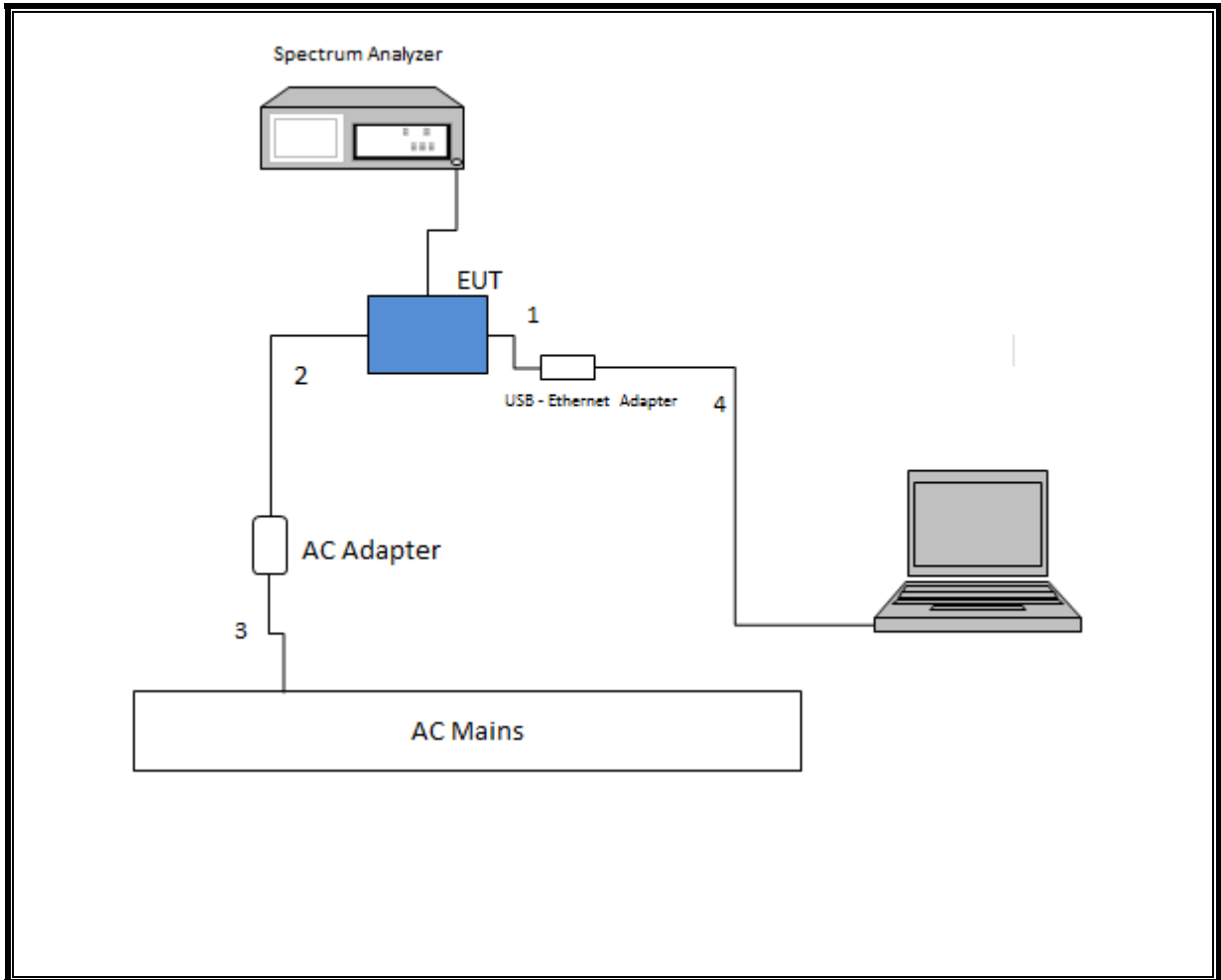
I/O CABLES

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	
3	AC	1	2-prong	Un-Shielded	0.5	
4	Ethernet	1	RJ45	Un-Shielded	2	

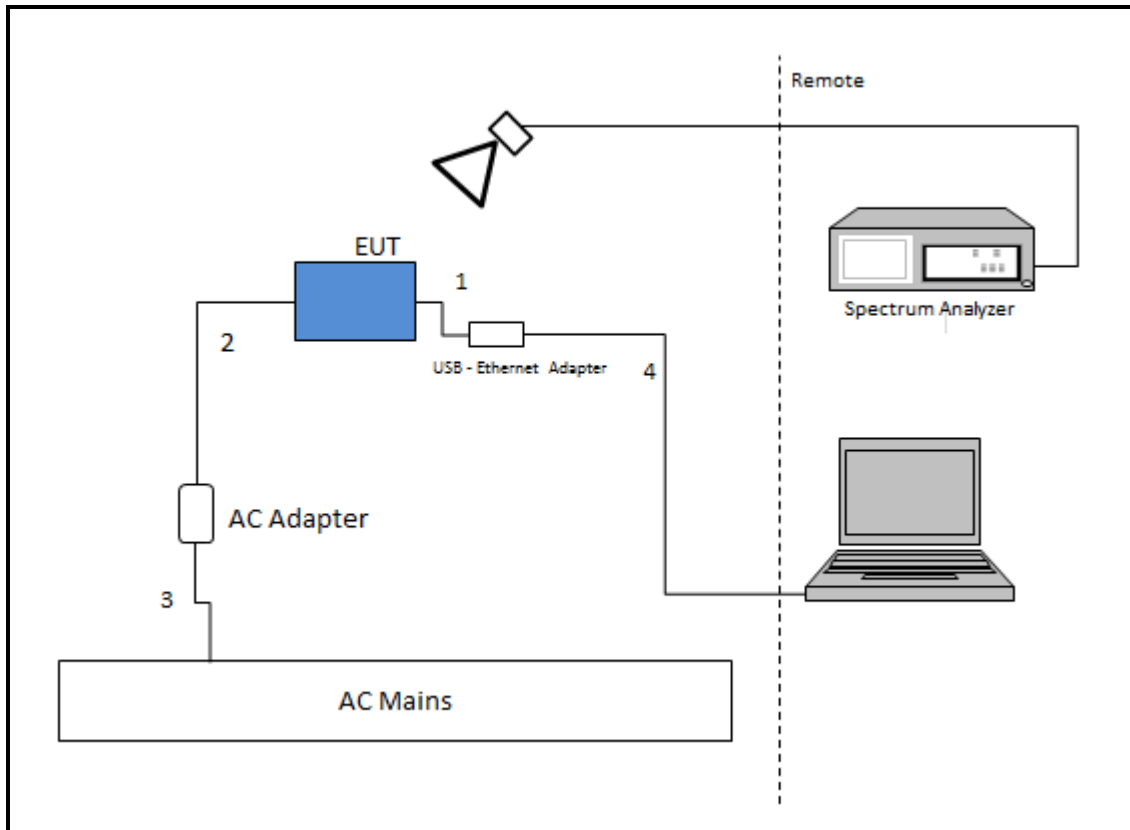
TEST SETUP

The EUT was tested connected to a support Laptop via RJ45/USB adapter. Test software exercised the radio.

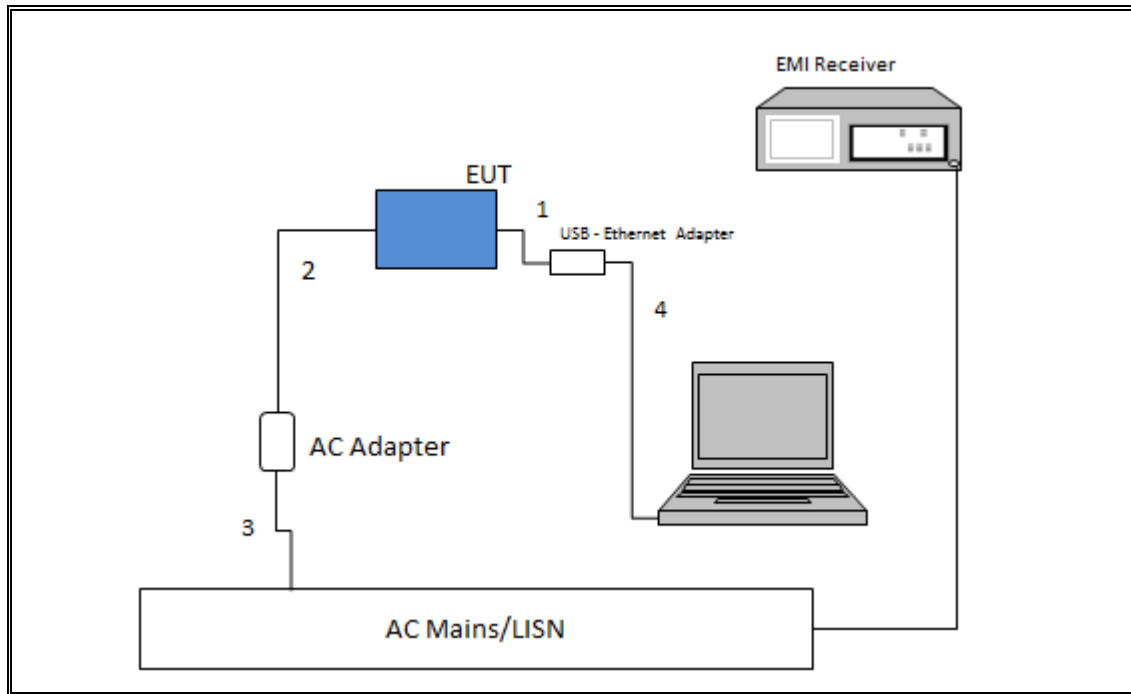
SETUP DIAGRAM FOR ANTENNA PORT CONDUCTED TESTS



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
Antenna, Biconolog, 30MHz-1 GHz	Sunol Sciences Corp.	JB1	T130	09/23/17
Antenna, Horn, 1-18GHz	ETS Lindgren	3117	T711	01/30/18
High Pass Filter 3GHz	Micro-Tronics	HPM17543	T486	8/1/2017
RF Preamplicifier, 1 - 18GHz	Miteq	AFS42-00101800-25-S-42	T1165	08/01/17
RF Preamplicifier, 1 - 7GHz	Ampical	AMP1G6-10-27	T1370	05/15/18
RF Preamplicifier, 10kHz - 1GHz	Sonoma	310N	T300	11/10/17
Spectrum Analyzer	Agilent (Keysight) Technologies	E4440A	T199	07/27/17
Spectrum Analyzer	Agilent (Keysight) Technologies	E4446A	T146	07/13/17
Spectrum Analyzer	Keysight	N9030A	T1466	04/11/18
LISN	Fischer Custom Communications	FCC-LISN-50/250-25-2	T24	03/01/18
EMI Receiver	Rohde & Schwarz	ESR	T1436	01/06/18
Antenna, Horn, 18-26 GHz	ARA	MWH-1826/B	T447	06/30/17
RF Preamplicifier, 1 - 26GHz	Agilent	8449B	T404	07/05/17
Spectrum Analyzer	HP	8564E	T106	09/07/17
Power Meter	Keysight	N1911A	T1269	03/29/18
Power Sensor	Keysight	N1921A	T1224	03/29/18

Test Software List			
Description	Manufacturer	Model	Version
Radiated Software	UL	UL EMC	9.5, 12/01/16
Antenna Port Software	UL	UL RF	6.9, 6/15/17
Conducted Emissions Software	UL	UL EMC	9.5, 5/26/15

7. ANTENNA PORT TEST RESULTS

7.1. MEASUREMENT METHODS

On Time and Duty Cycle: KDB 558074 D01 v03r04, Section 6.

6 dB BW: KDB 558074 D01 v03r04, Section 8.1.

Output Power: KDB 558074 D01 v03r04, Section 9.1.2.

Power Spectral Density: KDB 558074 D01 v03r04, Section 10.2.

Out-of-band emissions in non-restricted bands: KDB 558074 D01 v03r04, Section 11.0.

Out-of-band emissions in restricted bands: KDB 558074 D01 v03r04, Section 12.1.

Band-edge: KDB 558074 D01 v03r04, Section 12.1.

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

7.2. ON TIME, DUTY CYCLE

LIMITS

None; for reporting purposes only.

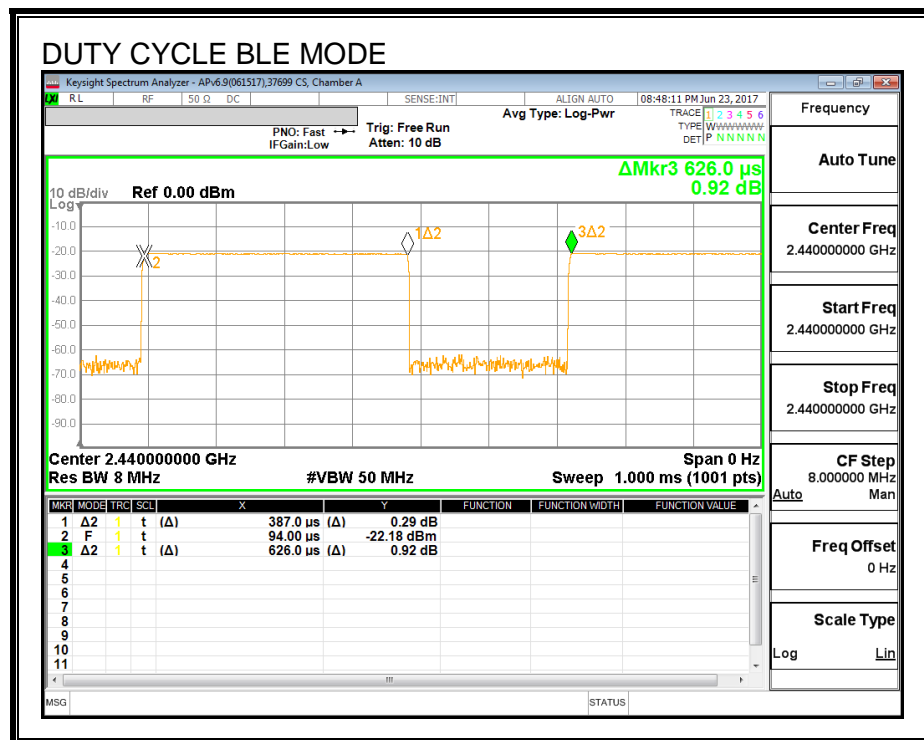
PROCEDURE

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	0.387	0.626	0.618	61.8%	2.09	2.584

DUTY CYCLE PLOTS



7.3. BLE

7.3.1. 6 dB BANDWIDTH

LIMITS

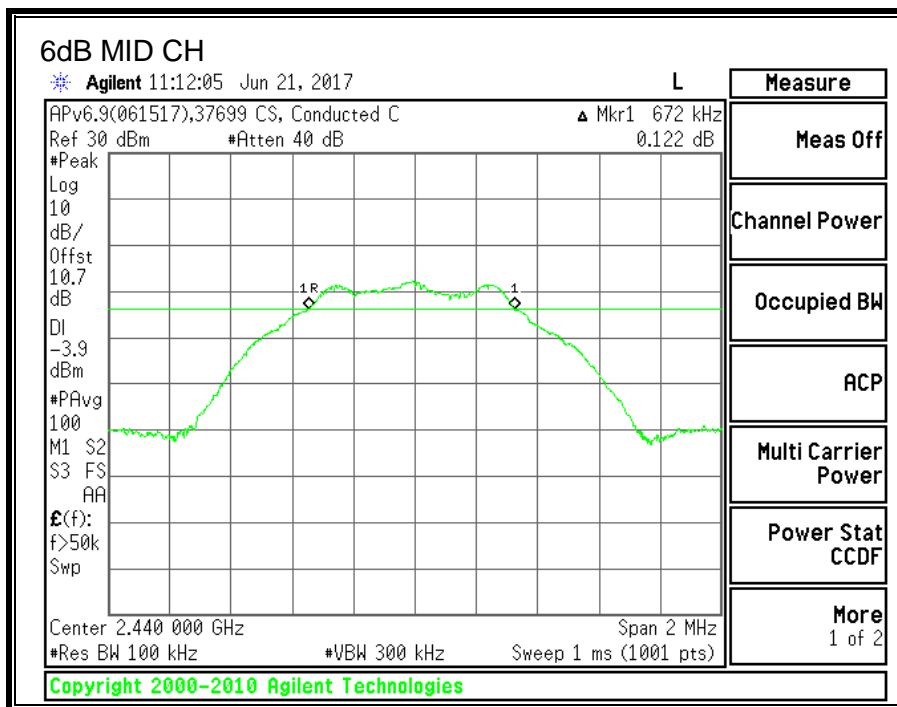
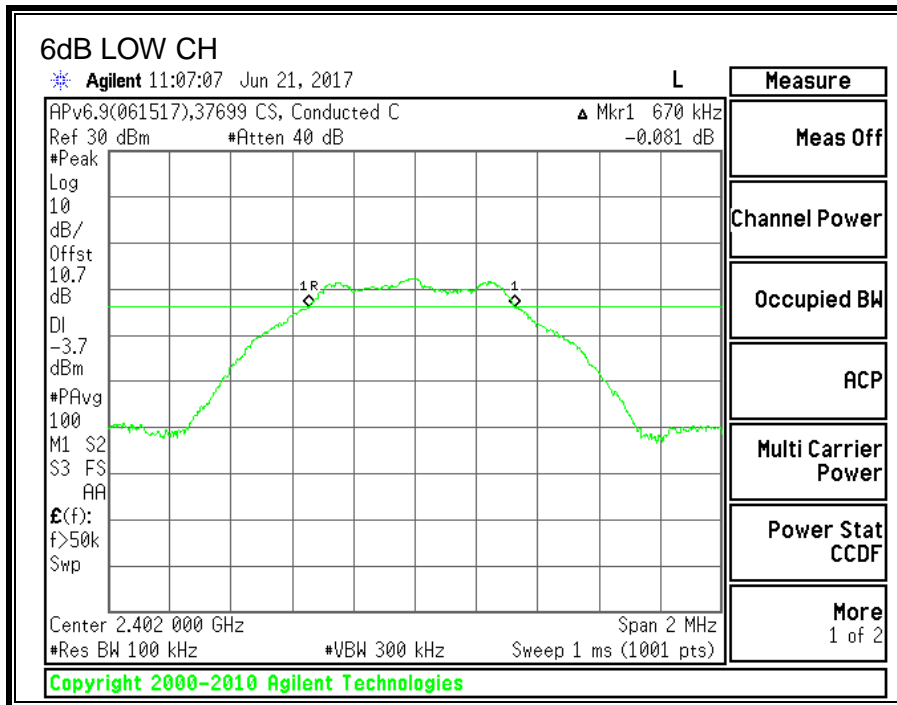
FCC §15.247 (a) (2)

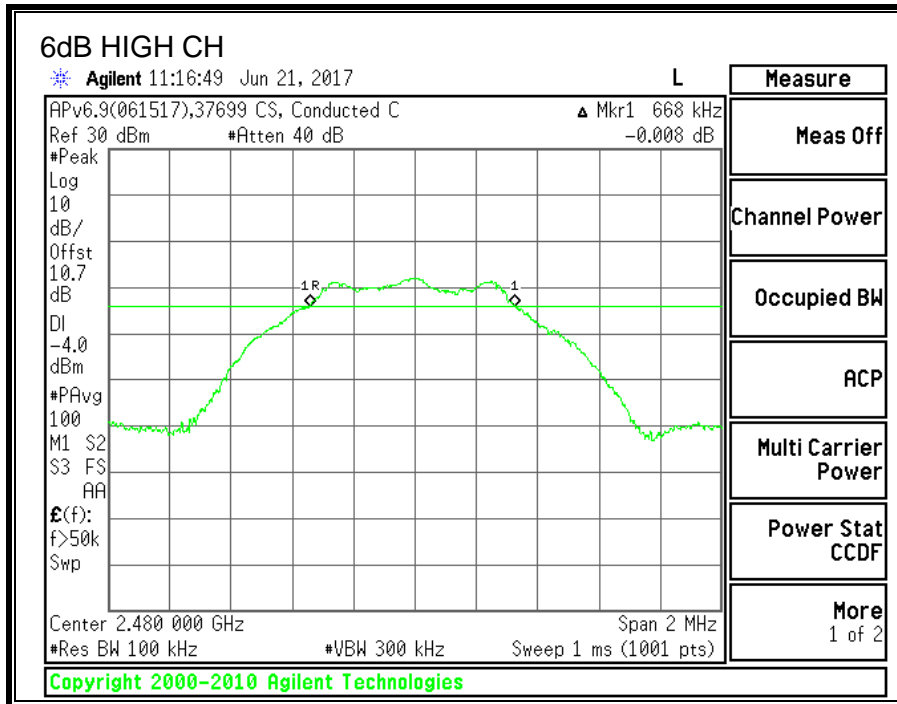
IC RSS-247 (5.2) (a)

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

RESULTS

Channel	Frequency	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.670	0.5
Middle	2440	0.672	0.5
High	2480	0.668	0.5





7.3.2. 99% BANDWIDTH

LIMITS

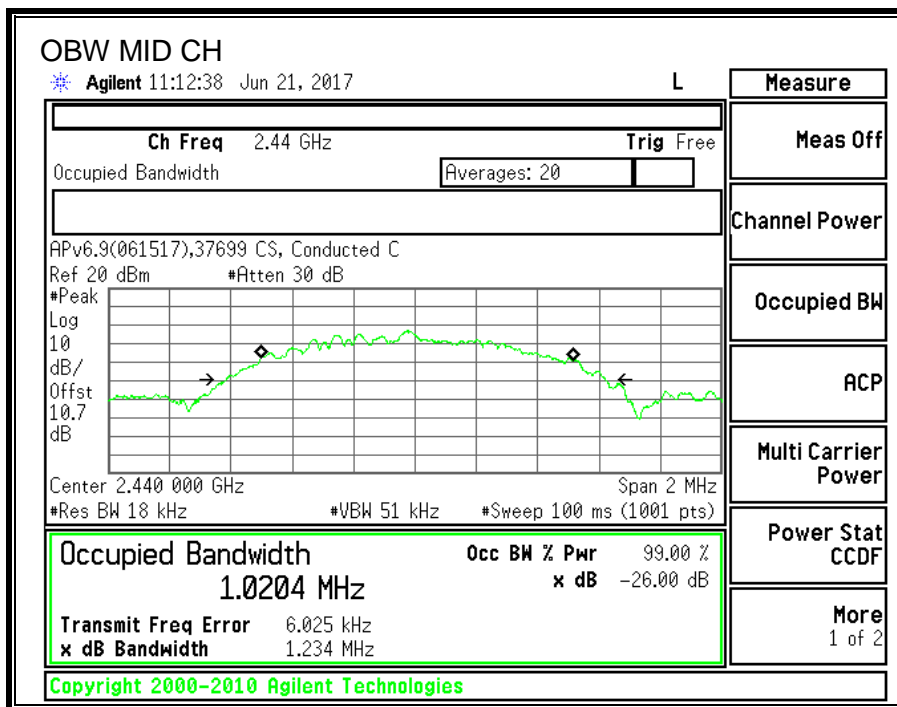
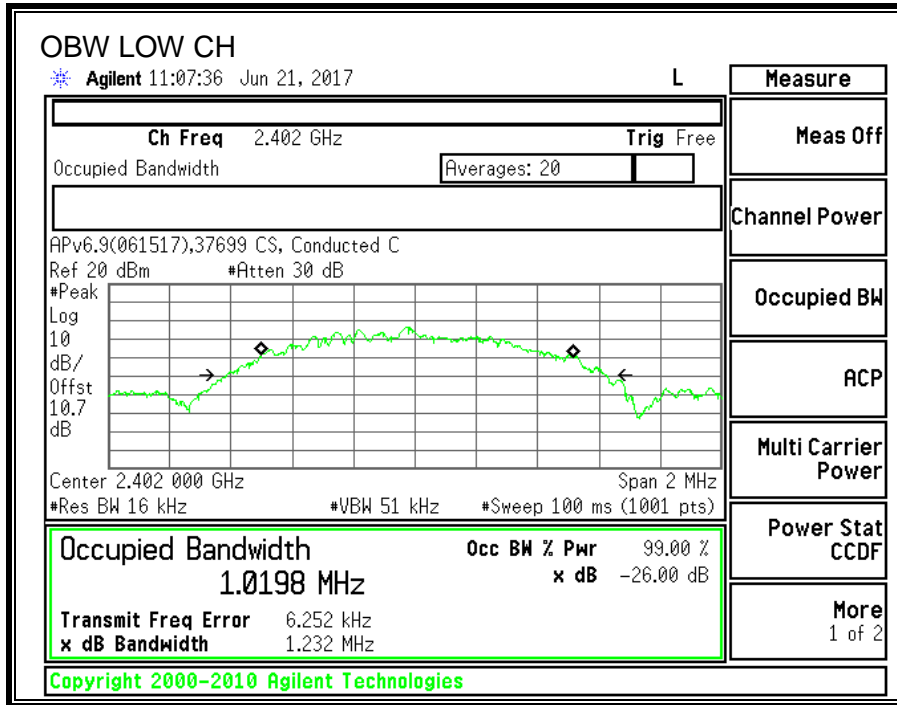
None; for reporting purposes only.

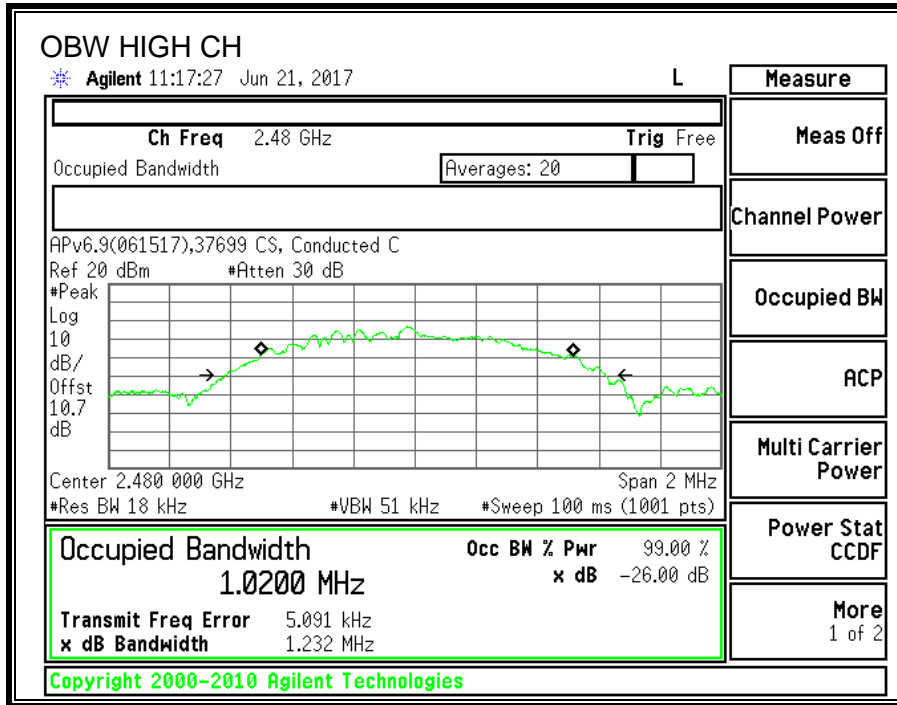
Test Procedure

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

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0198
Middle	2440	1.0204
High	2480	1.0200





7.3.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

RESULTS

ID:	37699 CS	Date:	06/19/17
------------	----------	--------------	----------

Channel	Frequency (MHz)	AV Power (dBm)
Low	2402	2.26
Middle	2440	2.11
High	2480	1.97

7.3.4. 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.

RESULTS

Tested By:	37699 CS
Date:	06/19/17

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	2.45	30	-27.55
Middle	2440	2.31	30	-27.69
High	2480	2.13	30	-27.87

7.3.5. POWER SPECTRAL DENSITY

LIMITS

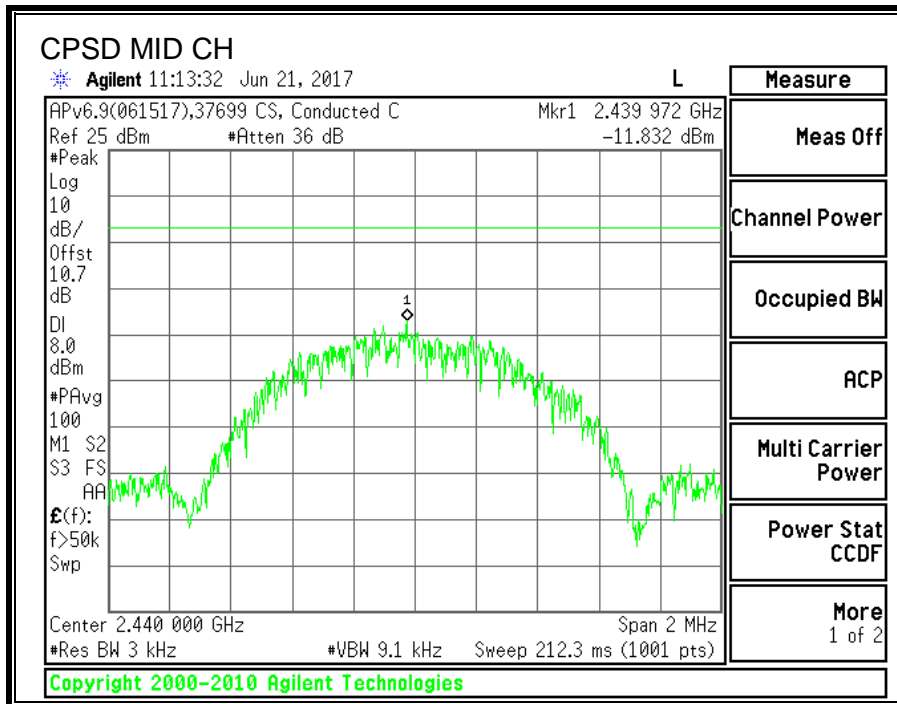
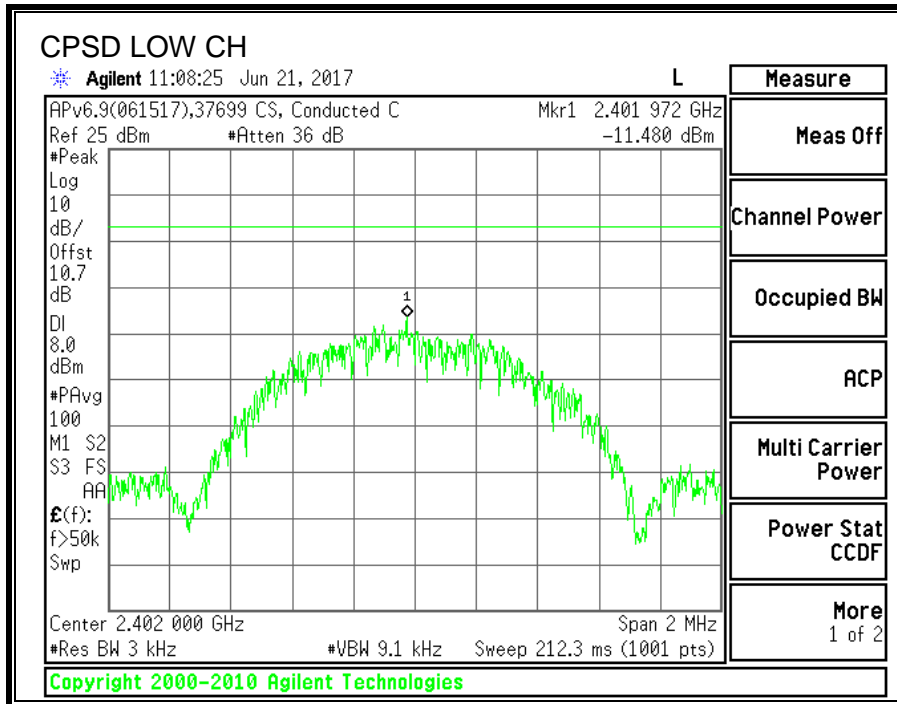
FCC §15.247 (e)

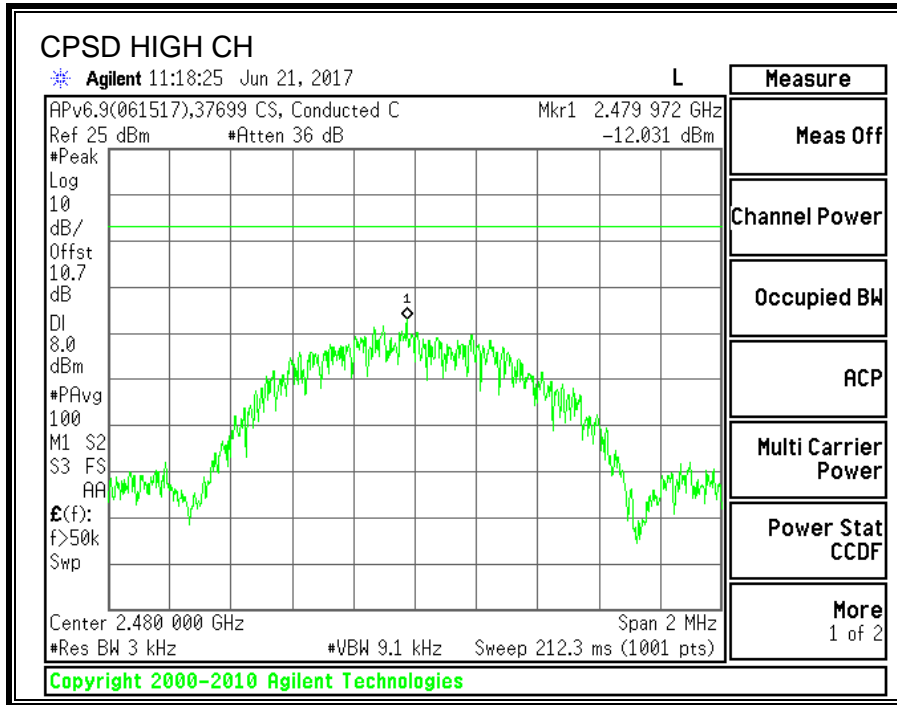
IC RSS-247 (5.2) (b)

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

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-11.48	8	-19.48
Middle	2440	-11.83	8	-19.83
High	2480	-12.03	8	-20.03





7.3.6. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS

LIMITS

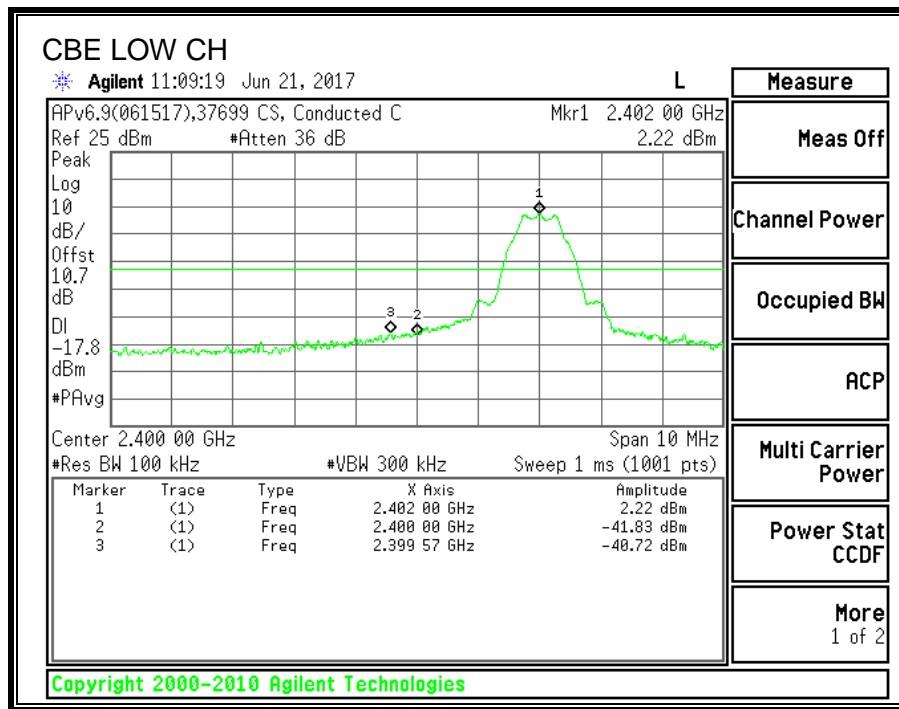
FCC §15.247 (d)

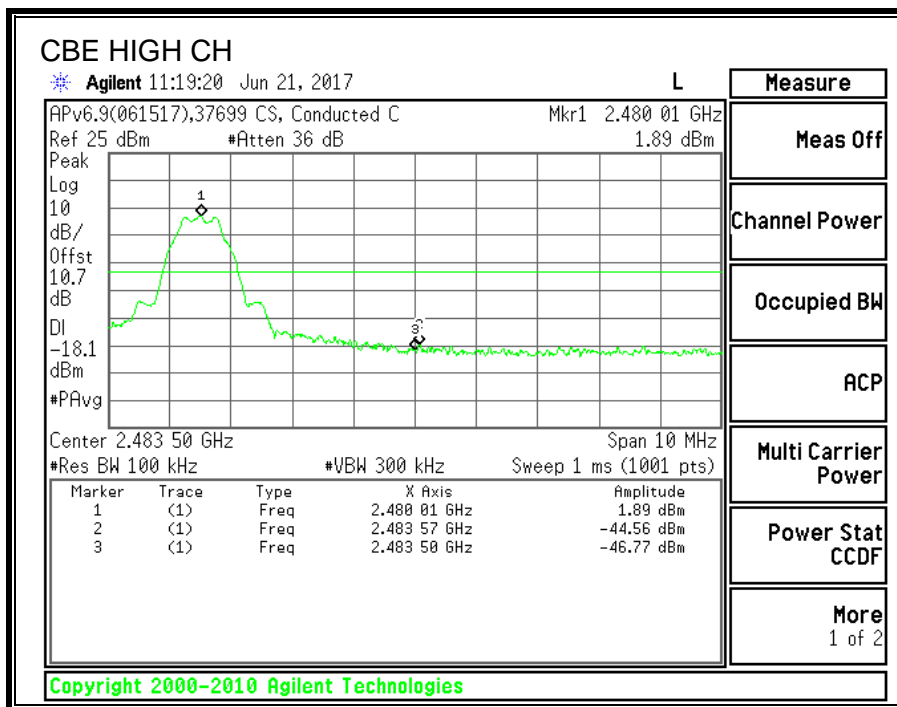
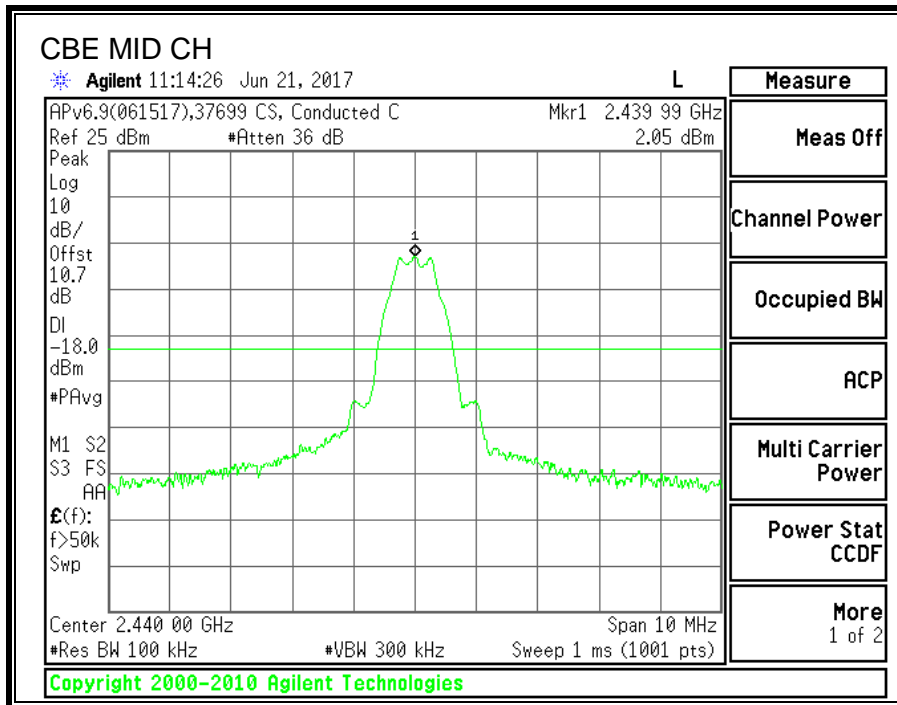
IC RSS-247 (5.5)

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

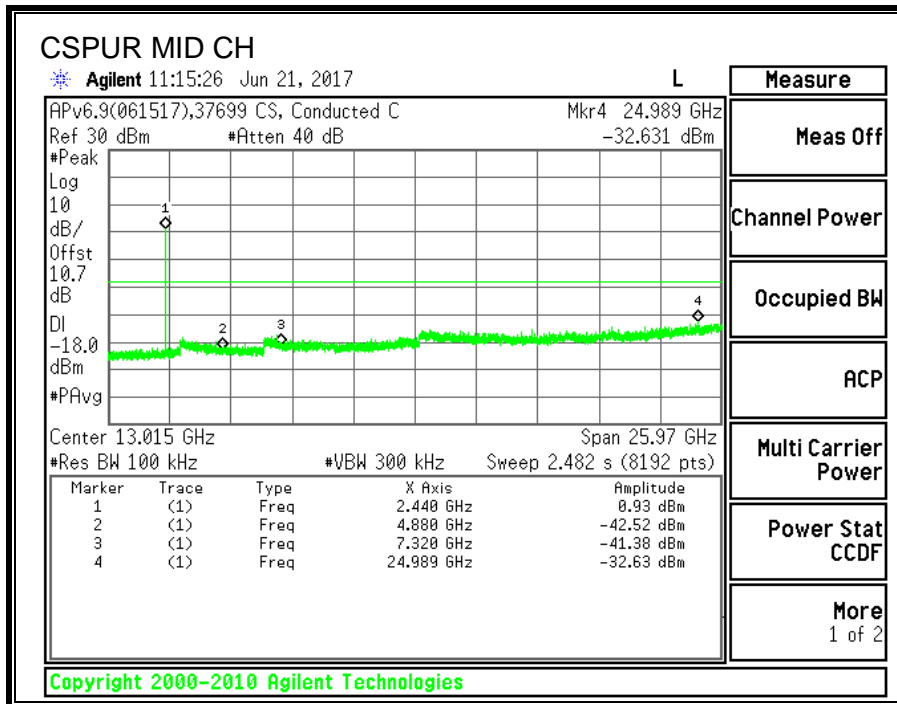
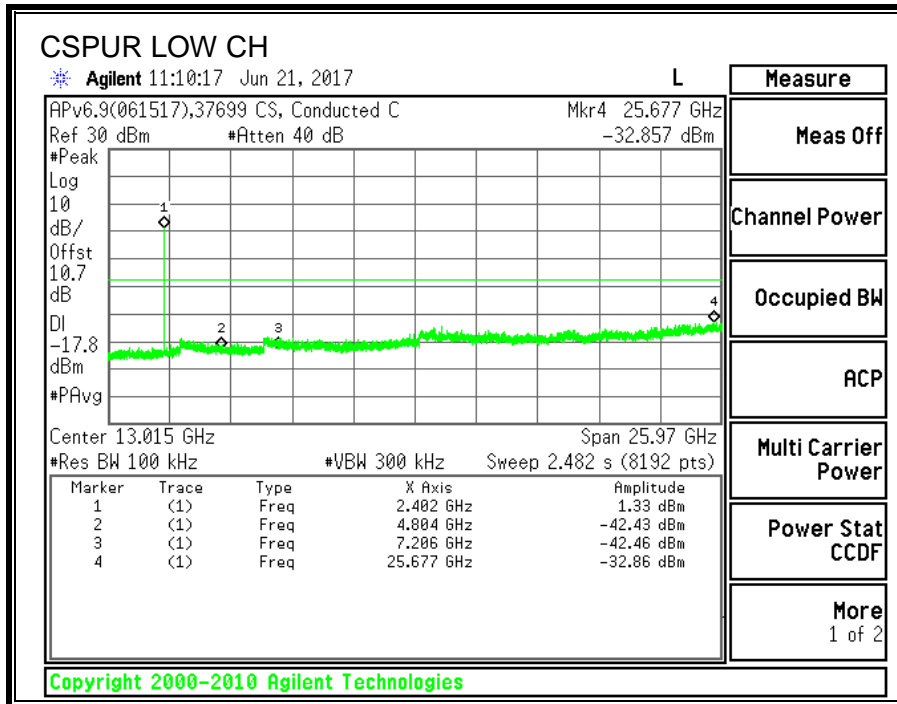
RESULTS

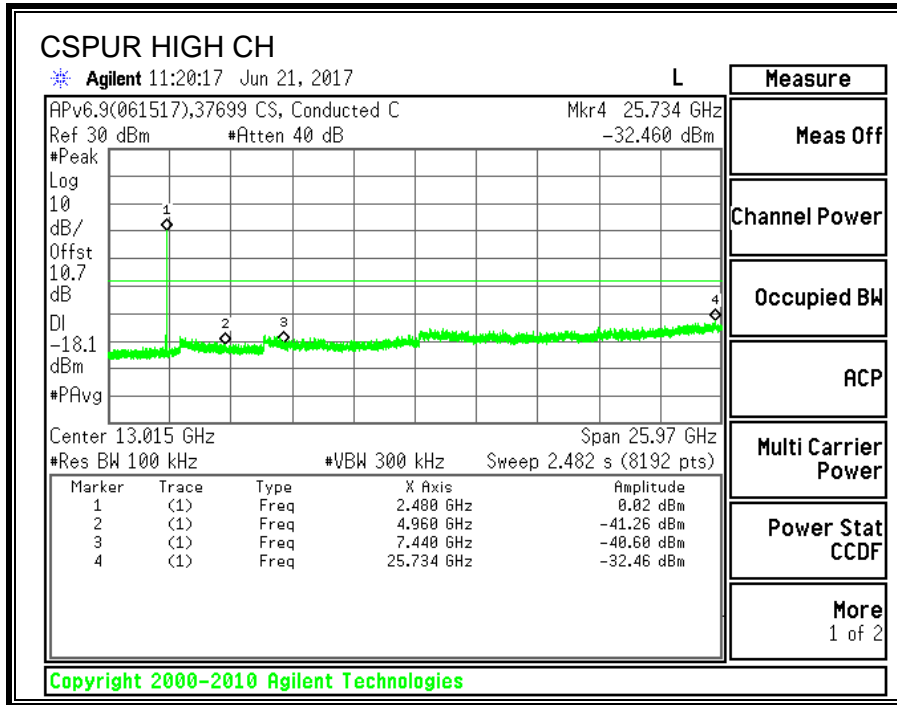
BANDEDGE





SPURIOUS EMISSIONS





8. RADIATED TEST RESULTS

8.1. 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
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.

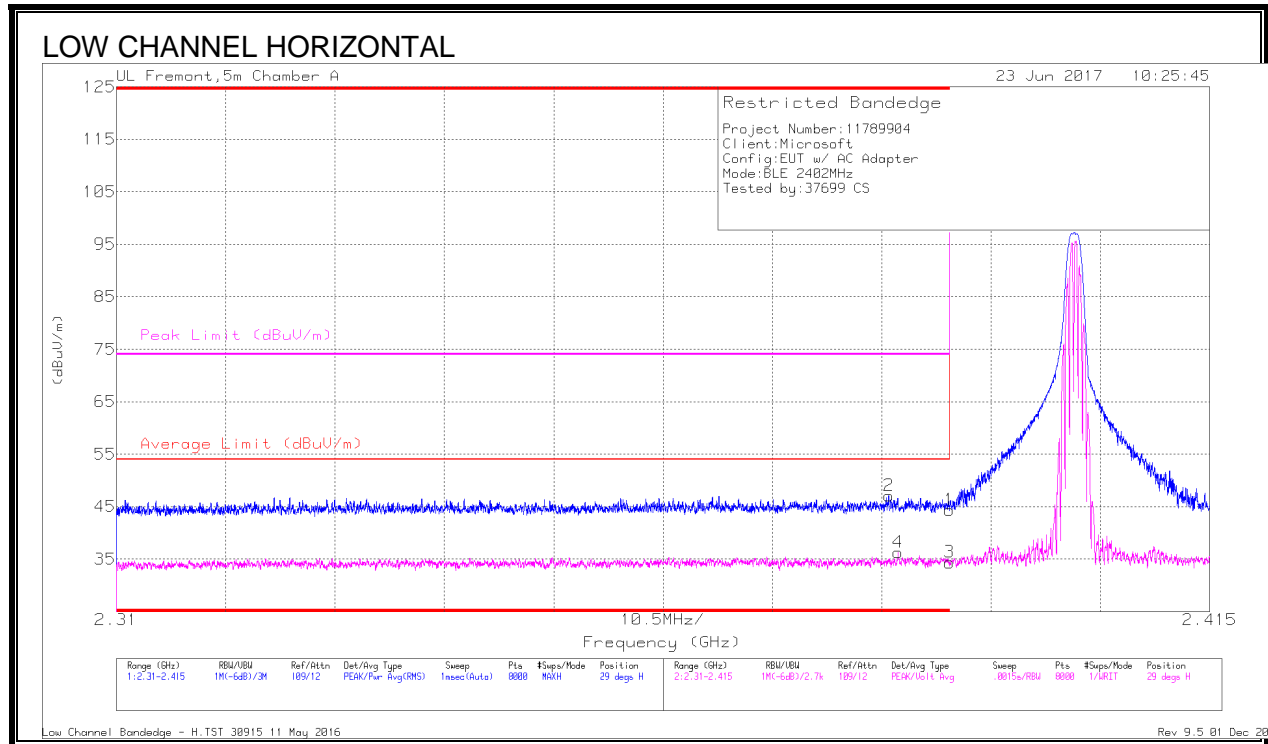
For final measurements above 1 GHz the resolution bandwidth was set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T (2.7 kHz) video bandwidth with peak detector for average measurements.

The spectrum from 30 MHz to 1GHz and 18GHz to 26 GHz is investigated with the transmitter set to transmit at the channel with highest output power as worst-case scenario. 1GHz to 18GHz was set to the lowest, middle, and highest channels in the 2.4 GHz 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.

8.2. BLE

8.2.1. RESTRICTED BANDEGE (LOW CHANNEL)

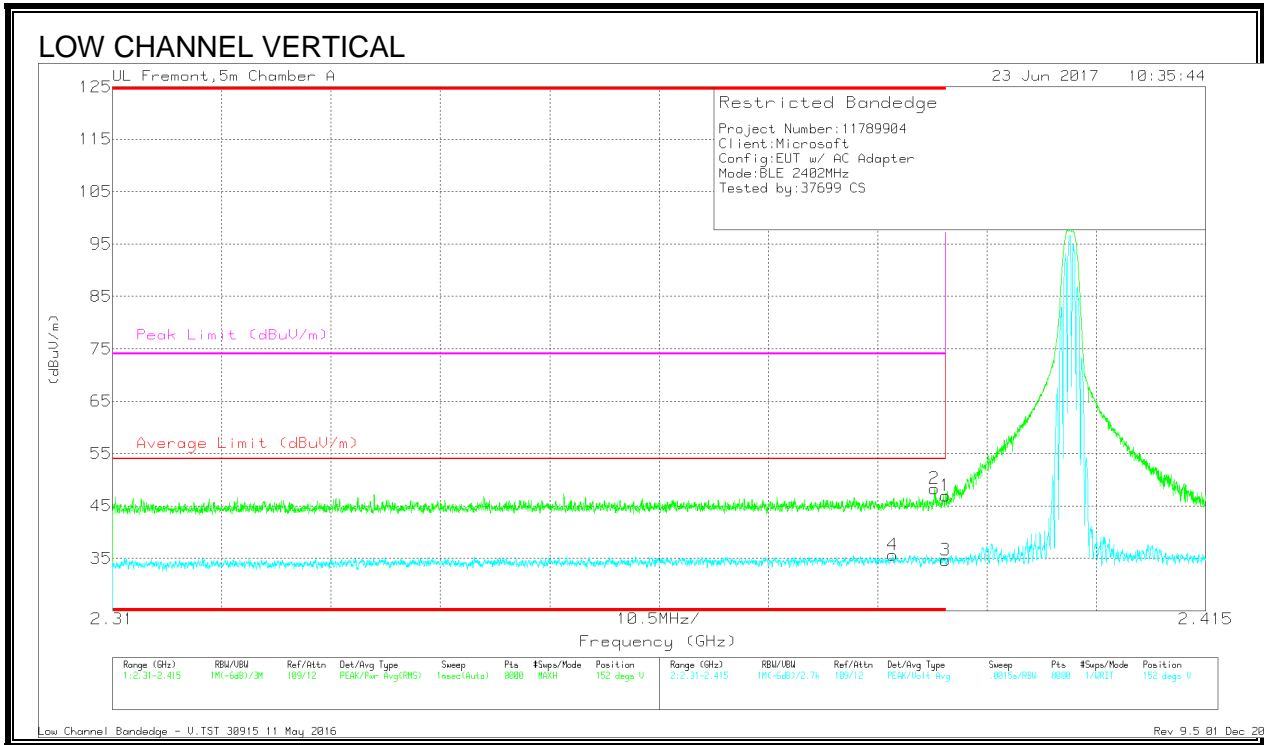


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	35.96	Pk	32.1	-23.7	44.36	-	-	74	-29.64	29	233	H
2	* 2.384	38.7	Pk	32.1	-23.7	47.1	-	-	74	-26.9	29	233	H
3	* 2.39	25.94	VA1T	32.1	-23.7	34.34	54	-19.66	-	-	29	233	H
4	* 2.385	27.82	VA1T	32.1	-23.7	36.22	54	-17.78	-	-	29	233	H

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

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average $V_B=1/T_{on}$ where: T_{on} is transmit duration



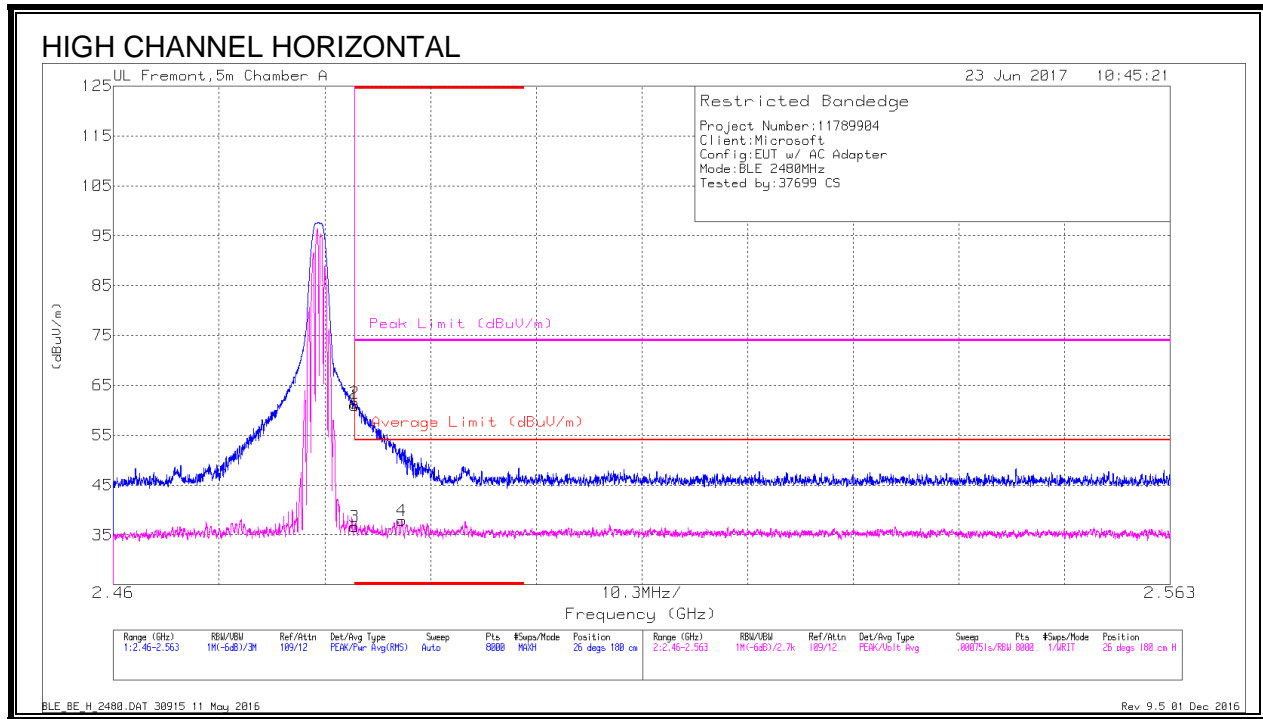
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* 2.385	27.2	VA1T	32.1	-23.7	35.6	54	-18.4	-	-	152	364	V
2	* 2.389	39.93	PK	32.1	-23.7	48.33	-	-	74	-25.67	152	364	V
1	* 2.39	38.58	PK	32.1	-23.7	46.98	-	-	74	-27.02	152	364	V
3	* 2.39	26.23	VA1T	32.1	-23.7	34.63	54	-19.37	-	-	152	364	V

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

PK - Peak detector

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

8.2.2. AUTHORIZED BANDEDGE (HIGH CHANNEL)

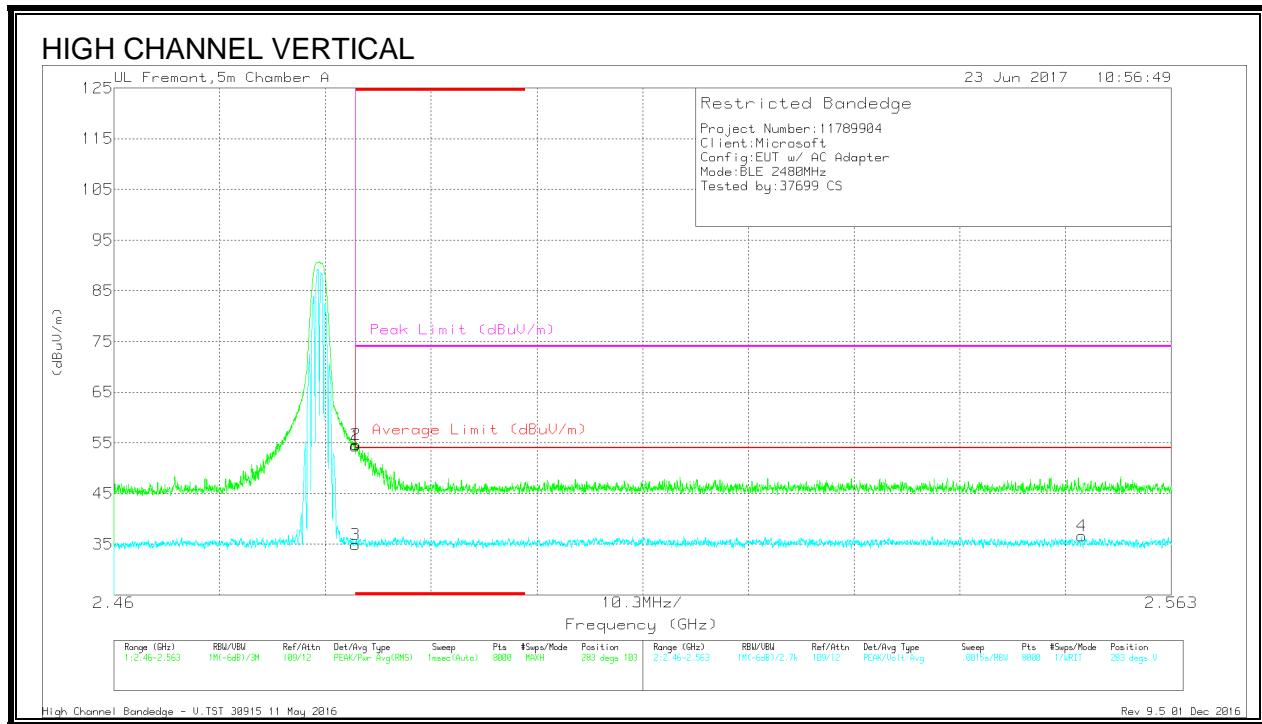


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	52.11	PK	32.5	-23.6	61.01	-	-	74	-12.99	26	180	H
2	* 2.484	52.57	PK	32.5	-23.6	61.47	-	-	74	-12.53	26	180	H
3	* 2.484	27.77	VA1T	32.5	-23.6	36.67	54	-17.33	-	-	26	180	H
4	* 2.488	29	VA1T	32.6	-23.7	37.9	54	-16.1	-	-	26	180	H

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

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration



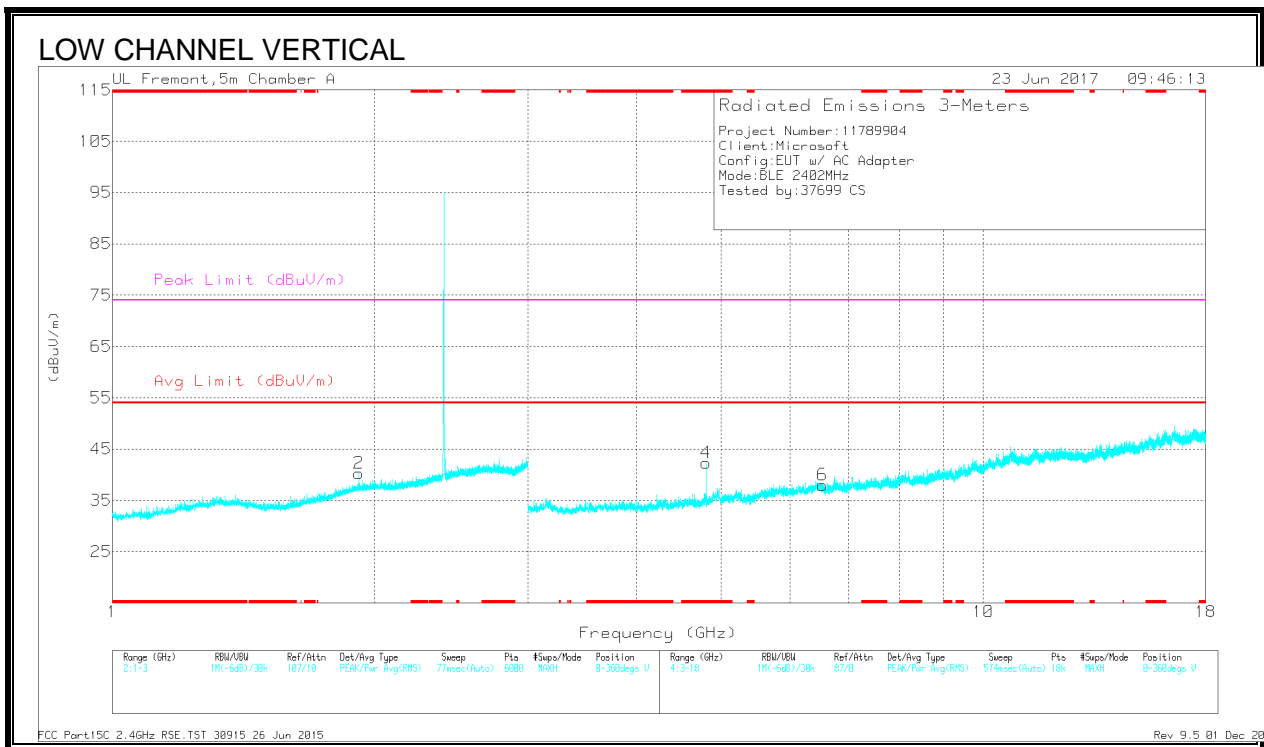
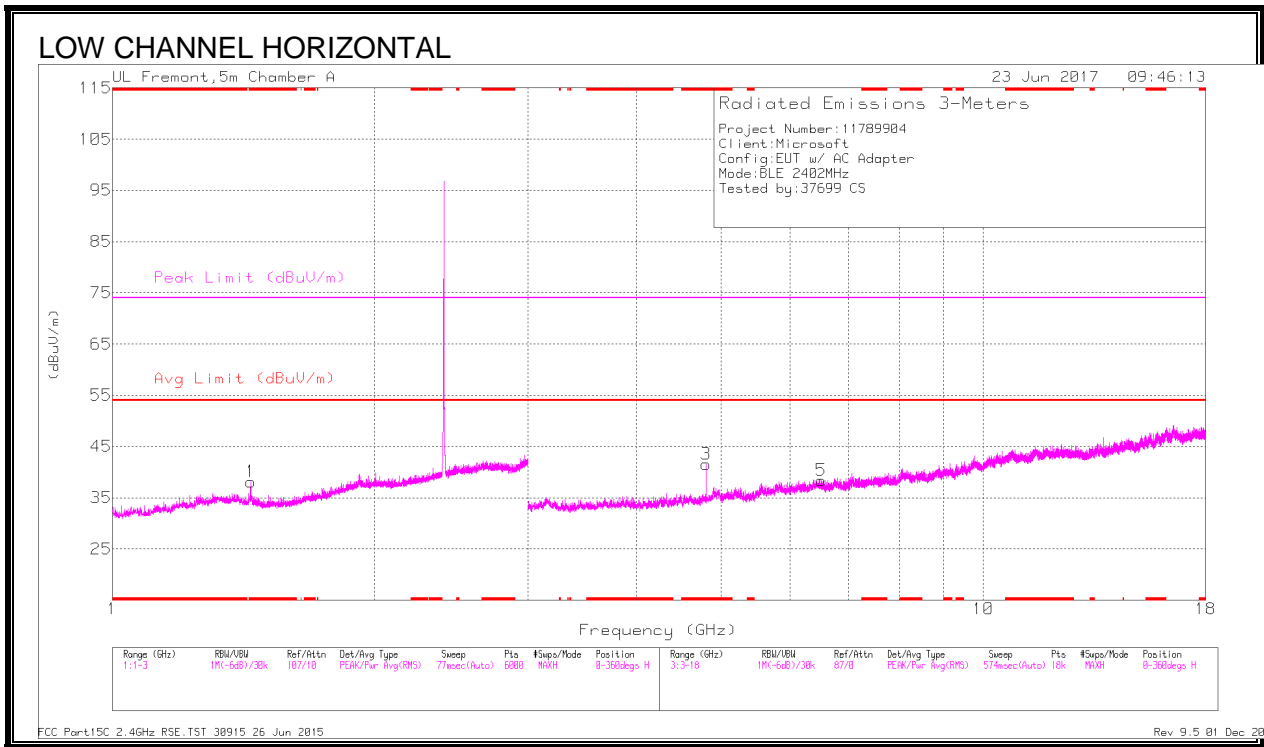
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	45.47	Pk	32.5	-23.6	54.37	-	-	74	-19.63	283	103	V
2	* 2.484	45.73	Pk	32.5	-23.6	54.63	-	-	74	-19.37	283	103	V
3	* 2.484	26.05	VA1T	32.5	-23.6	34.95	54	-19.05	-	-	283	103	V
4	2.554	27.53	VA1T	32.6	-23.5	36.63	54	-17.37	-	-	283	103	V

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

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average $V_B=1/T_{on}$ where: T_{on} is transmit duration

8.2.3. HARMONICS AND SPURIOUS EMISSIONS

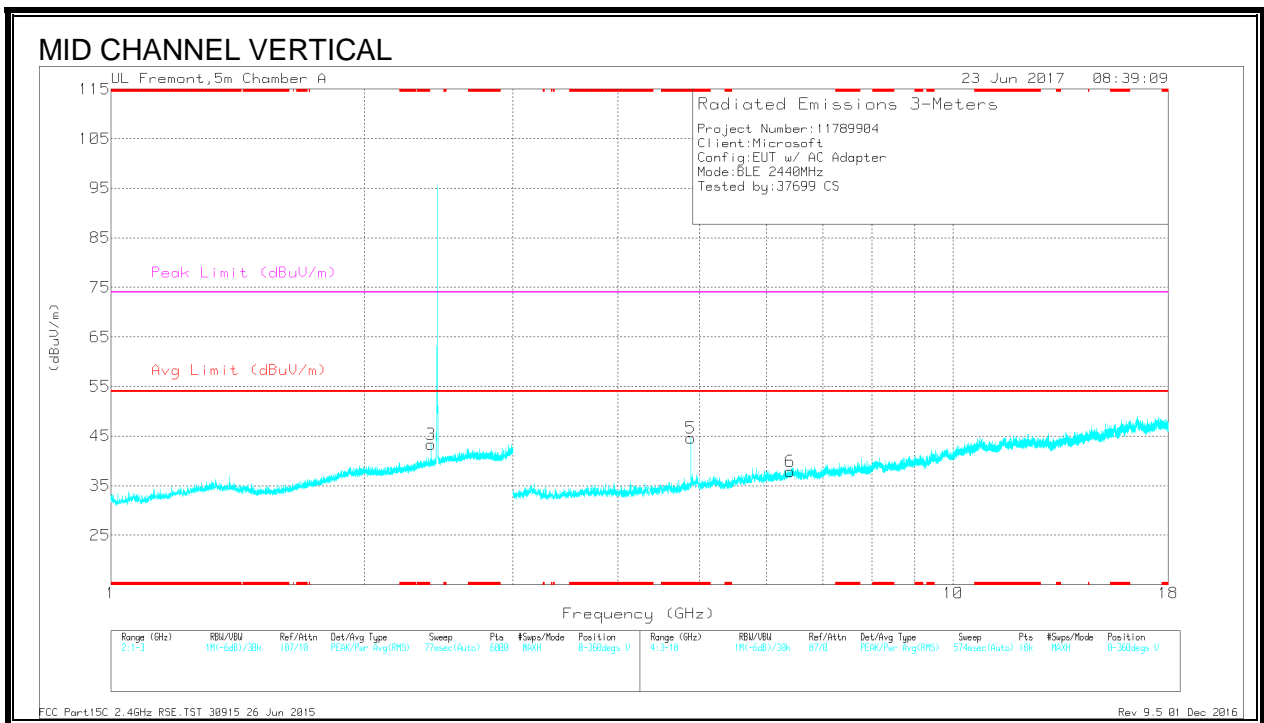
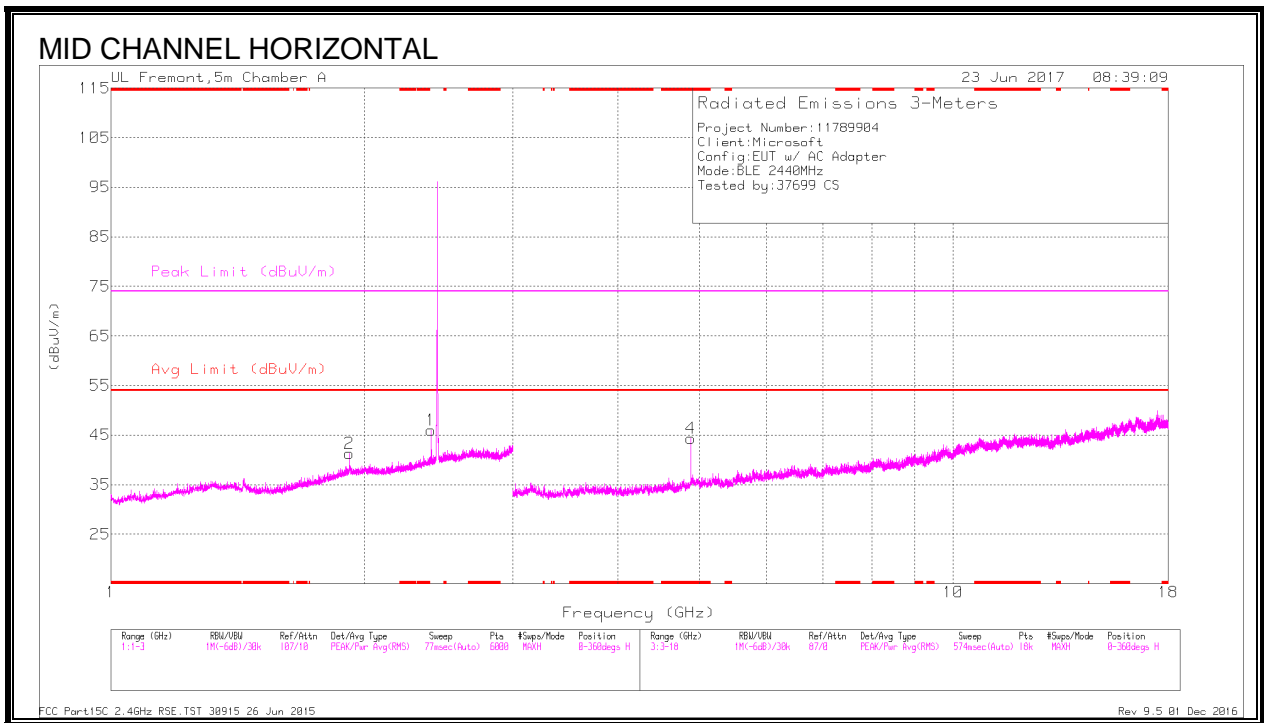


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.44	44.23	PK2	28.8	-23.8	49.23	-	-	74	-24.77	67	106	H
	* 1.44	26.59	VA1T	28.8	-23.8	31.59	54	-22.41	-	-	67	106	H
3	* 4.803	40.94	PK2	34	-28.6	46.34	-	-	74	-27.66	88	110	H
	* 4.804	33.19	VA1T	34	-28.5	38.69	54	-15.31	-	-	88	110	H
4	* 4.804	42.24	PK2	34	-28.5	47.74	-	-	74	-26.26	200	244	V
	* 4.804	35.21	VA1T	34	-28.6	40.61	54	-13.39	-	-	200	244	V
2	1.92	36.44	PK2	31.3	-23.5	44.24	-	-	-	-	0	200	V
	6.514	34.24	PK2	35.5	-25.3	44.44	-	-	-	-	0	200	H
6	6.541	34.17	PK2	35.6	-25.6	44.17	-	-	-	-	0	200	V

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

PK2 - KDB558074 Method: Maximum Peak

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

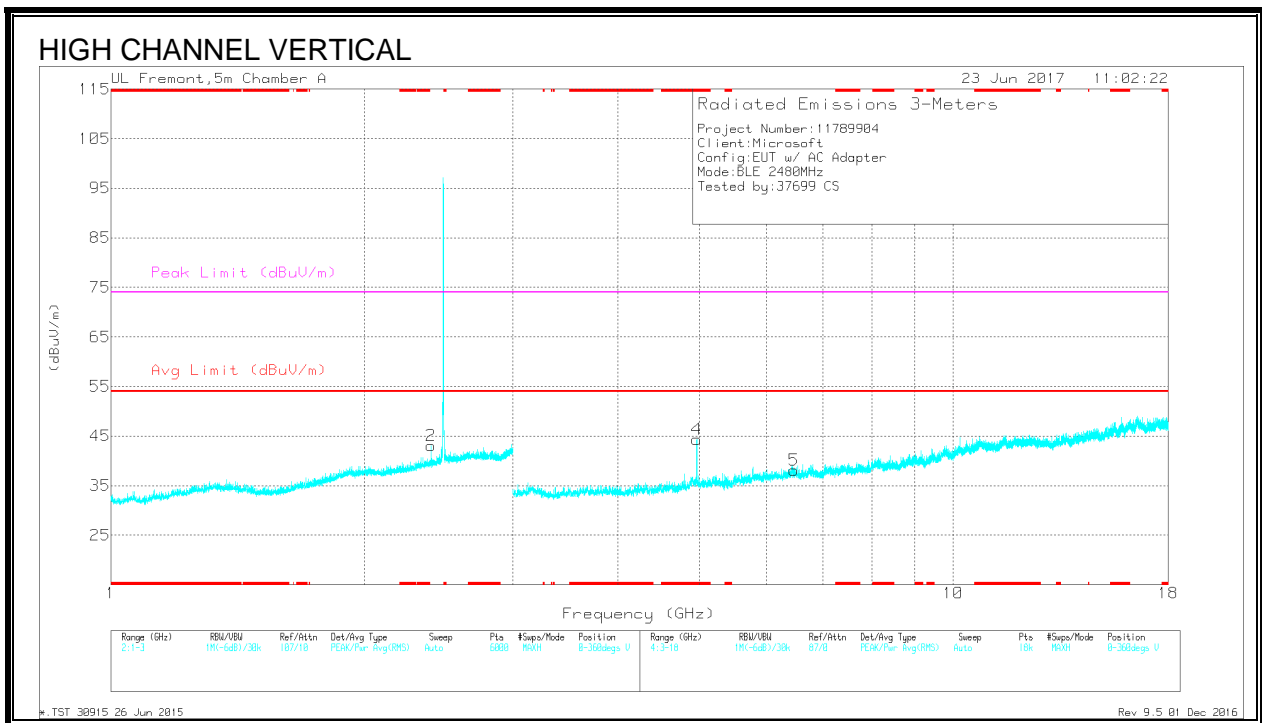
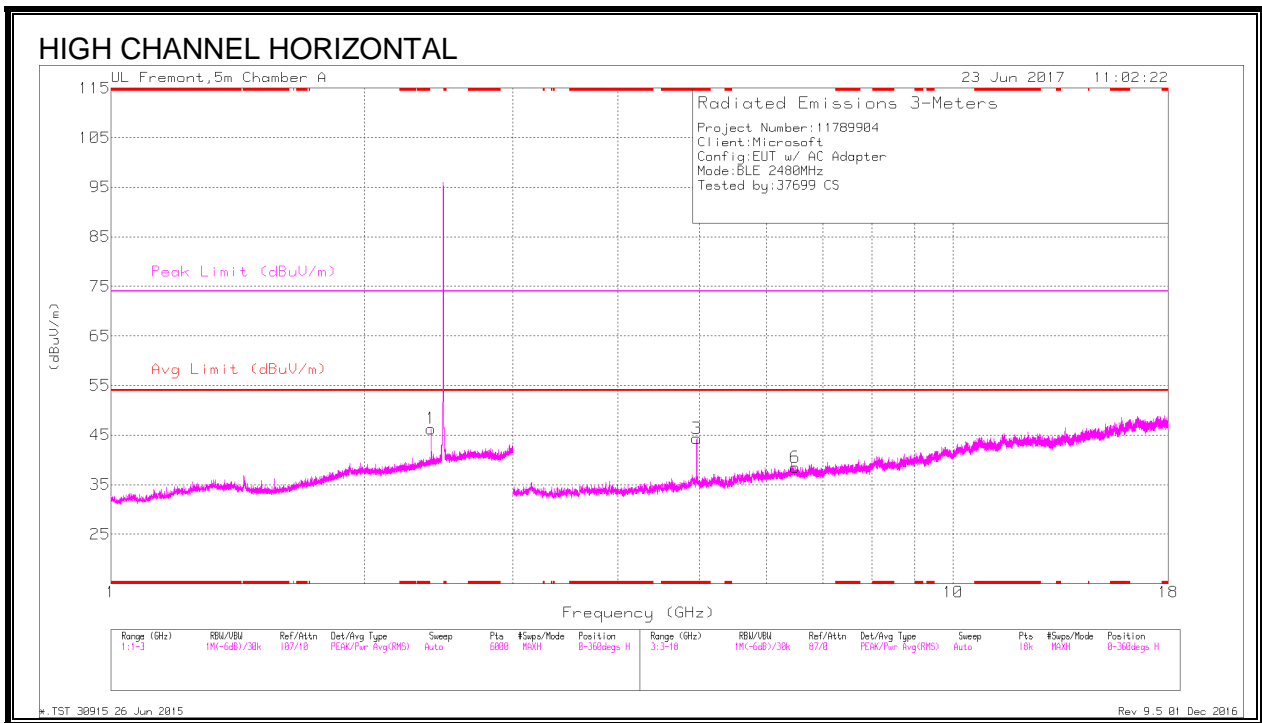


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (dB/m)	Amp/Cb/Filtr/P ad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* 4.88	41.48	PK2	34	-27.9	47.58	-	-	74	-26.42	14	158	H
	* 4.88	33.92	VA1T	34	-27.9	40.02	54	-13.98	-	-	14	158	H
5	* 4.879	43.25	PK2	34	-27.9	49.35	-	-	74	-24.65	158	241	V
	* 4.88	36.67	VA1T	34	-27.9	42.77	54	-11.23	-	-	158	241	V
2	1.919	38.92	PK2	31.3	-23.5	46.72	-	-	-	-	0	101	H
1	2.4	42.89	PK2	32.1	-23.7	51.29	-	-	-	-	0	200	H
3	2.401	37.29	PK2	32.1	-23.7	45.69	-	-	-	-	0	200	V
6	6.404	34.66	PK2	35.5	-25.7	44.46	-	-	-	-	0	101	V

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

PK2 - KDB558074 Method: Maximum Peak

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (dB/m)	Amp/Cb/Filtr/P ad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	* 4.961	43.48	PK2	34.1	-28.2	49.38	-	-	74	-24.62	60	153	H
	* 4.96	36.53	VA1T	34.1	-28.2	42.43	54	-11.57	-	-	60	153	H
4	* 4.961	46.08	PK2	34.1	-28.2	51.98	-	-	74	-22.02	199	257	V
	* 4.96	39.34	VA1T	34.1	-28.2	45.24	54	-8.76	-	-	199	257	V
1	2.4	40.37	PK2	32.1	-23.7	48.77	-	-	-	-	360	100	H
2	2.4	38.1	PK2	32.1	-23.7	46.5	-	-	-	-	360	100	V
5	6.47	33.96	PK2	35.5	-25	44.46	-	-	-	-	360	100	V
6	6.495	33.76	PK2	35.5	-25.2	44.06	-	-	-	-	360	201	H

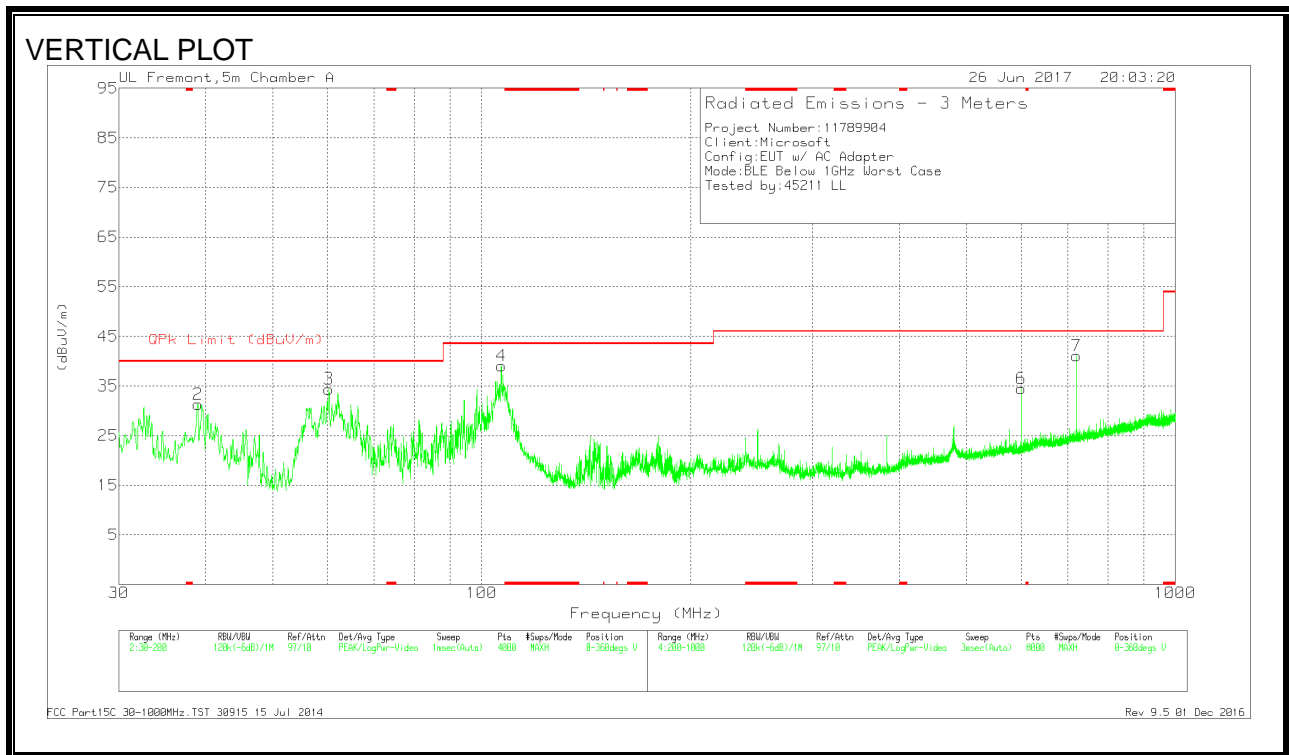
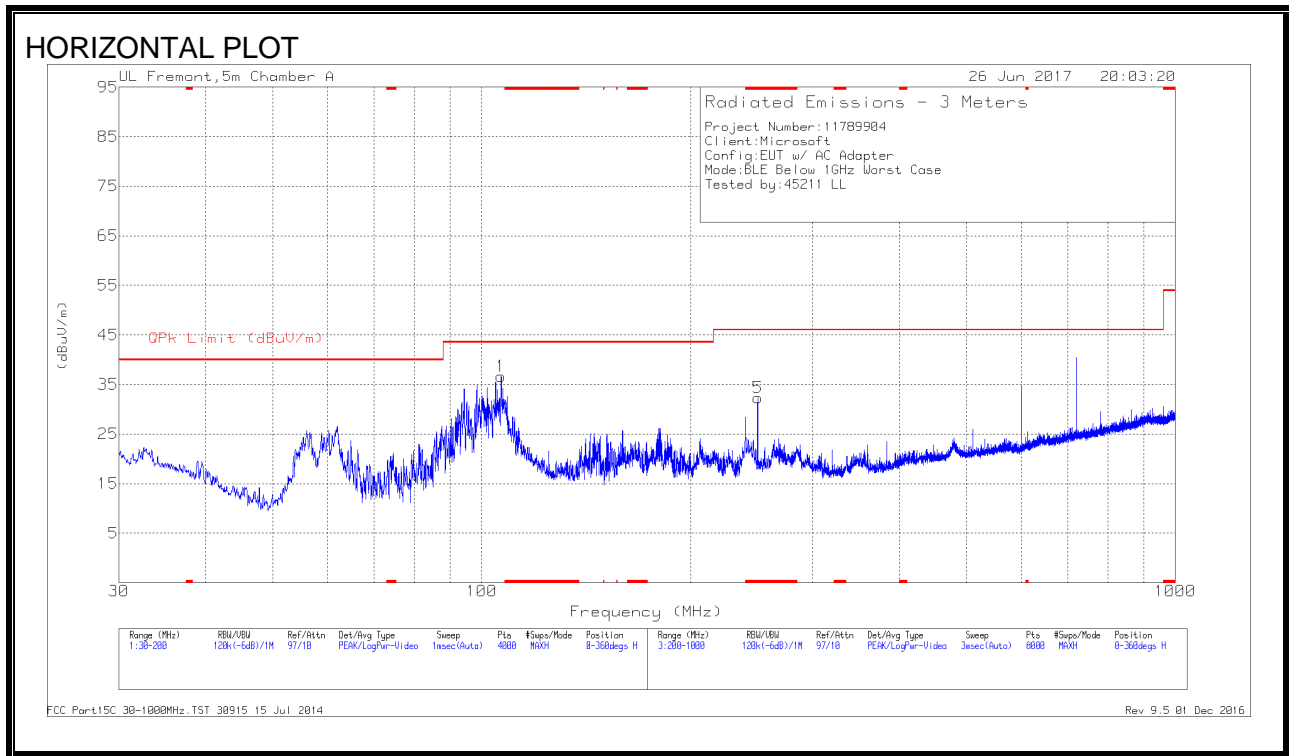
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK2 - KDB558074 Method: Maximum Peak

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

8.3. WORST-CASE BELOW 1 GHz

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



DATA

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
3	60.2061	52.22	Qp	11.7	-30.9	33.02	40	-6.98	5	101	V
4	106.742	51.09	Qp	15.9	-30.5	36.49	43.52	-7.03	44	102	V
7	720.0281	44.46	Qp	24.5	-28.2	40.76	46.02	-5.26	123	101	V
6	599.952	40.63	Pk	22.5	-28.6	34.53	46.02	-11.49	0-360	101	V
1	106.6898	51.29	Pk	15.9	-30.5	36.69	43.52	-6.83	0-360	300	H
5	* 250.0065	46.4	Pk	15.5	-29.6	32.3	46.02	-13.72	0-360	100	H
2	38.9698	43.77	Pk	18.7	-31.1	31.37	40	-8.63	0-360	100	V

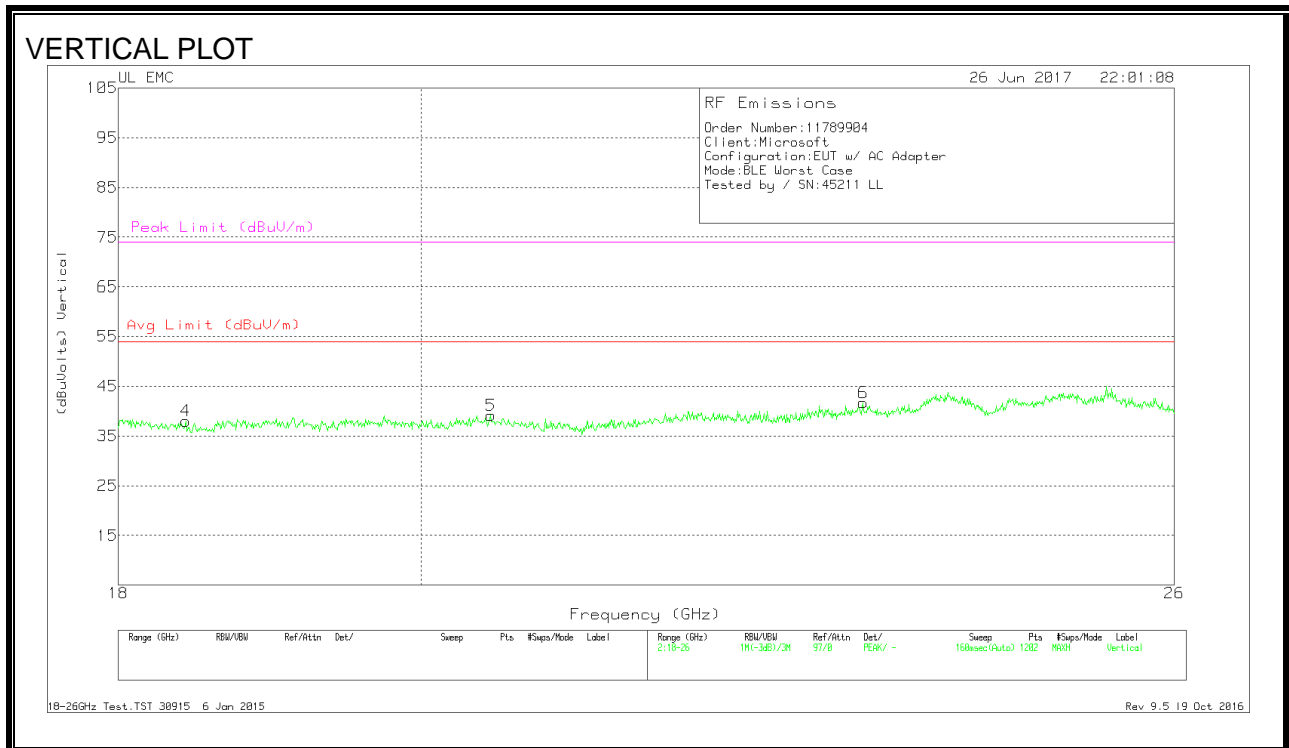
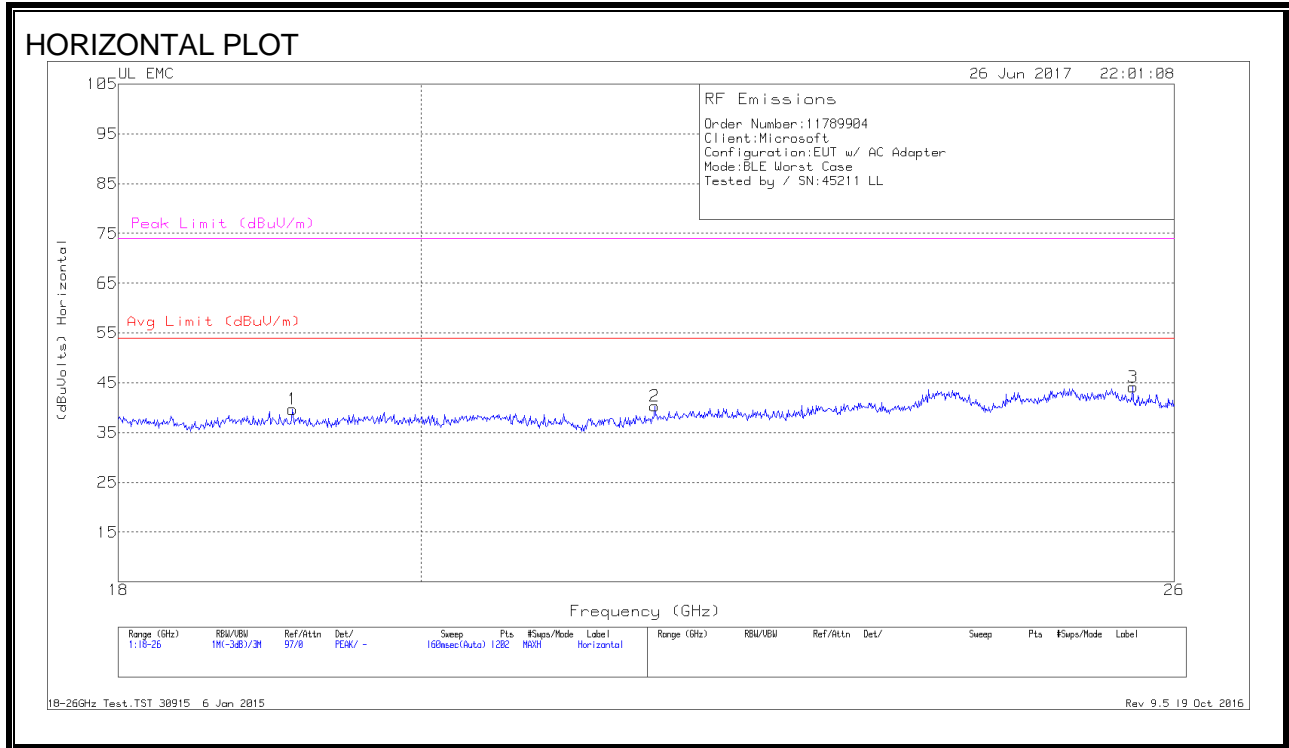
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Qp - Quasi-Peak detector

Pk - Peak detector

8.4. WORST-CASE ABOVE 18 GHZ

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



Data

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	19.126	41.07	Pk	32.5	-24.4	-9.5	39.67	54	-14.33	74	-34.33
2	21.697	41.23	Pk	33.2	-24.6	-9.5	40.33	54	-13.67	74	-33.67
3	25.627	43.97	Pk	34.3	-24.6	-9.5	44.17	54	-9.83	74	-29.83
4	18.426	40.6	Pk	32.3	-25.4	-9.5	38	54	-16	74	-36
5	20.491	40.77	Pk	33.1	-25.2	-9.5	39.17	54	-14.83	74	-34.83
6	23.329	42.27	Pk	33.7	-24.8	-9.5	41.7	54	-12.33	74	-32.33

Pk - Peak detector

8.5. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

Frequency of Emission (MHz)	Conducted Limit (dB μ V)	
	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.

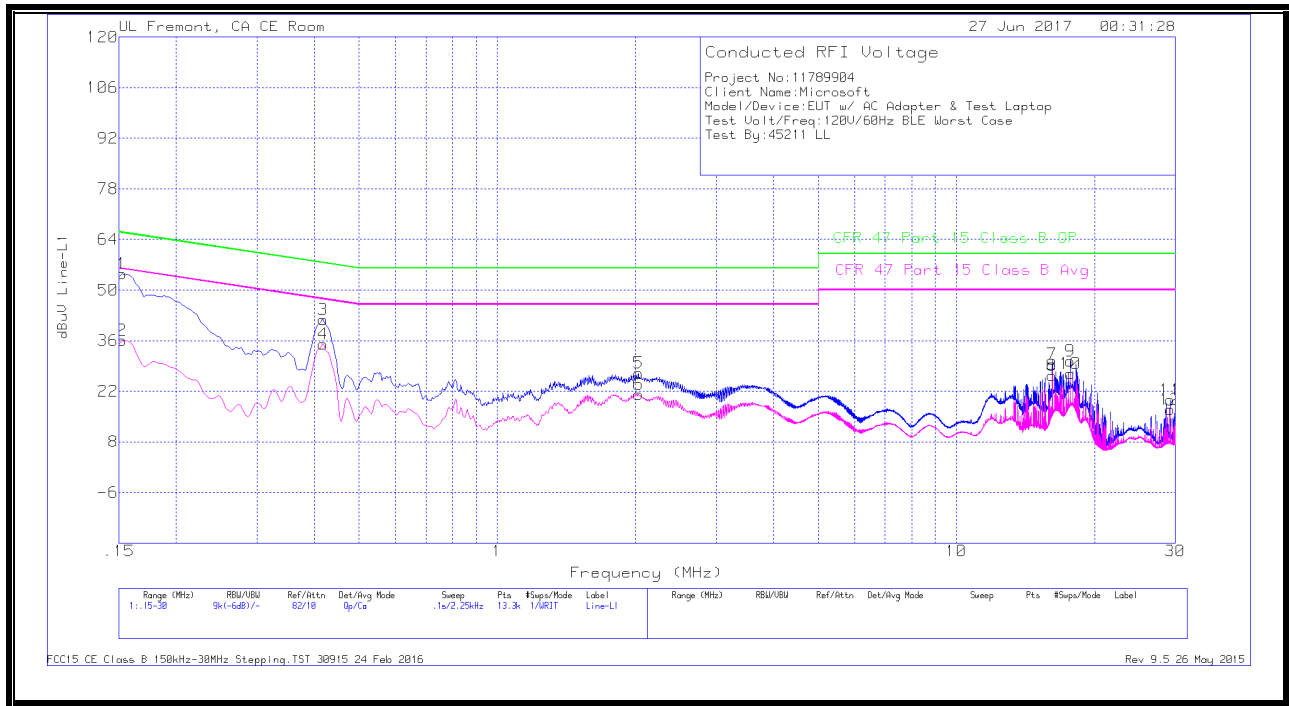
TEST PROCEDURE

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.

LINE 1 RESULTS



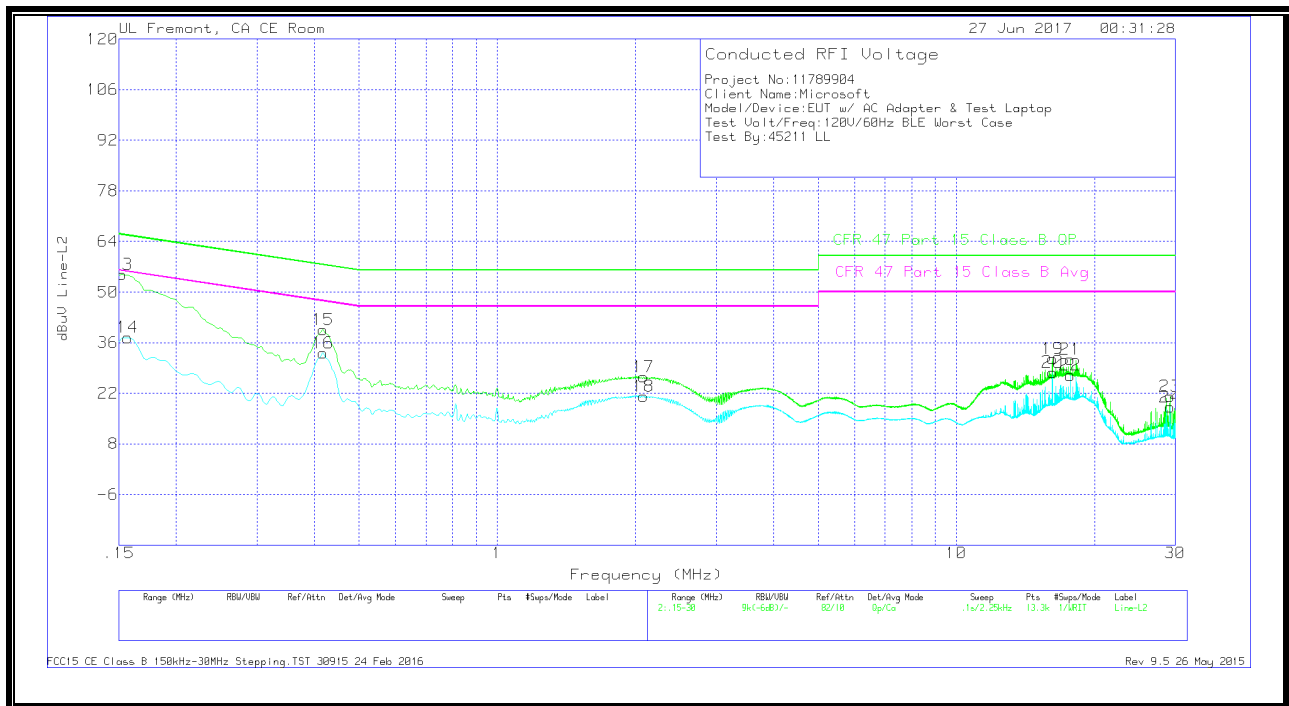
Range 1: Line-L1 .15 - 30MHz

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	44.27	Qp	.1	.1	10.1	54.57	65.88	-11.31	-	-
2	.15225	25.82	Ca	.1	.1	10.1	36.12	-	-	55.88	-19.76
3	.41775	31.69	Qp	0	.1	10.1	41.89	57.49	-15.6	-	-
4	.41775	24.78	Ca	0	.1	10.1	34.98	-	-	47.49	-12.51
5	2.031	16.77	Qp	0	.1	10.1	26.97	56	-29.03	-	-
6	2.031	11.03	Ca	0	.1	10.1	21.23	-	-	46	-24.77
7	16.16775	18.94	Qp	0	.2	10.3	29.44	60	-30.56	-	-
8	16.16775	15.86	Ca	0	.2	10.3	26.36	-	-	50	-23.64
9	17.69325	19.9	Qp	0	.2	10.3	30.4	60	-29.6	-	-
10	17.69325	16.36	Ca	0	.2	10.3	26.86	-	-	50	-23.14
11	29.23575	8.73	Qp	.1	.3	10.4	19.53	60	-40.47	-	-
12	29.23575	6.18	Ca	.1	.3	10.4	16.98	-	-	50	-33.02

Qp - Quasi-Peak detector

Ca - CISPR average detection

LINE 2 RESULTS



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)
13	.15225	44.78	Qp	0	0	10.1	54.88	65.88	-11	-	-
14	.15675	27.2	Ca	0	.1	10.1	37.4	-	-	55.63	-18.23
15	.41775	29.34	Qp	0	.1	10.1	39.54	57.49	-17.95	-	-
16	.41775	22.87	Ca	0	.1	10.1	33.07	-	-	47.49	-14.42
17	2.085	16.26	Qp	0	.1	10.1	26.46	56	-29.54	-	-
18	2.085	11.02	Ca	0	.1	10.1	21.22	-	-	46	-24.78
19	16.2285	21.03	Qp	0	.2	10.3	31.53	60	-28.47	-	-
20	16.2285	17.33	Ca	0	.2	10.3	27.83	-	-	50	-22.17
21	17.69325	20.89	Qp	0	.2	10.3	31.39	60	-28.61	-	-
22	17.69325	16.47	Ca	0	.2	10.3	26.97	-	-	50	-23.03
23	29.23575	10.36	Qp	.1	.3	10.4	21.16	60	-38.84	-	-
24	29.23575	7.32	Ca	.1	.3	10.4	18.12	-	-	50	-31.88

Qp - Quasi-Peak detector

Ca - CISPR average detection