FCC 47 CFR PART 15 SUBPART C
INDUSTRY CANADA RSS-210 ISSUE 9

CERTIFICATION TEST REPORT

FOR

SMARTPHONE

MODEL NUMBER: A1905

FCC ID: BCG-E3172A
IC: 579C-E3172A

REPORT NUMBER: 11708394-E6V2

ISSUE DATE: AUGUST 08, 2017

Prepared for
APPLE, INC.
1 INFINITE LOOP
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	7/25/2017	Initial Issue	Mengistu Mekuria
V2	8/08/2017	Address TCB question	Chin Pang

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS 4

2. TEST METHODOLOGY 5

3. FACILITIES AND ACCREDITATION 5

4. CALIBRATION AND UNCERTAINTY 5

4.1. MEASURING INSTRUMENT CALIBRATION 5

4.2. SAMPLE CALCULATION 5

4.3. MEASUREMENT UNCERTAINTY 6

5. EQUIPMENT UNDER TEST 7

5.1. DESCRIPTION OF EUT 7

5.2. MAXIMUM OUTPUT POWER 7

5.3. SOFTWARE AND FIRMWARE 7

5.4. WORST-CASE CONFIGURATION AND MODE 7

5.5. DESCRIPTION OF TEST SETUP 8

6. TEST AND MEASUREMENT EQUIPMENT 11

7. OCCUPIED BANDWIDTH 12

7.1. CE MODE 13

7.2. READER MODE 14

8. RADIATED EMISSION TEST RESULTS 15

8.1. LIMITS AND PROCEDURE 15

8.2. FUNDAMENTAL AND SPURIOUS EMISSIONS (0.15 – 30 MHz) 17

8.2.1. CE MODE 17

8.3. TX SPURIOUS EMISSION 30 TO 1000 MHz 25

8.3.1. CE MODE 25

8.3.2. READER MODE 27

9. FREQUENCY STABILITY 29

9.1. CE Mode 30

9.2. Reader Mode 30

10. AC MAINS LINE CONDUCTED EMISSIONS 31

10.1.1. CE MODE TYPE B 32

10.1.2. WITH ANTENNA PORT TERMINATED, 848 KBPS 34

10.1.3. READER MODE TYPE B 36

10.1.4. WITH ANTENNA PORT TERMINATED, 848 KBPS 38

11. SETUP PHOTOS 40

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: APPLE, INC.
1 INFINITE LOOP
CUPERTINO, CA 95014, U.S.A.

EUT DESCRIPTION: SMARTPHONE

MODEL: A1905

SERIAL NUMBER: C7CTP04UJ5TT

DATE TESTED: MARCH 14, 2017 – MAY 30, 2017

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 15 SUBPART C	Pass
INDUSTRY CANADA RSS-210 Issue 9, Annex B.6.	Pass
INDUSTRY CANADA RSS-GEN Issue 4	Pass

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

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

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UL Verification Services Inc. By:

MENGISTU MEKURIA
SENIOR ENGINEER
UL Verification Services Inc.

Prepared By:

TONY WANG
EMC ENGINEER
UL Verification Services Inc.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2013, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 4, and RSS-210 Issue 9.

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. The full scope of accreditation can be viewed at http://ts.nist.gov/standards/scopes/2000650.htm.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

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

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

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 9KHz to 0.15 MHz	± 3.84 dB
Conducted Disturbance, 0.15 to 30 MHz	± 3.65 dB
Radiated Disturbance, 9KHz to 30 MHz	± 3.15 dB
Radiated Disturbance, 30 to 1000 MHz	± 5.36 dB
Radiated Disturbance,1000 to 18000 MHz	± 4.32 dB
Radiated Disturbance,18000 to 26000 MHz	± 4.45 dB
Radiated Disturbance,26000 to 40000 MHz	± 5.24 dB
Occupied Channel Bandwidth	±0.39 %
Temperature	±0.9 °C
Supply voltages	±0.45 %
Time	±0.45 %

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The equipment under test is a mobile phone with GSM, GPRS, EGPRS, UMTS, LTE and TD-SCDMA technologies. It also supports IEEE 802.11a/b/g/n/ac, Bluetooth, GPS and NFC. The device has a built-in inductive charging receiver which is not user accessible. The rechargeable battery is not user accessible.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak radiated magnetic field strength as follows:

Frequency Range (MHz)	Mode	Type	E Field at 30m distance (dBuV/m)
13.56	CE Mode	B	24.91
	Reader Mode	B	24.01

5.3. SOFTWARE AND FIRMWARE

The test utility software used during testing was Firmware version 1.8 rev 55147 and Software tool version was NCI_UART_RTM4_B1_V1.07.

5.4. WORST-CASE CONFIGURATION AND MODE

The fundamental of the EUT was investigated under three orthogonal orientations X (Flatbed), Y (Landscape), and Z (Portrait). The Y (Landscape) orientation was determined to be the worst-case orientation.

The worst case position of the EUT was investigated under two configurations: EUT with power supply, EUT with earphones. The EUT with power supply configuration was determined to be worst-case configurations; therefore, all final tests were performed on the EUT with power supply.

In addition, Type A, B, F and ISO 15693 with CE mode and Reader mode data rate were investigated to determine the worst case based on the highest power and spurious emissions. Type B was determined to be the worst case and therefore Type B was selected for all final tests.

Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open are test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788

5.5. DESCRIPTION OF TEST SETUP

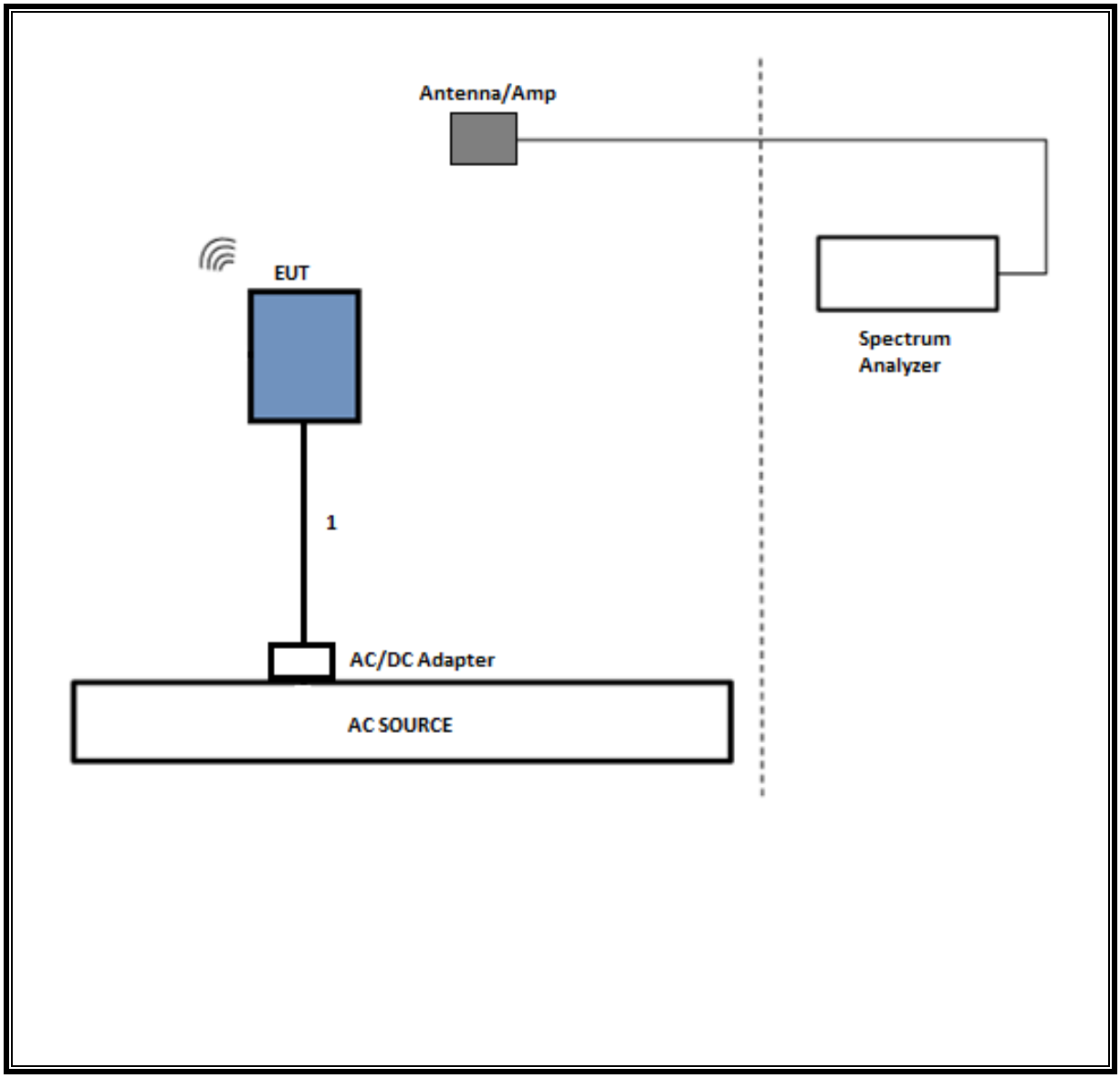
SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Apple	Mac Book Pro	D292365COYADHLHC3	n/a
Laptop AC/DC Adapter	Apple	A1436	N/A	n/a
EUT AC/DC Adapter	Apple	A1385	D292365B2FQDHLHC7	n/a

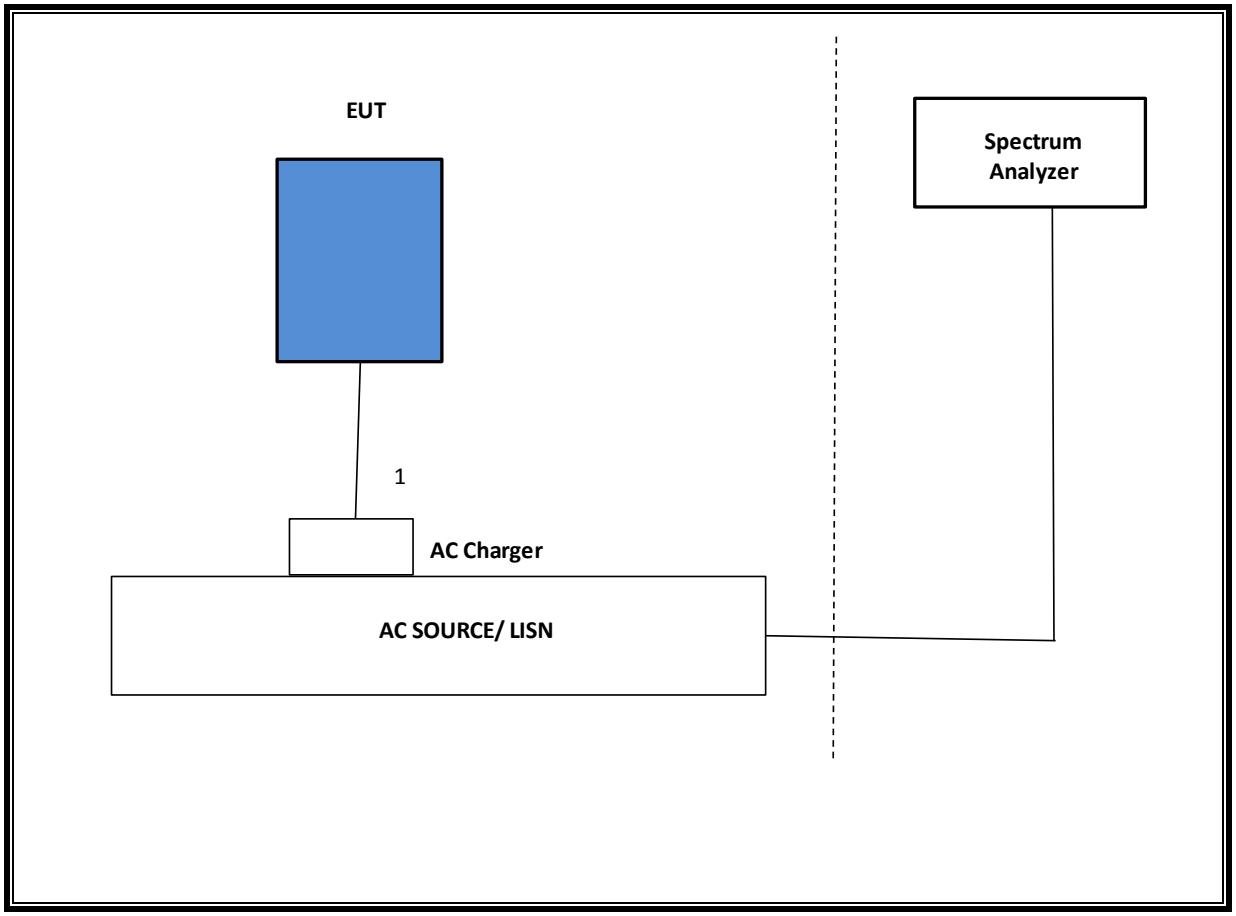
I/O CABLES (Radiated and AC Line)

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	USB	1	USB	Un-shielded	1	n/a

SETUP DIAGRAM FOR RADIATED TESTS



SETUP DIAGRAM FOR 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**	**T No.**	**Cal Date**
*Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB3	T407	4/4/2017
*Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	T286	5/4/2017
Spectrum Analyzer, PXA 3Hz to 44GHz	Keysight	N9030A	T340	12/14/2017
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB3	T426	9/23/2017
*Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	T285	6/20/2017
Spectrum Analyzer, PXA 3Hz to 44GHz	Keysight	N9030A	T1113	12/20/2017
Antenna, Active Loop 9KHz to 30MHz	EMCO	6502	T1616	12/12/2017
Chamber, Environmental	Cincinnati Sub Zero	ZPHS-8-3.5-SCT/WC	T754	9/10/2017
EMI Test Receiver 9Khz-7GHz	Rohde & Schwarz	ESCI7	T1436	12/12/2017
*LISN for Conducted Emissions CISPR-16	Fischer	50/250-25-2-01	T1310	6/8/2017
Line conducted Power cable ANSI 63.4	UL	PG1	861	9/1/2017
UL SOFTWARE				
Radiated Software	UL	UL EMC	Fundamental mask, 5/7/15	
Conducted Software	UL	UL EMC	Ver 2.2, March 31, 2015	
Radiated Software	UL	UL EMC	Below 30Mhz, 6/24/15	
Radiated Software	UL	UL EMC	Below 1Ghz, 7/15/14	
AC Line Conducted Software	UL	UL EMC	Ver 9.5, April 3, 2015	

Note: *Testing is completed before equipment expiration date.

7. OCCUPIED BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to 10kHz. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

Note: Because the measured signal is CW/CW-like adjusting the RBW per C63.10 would not be practical since measured bandwidth will always follow the RBW and the result will be approximately twice the RBW

RESULTS

ID:	42851	Date:	4/25/17

99% and 20dB BW

CE Mode

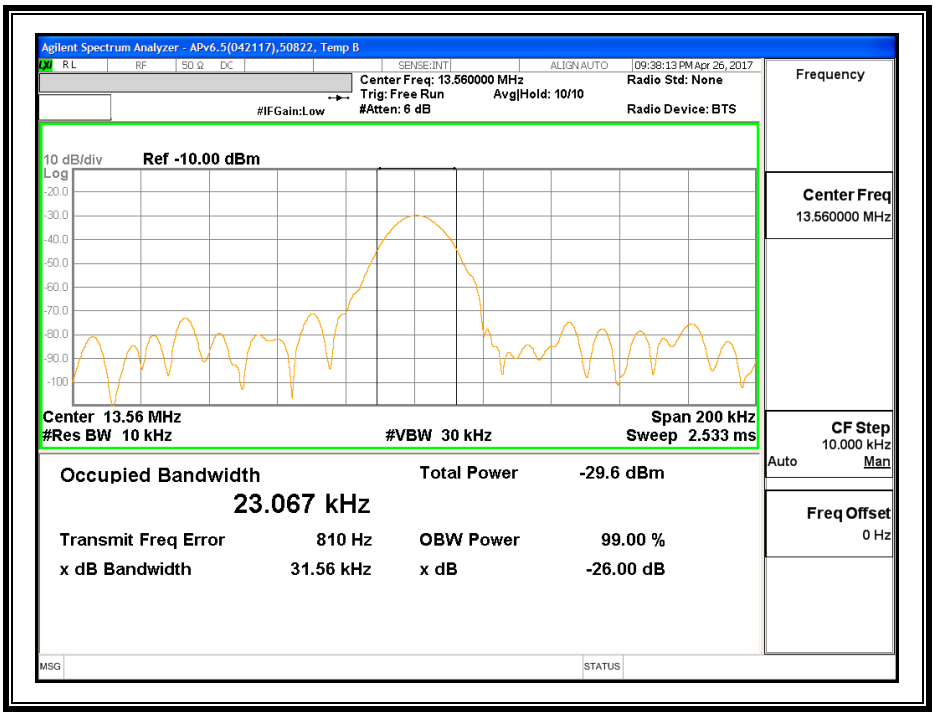
Moduation	Frequency	Data Rate	99% Bandwidth	20dB Bandwidth
	(MHz)	(Kbps)	(KHz)	(KHz)
Type B	13.56	848	23.067	31.56

READER Mode

Moduation	Frequency	Data Rate	99% Bandwidth	20dB Bandwidth
	(MHz)	(Kbps)	(KHz)	(KHz)
Type B	13.56	848	23.335	30.63

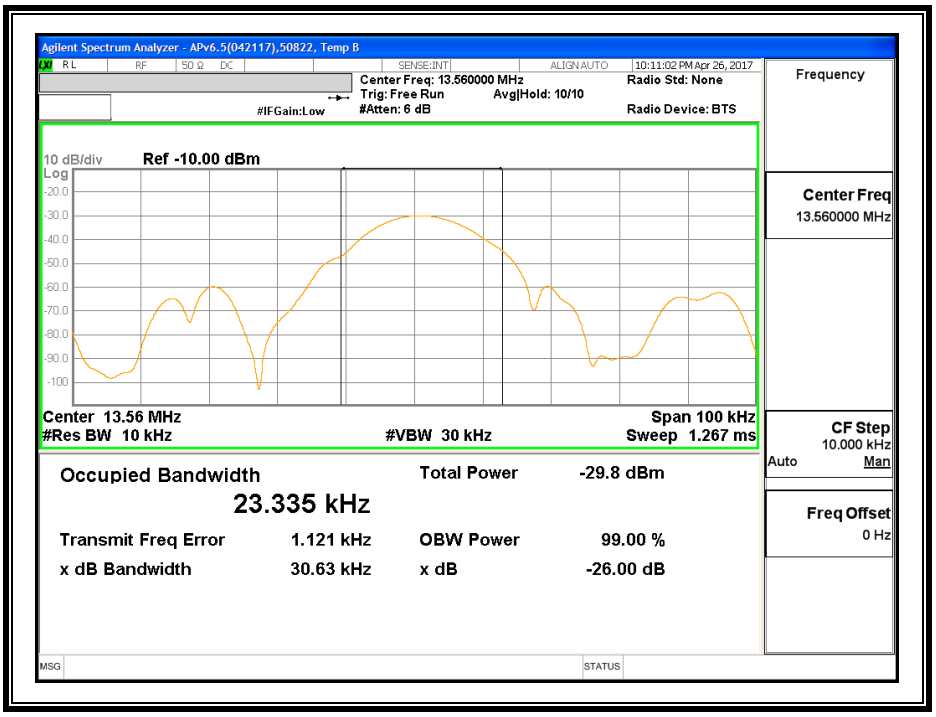
7.1. CE MODE

Type B, 848Kbps



7.2. READER MODE

Type B, 848Kbps



8. RADIATED EMISSION TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMIT

§15.225
IC RSS-210, Issue 9 Annex B.6.
IC RSS-GEN, Section 8.9 (Transmitter)
IC RSS-GEN, Section 7.1.2 (Receiver)

(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/ meter at 30 meters.

(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

(d) The field strength of any emissions appearing outside of the 13.110– 14.010 MHz and shall not exceed the general radiated emission limits in § 15.209 as follows:
§15.209 (a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Limits for radiated disturbance of an intentional radiator		
Frequency range (MHz)	Limits (µV/m)	Measurement Distance (m)
0.009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 – 30.0	30	30
30 – 88	100**	3
88 - 216	150**	3
216 – 960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g. §§ 15.231 and 15.241.
§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

Formula for converting the filed strength from uV/m to dBuV/m is:
Limit (dBuV/m) = 20 log limit (uV/m)

In addition:

§15.209 (d) The emission limits shown the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emissions limits in these three bands are based on measurements employing an average detector.

§15.209 (d) The provisions in §§ 15.225, measuring emissions at distances other than the distances specified in the above table, determining the frequency range over which radiated emissions are to be measured, and limiting peak emissions apply to all devices operated under this part.

TEST PROCEDURE

ANSI C63.10, 2013

The EUT is an intentional radiator that incorporates a digital device, the highest fundamental frequency generated or used in the device is 13.56 MHz; therefore, the frequency range was investigated from 0.15 MHz to the 10th harmonic of the highest fundamental frequency, or 1000 MHz, whichever is greater.

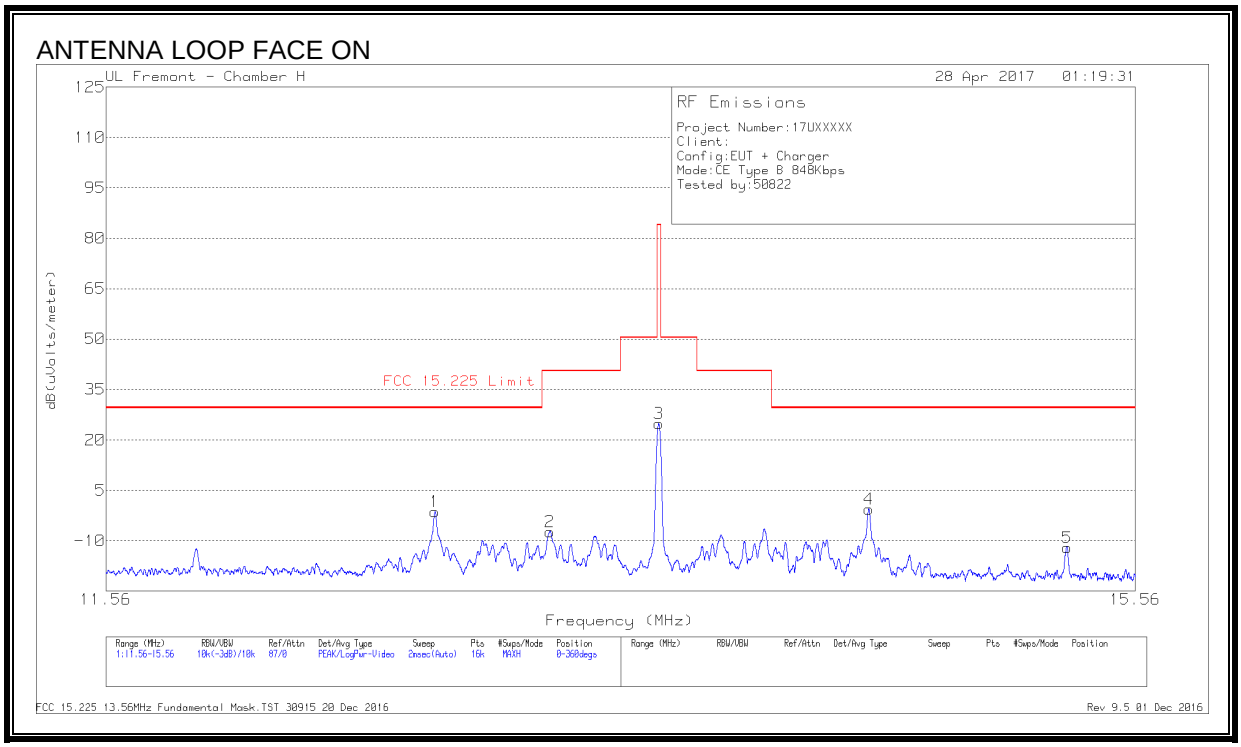
RESULTS

8.2. FUNDAMENTAL AND SPURIOUS EMISSIONS (0.15 – 30 MHz)

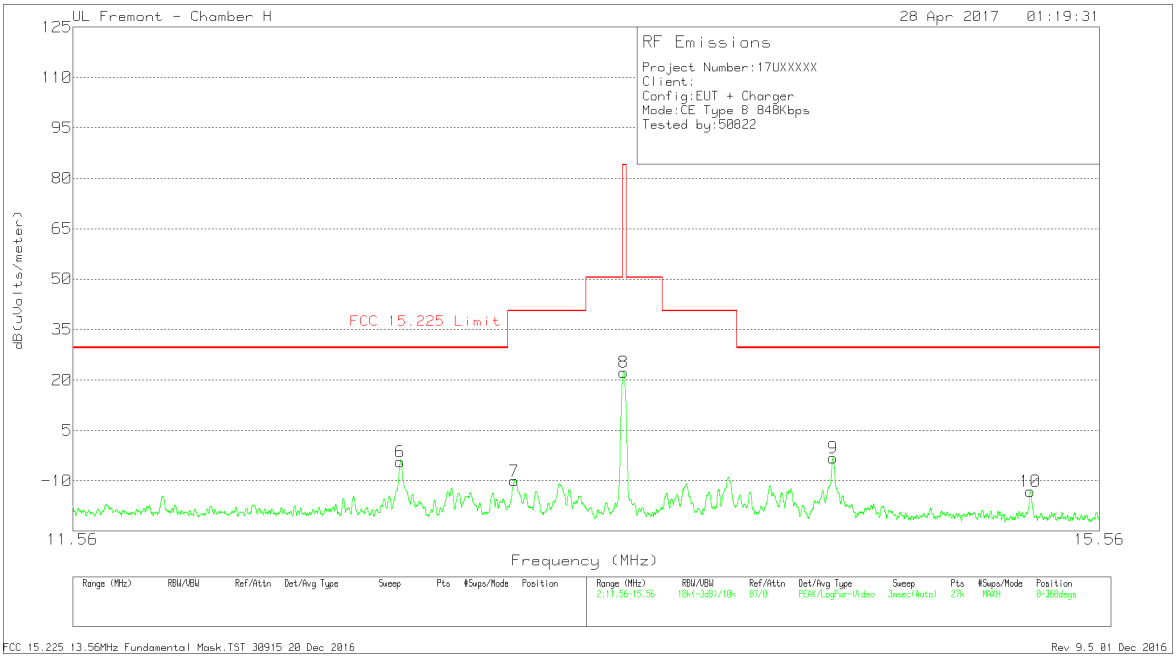
8.2.1. CE MODE

TYPE B

848Kbps FUNDAMENTAL



ANTENNA LOOP FACE OFF



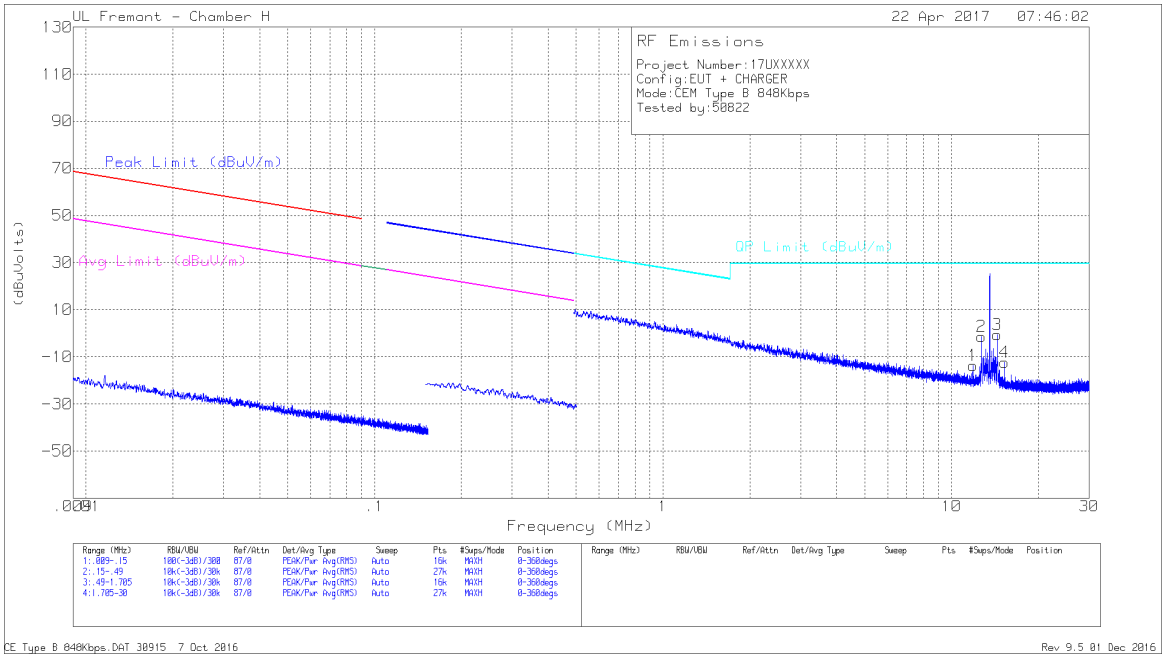
Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cables (dB)	Dist Corr (dB) 40Log	Corrected Reading dB(uVolts/ meter)	FCC 15.225 Limit	PK Margin (dB)	Azimuth (Degs)
6	12.71011	24.84	Pk	10.5	.4	-40	-4.26	29.54	-33.8	0-360
1	12.7125	27.71	Pk	10.5	.4	-40	-1.39	29.54	-30.93	0-360
7	13.13679	19.17	Pk	10.4	.4	-40	-10.03	40.51	-50.54	0-360
2	13.1405	21.91	Pk	10.4	.4	-40	-7.29	40.51	-47.8	0-360
8	13.55948	51.48	Pk	10.4	.4	-40	22.28	84	-61.72	0-360
3	13.56013	54.11	Pk	10.4	.4	-40	24.91	84	-59.09	0-360
9	14.40508	26.1	Pk	10.3	.4	-40	-3.2	29.54	-32.74	0-360
4	14.4085	28.78	Pk	10.3	.4	-40	-.52	29.54	-30.06	0-360
10	15.25267	16.24	Pk	10.2	.4	-40	-13.16	29.54	-42.7	0-360
5	15.25725	17.32	Pk	10.2	.4	-40	-12.08	29.54	-41.62	0-360

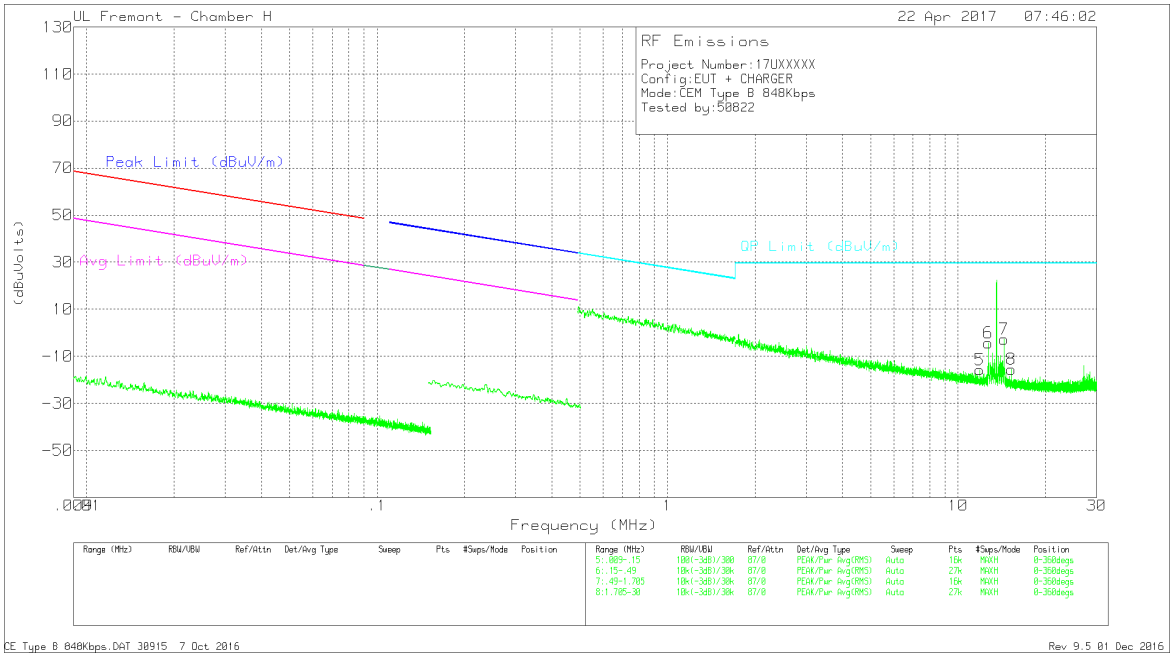
Pk - Peak detector

SPURIOUS EMISSION

ANTENNA LOOP FACE ON



ANTENNA LOOP FACE OFF



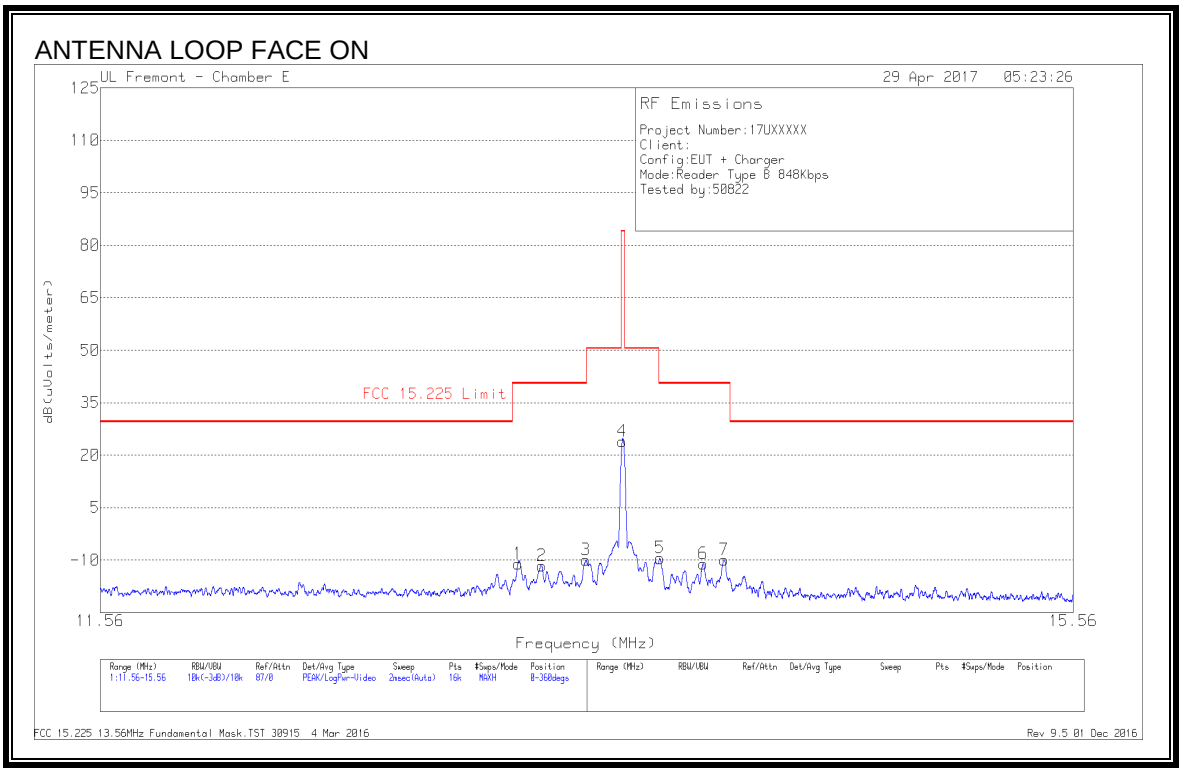
Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cables (dB)	Dist Corr 30m	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
5	11.86431	13.11	Pk	10.8	.4	-40	-15.69	29.5	-45.19	0-360
1	11.86746	15.09	Pk	10.8	.4	-40	-13.71	29.5	-43.21	0-360
6	12.71267	24.52	Pk	10.7	.4	-40	-4.38	29.5	-33.88	0-360
2	12.71319	27.39	Pk	10.7	.4	-40	-1.51	29.5	-31.01	0-360
7	14.40781	26.16	Pk	10.6	.4	-40	-2.84	29.5	-32.34	0-360
3	14.40833	28.39	Pk	10.6	.4	-40	-.61	29.5	-30.11	0-360
8	15.25459	13.66	Pk	10.5	.4	-40	-15.44	29.5	-44.94	0-360
4	15.25774	16.8	Pk	10.5	.4	-40	-12.3	29.5	-41.8	0-360

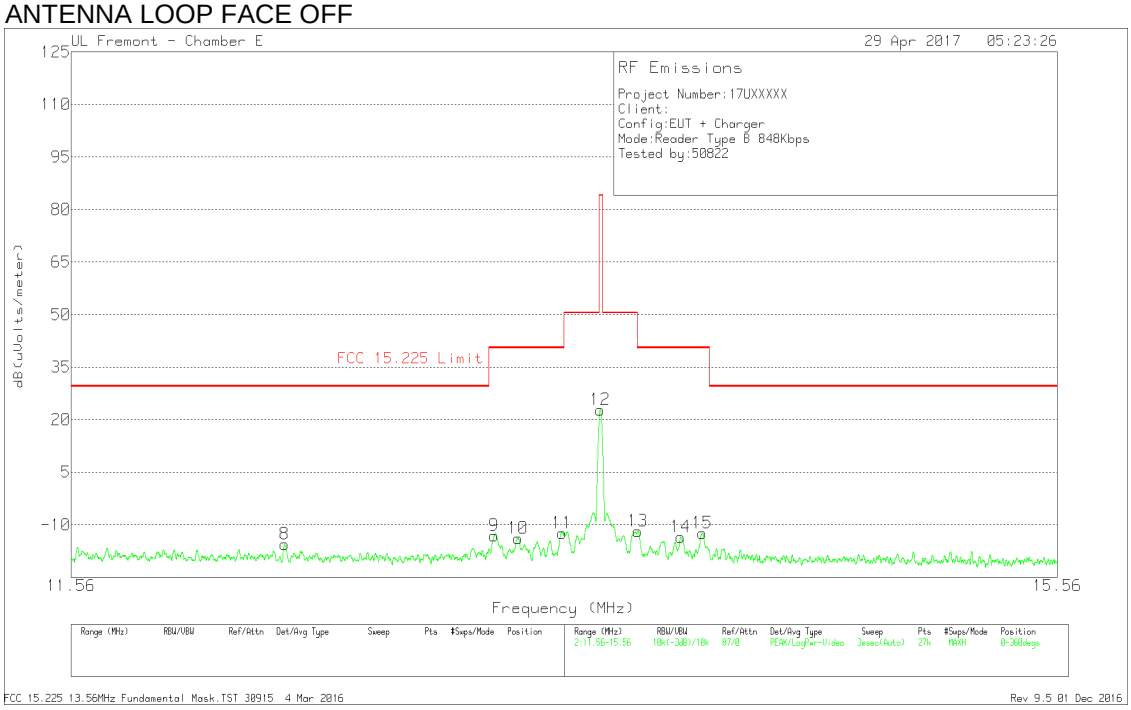
Pk - Peak detector

READER MODE

Type B, 848Kbps FUNDAMENTAL



ANTENNA LOOP FACE OFF



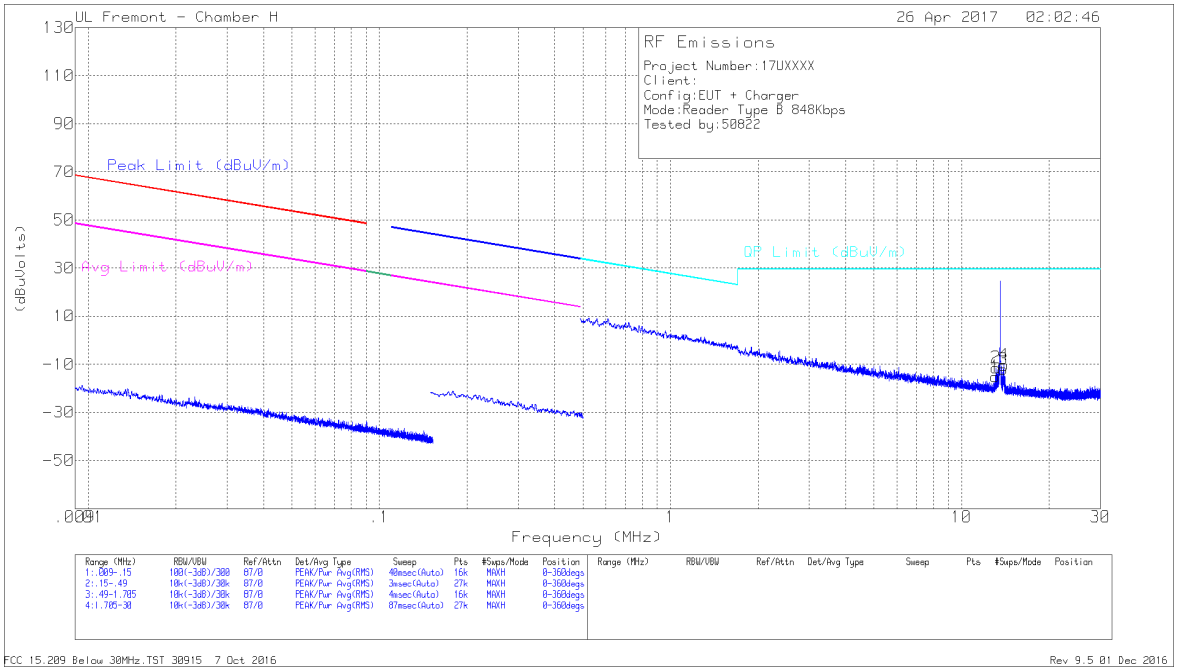
Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cables (dB)	Dist Corr (dB) 40Log	Corrected Reading dB(uVolts/meter)	FCC 15.225 Limit	PK Margin (dB)	Azimuth (Degs)
8	12.32849	13.08	Pk	10.8	.5	-40	-15.62	29.54	-45.16	0-360
9	13.13028	15.63	Pk	10.7	.5	-40	-13.17	40.51	-53.68	0-360
1	13.13225	17.72	Pk	10.7	.5	-40	-11.08	40.51	-51.59	0-360
10	13.22744	14.89	Pk	10.7	.5	-40	-13.91	40.51	-54.42	0-360
2	13.229	17.21	Pk	10.7	.5	-40	-11.59	40.51	-52.1	0-360
11	13.40371	16.4	Pk	10.7	.5	-40	-12.4	40.51	-52.91	0-360
3	13.40788	18.76	Pk	10.7	.5	-40	-10.04	40.51	-50.55	0-360
4	13.5575	52.91	Pk	10.6	.5	-40	24.01	84	-59.99	0-360
12	13.55837	51.79	Pk	10.6	.5	-40	22.89	84	-61.11	0-360
13	13.71273	17.11	Pk	10.6	.5	-40	-11.79	40.51	-52.3	0-360
5	13.7135	19.4	Pk	10.6	.5	-40	-9.5	40.51	-50.01	0-360
14	13.88996	15.42	Pk	10.6	.5	-40	-13.48	40.51	-53.99	0-360
6	13.89738	17.87	Pk	10.6	.5	-40	-11.03	40.51	-51.54	0-360
15	13.98254	16.47	Pk	10.6	.5	-40	-12.43	40.51	-52.94	0-360
7	13.9865	18.92	Pk	10.6	.5	-40	-9.98	40.51	-50.49	0-360

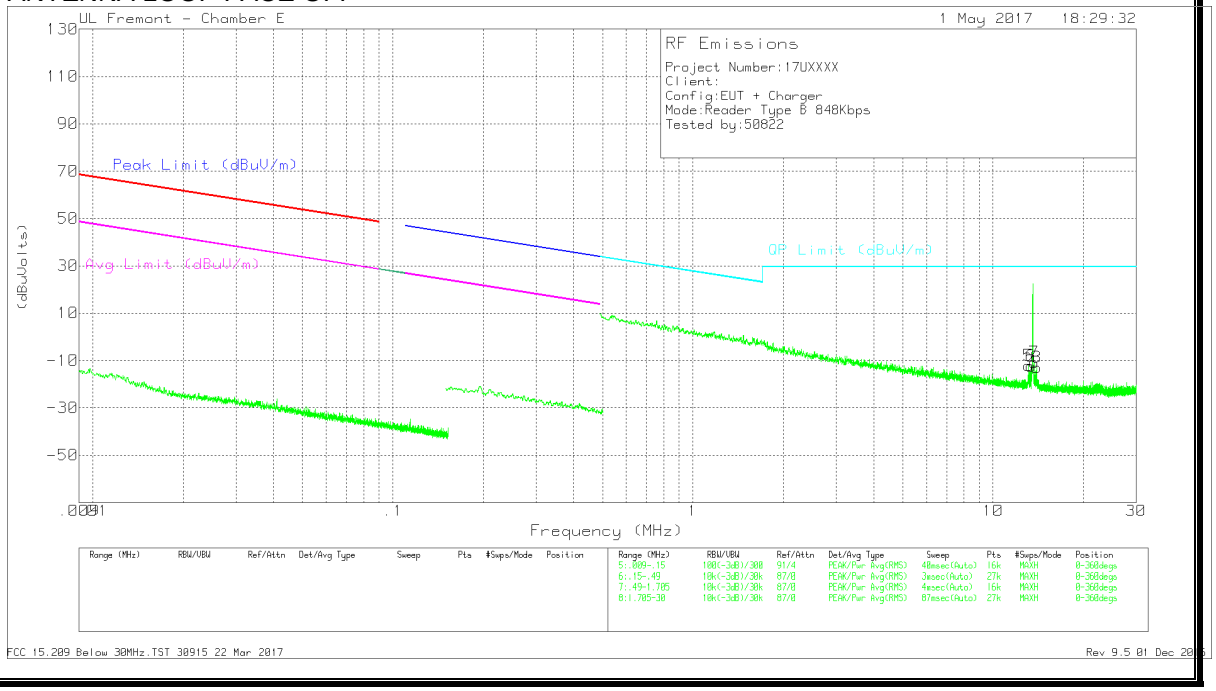
Pk - Peak detector

SPURIOUS EMISSION

ANTENNA LOOP FACE ON and OFF



ANTENNA LOOP FACE OFF



DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cables (dB)	Dist Corr (dB) 40Log	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
5	13.13449	17	Pk	10.5	.5	-40	-12	29.5	-41.5	0-360
1	13.14182	18.08	Pk	10.5	.5	-40	-10.92	29.5	-40.42	0-360
6	13.39963	16.62	Pk	10.5	.5	-40	-12.38	29.5	-41.88	0-360
2	13.42269	17.5	Pk	10.5	.5	-40	-11.5	29.5	-41	0-360
3	13.69726	18.43	Pk	10.4	.5	-40	-10.67	29.5	-40.17	0-360
7	13.71508	18.29	Pk	10.4	.5	-40	-10.81	29.5	-40.31	0-360
8	13.98284	16.13	Pk	10.4	.5	-40	-12.97	29.5	-42.47	0-360
4	13.98861	17.75	Pk	10.4	.5	-40	-11.35	29.5	-40.85	0-360

Pk - Peak detector

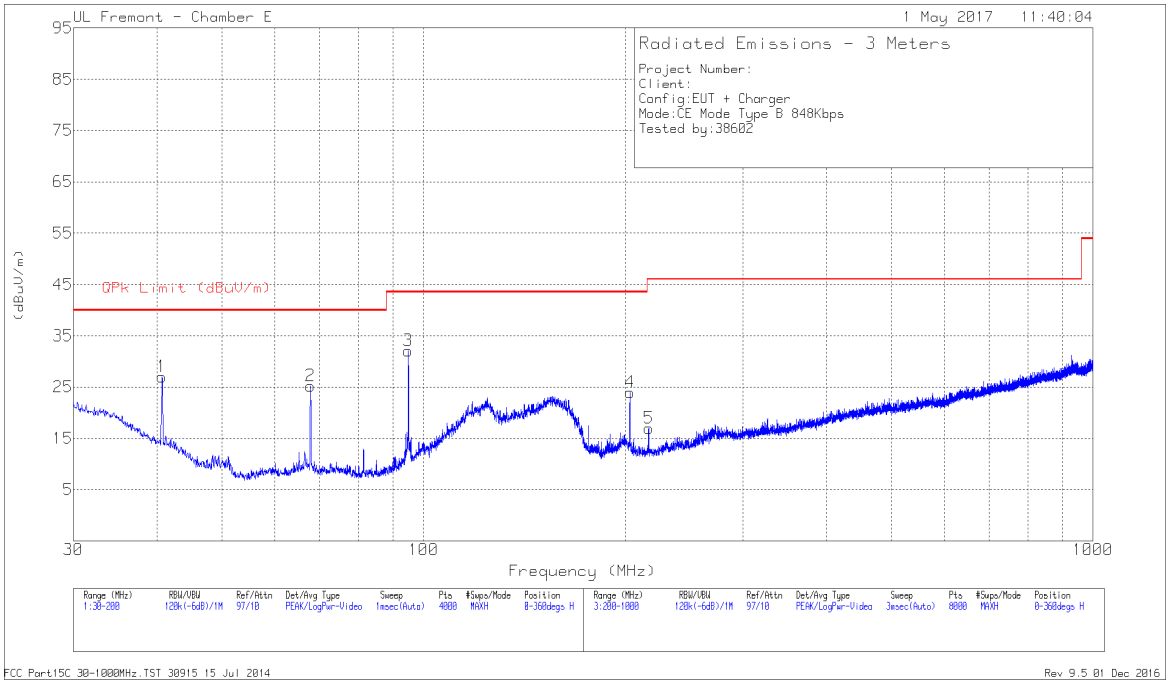
8.3. TX SPURIOUS EMISSION 30 TO 1000 MHz

8.3.1. CE MODE

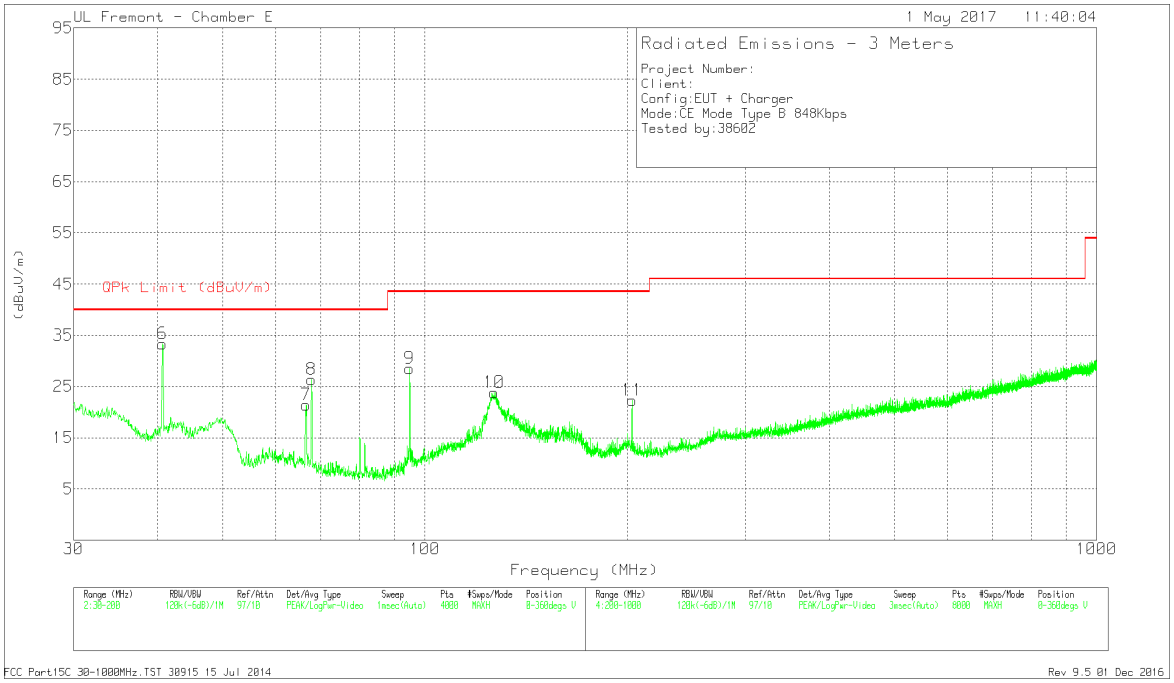
TYPE B

848Kbps

HORIZONTAL PLOT



VERITCAL PLOT



Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T899 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
10	* 126.755	36.68	Pk	17.7	-30.6	23.78	43.52	-19.74	0-360	100	V
1	40.6703	40.8	Pk	17.7	-31.5	27	40	-13	0-360	299	H
6	40.6703	47.12	Pk	17.7	-31.5	33.32	40	-6.68	0-360	100	V
7	66.602	40.54	Pk	12.1	-31.2	21.44	40	-18.56	0-360	100	V
2	67.7923	44.29	Pk	12.1	-31.2	25.19	40	-14.81	0-360	200	H
8	67.7923	45.45	Pk	12.1	-31.2	26.35	40	-13.65	0-360	100	V
3	94.9143	50.19	Pk	12.8	-30.9	32.09	43.52	-11.43	0-360	299	H
9	94.9143	46.62	Pk	12.8	-30.9	28.52	43.52	-15	0-360	100	V
4	203.4004	38.79	Pk	15.2	-30	23.99	43.52	-19.53	0-360	100	H
11	203.4004	37.13	Pk	15.2	-30	22.33	43.52	-21.19	0-360	100	V
5	217.0022	32.34	Pk	14.4	-29.8	16.94	46.02	-29.08	0-360	100	H

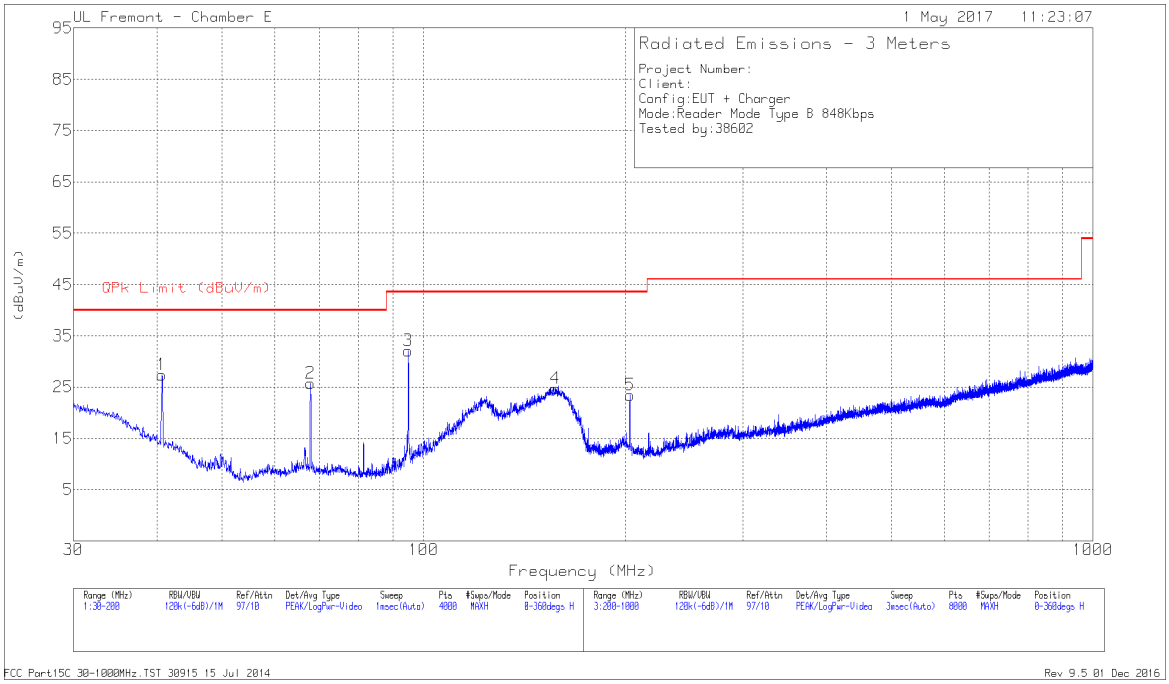
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector

8.3.2. READER MODE

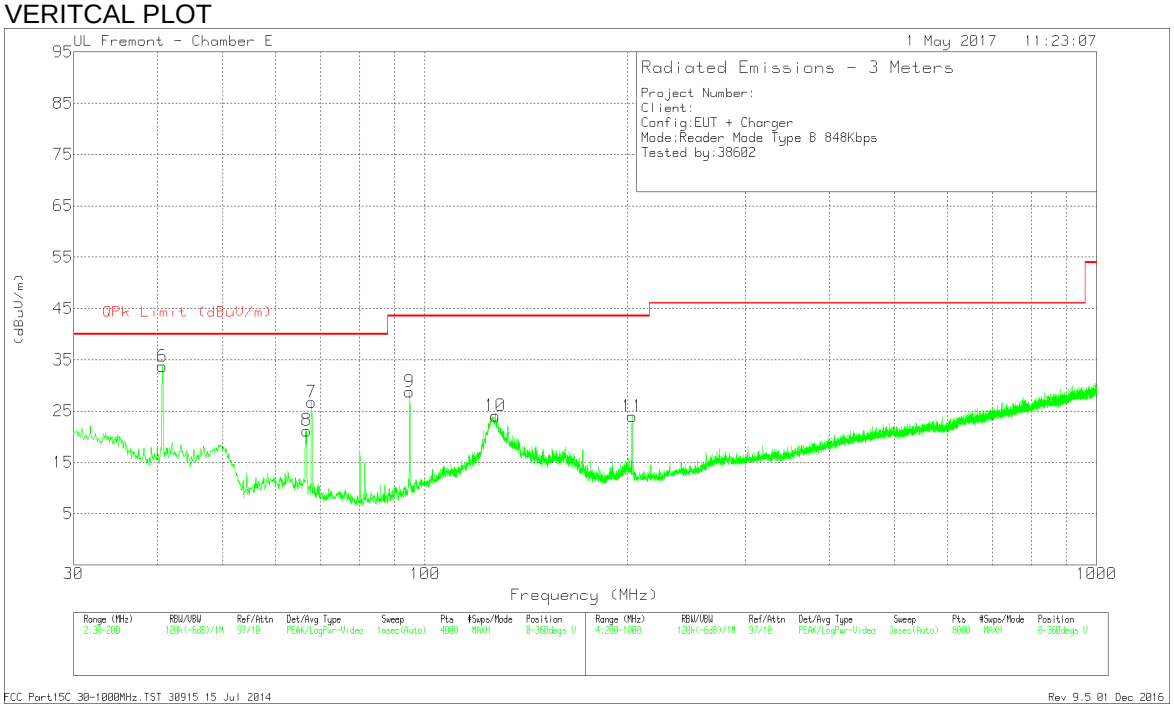
TYPE B

848Kbps

HORIZONTAL PLOT



VERITCAL PLOT



Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T899 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
10	* 127.1801	37.01	Pk	17.7	-30.6	24.11	43.52	-19.41	0-360	100	V
1	40.6703	41.16	Pk	17.7	-31.5	27.36	40	-12.64	0-360	300	H
6	40.6703	47.53	Pk	17.7	-31.5	33.73	40	-6.27	0-360	100	V
8	66.6445	40.32	Pk	12.1	-31.2	21.22	40	-18.78	0-360	100	V
2	67.7923	44.8	Pk	12.1	-31.2	25.7	40	-14.3	0-360	300	H
7	67.7923	45.86	Pk	12.1	-31.2	26.76	40	-13.24	0-360	100	V
3	94.9143	50.2	Pk	12.8	-30.9	32.1	43.52	-11.42	0-360	300	H
9	94.9143	46.83	Pk	12.8	-30.9	28.73	43.52	-14.79	0-360	100	V
4	157.5968	39.04	Pk	16	-30.3	24.74	43.52	-18.78	0-360	200	H
5	203.4004	38.21	Pk	15.2	-30	23.41	43.52	-20.11	0-360	200	H
11	203.4004	38.76	Pk	15.2	-30	23.96	43.52	-19.56	0-360	100	V

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

9. FREQUENCY STABILITY

LIMIT

RSS-210 Issue 9

§15.225 (e) The frequency tolerance of the carrier signal shall be maintained within ±0.01% of the operating frequency, over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

TEST PROCEDURE

ANSI 603.10:2013 Clause 6.8.1 and 6.8.2

RESULTS

No non-compliance noted.

ID:	38602	**Date:**	3/27/2017

9.1. CE Mode

TYPE B 848Kbps

Reference Frequency: EUT Channel 13.56 MHz @ 20ºC Limit: ± 100 ppm = 1.356 kHz										
Power Supply	Envir. Temp	Frequency Deviation Measureed with Time Elapse								
(VAC)	(ºC)	Startup (MHz)	Delta (ppm)	@ 2 mins (MHz)	Delta (ppm)	@ 5 mins (MHz)	Delta (ppm)	@ 10 mins (MHz)	Delta (ppm)	Limit (ppm)
	50	13.5603523	-0.689	13.5603521	-0.672	13.5603517	-0.649	13.5603514	-0.623	± 100
	40	13.5603508	-0.581	13.5603507	-0.568	13.5603505	-0.559	13.5603504	-0.551	± 100
	30	13.5603486	-0.415	13.5603477	-0.353	13.5603470	-0.301	13.5603466	-0.268	± 100
3.80	***20***	***13.5603429***	***0.000***	***13.5603425***	***0.034***	***13.5603422***	***0.057***	***13.5603420***	***0.070***	***± 100***
	10	13.5603406	0.171	13.5603406	0.172	13.5603407	0.163	13.5603409	0.154	± 100
	0	13.5603400	0.218	13.5603399	0.226	13.5603399	0.227	13.5603400	0.220	± 100
	-10	13.5603386	0.322	13.5603385	0.329	13.5603386	0.323	13.5603387	0.312	± 100
	-20	13.5603370	0.441	13.5603369	0.444	13.5603370	0.438	13.5603372	0.424	± 100
3.23	20	13.5603427	0.018	13.5603422	0.055	13.5603418	0.085	13.5603416	0.099	± 100
4.37	20	13.5603428	0.011	13.5603424	0.040	13.5603420	0.070	13.5603421	0.062	± 100

9.2. Reader Mode

TYPE B 848Kbps

Reference Frequency: EUT Channel 13.56 MHz @ 20ºC Limit: ± 100 ppm = 1.356 kHz										
Power Supply	Envir. Temp	Frequency Deviation Measureed with Time Elapse								
(VAC)	(ºC)	Startup (MHz)	Delta (ppm)	@ 2 mins (MHz)	Delta (ppm)	@ 5 mins (MHz)	Delta (ppm)	@ 10 mins (MHz)	Delta (ppm)	Limit (ppm)
	50	13.5603522	-0.510	13.5603519	-0.492	13.5603517	-0.472	13.5603513	-0.447	± 100
	40	13.5603524	-0.524	13.5603526	-0.539	13.5603527	-0.549	13.5603527	-0.551	± 100
	30	13.5603487	-0.253	13.5603491	-0.281	13.5603495	-0.311	13.5603499	-0.341	± 100
3.80	***20***	***13.5603453***	***0.000***	***13.5603455***	***-0.021***	***13.5603457***	***-0.034***	***13.5603458***	***-0.040***	***± 100***
	10	13.5603445	0.059	13.5603434	0.137	13.5603426	0.199	13.5603418	0.253	± 100
	0	13.5603408	0.326	13.5603409	0.323	13.5603409	0.319	13.5603410	0.311	± 100
	-10	13.5603401	0.384	13.5603399	0.392	13.5603399	0.397	13.5603398	0.399	± 100
	-20	13.5603387	0.487	13.5603387	0.487	13.5603386	0.489	13.5603386	0.490	± 100
3.23	20	13.5603450	0.021	13.5603451	0.015	13.5603452	0.006	13.5603455	-0.015	± 100
4.37	20	13.5603452	0.003	13.5603452	0.006	13.5603453	-0.006	13.5603456	-0.022	± 100

10. AC MAINS LINE CONDUCTED EMISSIONS

§15.207
IC RSS-GEN, Section 8.8

(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

Frequency range (MHz)	Limits (dBµV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Notes: 1. The lower limit shall apply at the transition frequencies 2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

TEST PROCEDURE

ANSI C63.10

RESULTS

No non-compliance noted:

10.1.1. CE MODE TYPE B

NORMAL OPERATION, 848 KBPS

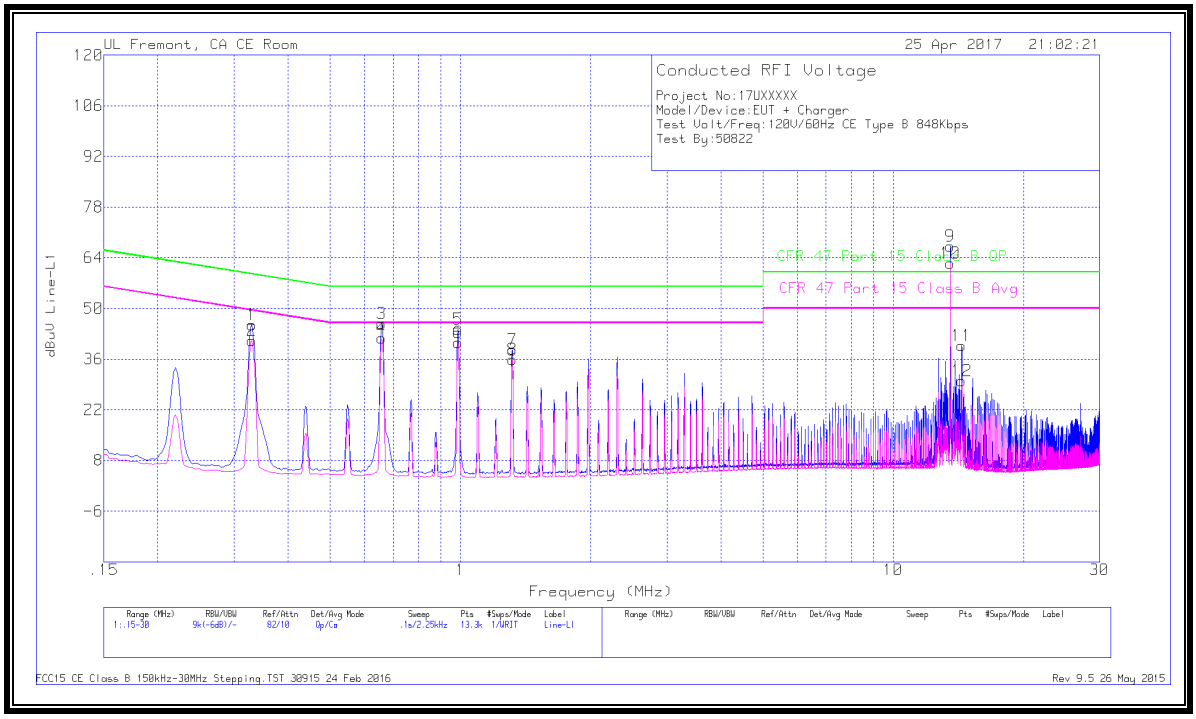
WORST EMISSIONS

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	.33	35.29	Qp	0	.1	10.1	45.49	59.45	-13.96	-	-
2	.33	30.99	Ca	0	.1	10.1	41.19	-	-	49.45	-8.26
3	.6585	35.7	Qp	0	.1	10.1	45.9	56	-10.1	-	-
4	.6585	31.58	Ca	0	.1	10.1	41.78	-	-	46	-4.22
5	.987	34.14	Qp	0	.1	10.1	44.34	56	-11.66	-	-
6	.987	30.46	Ca	0	.1	10.1	40.66	-	-	46	-5.34
7	1.31775	28.37	Qp	0	.1	10.1	38.57	56	-17.43	-	-
8	1.31775	25.68	Ca	0	.1	10.1	35.88	-	-	46	-10.12
9	13.56	56.63	Qp	.1	.2	10.2	67.13	**60**	**7.13**	-	-
10	13.56	52	Ca	.1	.2	10.2	62.5	-	-	**50**	**12.5**
11	14.4083	29.39	Qp	0	.2	10.2	39.79	60	-20.21	-	-
12	14.4083	19.57	Ca	0	.2	10.2	29.97	-	-	50	-20.03

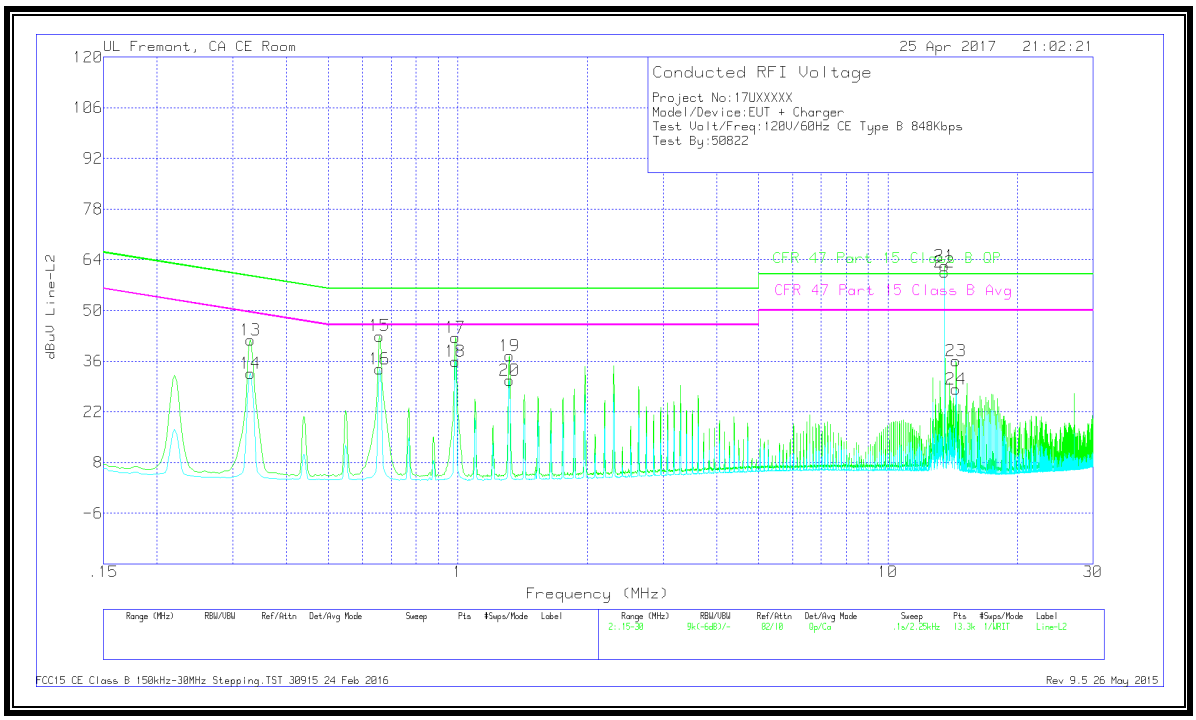
Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L2	LC Cables C2&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR)Margin (dB)
13	.33	31.57	Qp	0	.1	10.1	41.77	59.45	-17.68	-	-
14	.33	22.4	Ca	0	.1	10.1	32.6	-	-	49.45	-16.85
15	.6585	32.76	Qp	0	.1	10.1	42.96	56	-13.04	-	-
16	.6585	23.67	Ca	0	.1	10.1	33.87	-	-	46	-12.13
17	.987	32.34	Qp	0	.1	10.1	42.54	56	-13.46	-	-
18	.987	25.77	Ca	0	.1	10.1	35.97	-	-	46	-10.03
19	1.31775	27.26	Qp	0	.1	10.1	37.46	56	-18.54	-	-
20	1.31775	20.55	Ca	0	.1	10.1	30.75	-	-	46	-15.25
21	13.56	51.76	Qp	.1	.2	10.2	62.26	**60**	**2.26**	-	-
22	13.56	50.04	Ca	.1	.2	10.2	60.54	-	-	**50**	**10.54**
23	14.4083	25.63	Qp	.1	.2	10.2	36.13	60	-23.87	-	-
24	14.4083	17.78	Ca	.1	.2	10.2	28.28	-	-	50	-21.72

Qp - Quasi-Peak detector
Ca - CISPR average detection
FCC15 CE Class B 150kHz-30MHz Stepping.TST 30915 24 Feb 2016
Rev 9.5 26 May 2015

LINE 1 RESULTS



LINE 2 RESULTS



10.1.2. WITH ANTENNA PORT TERMINATED, 848 KBPS

WORST EMISSIONS

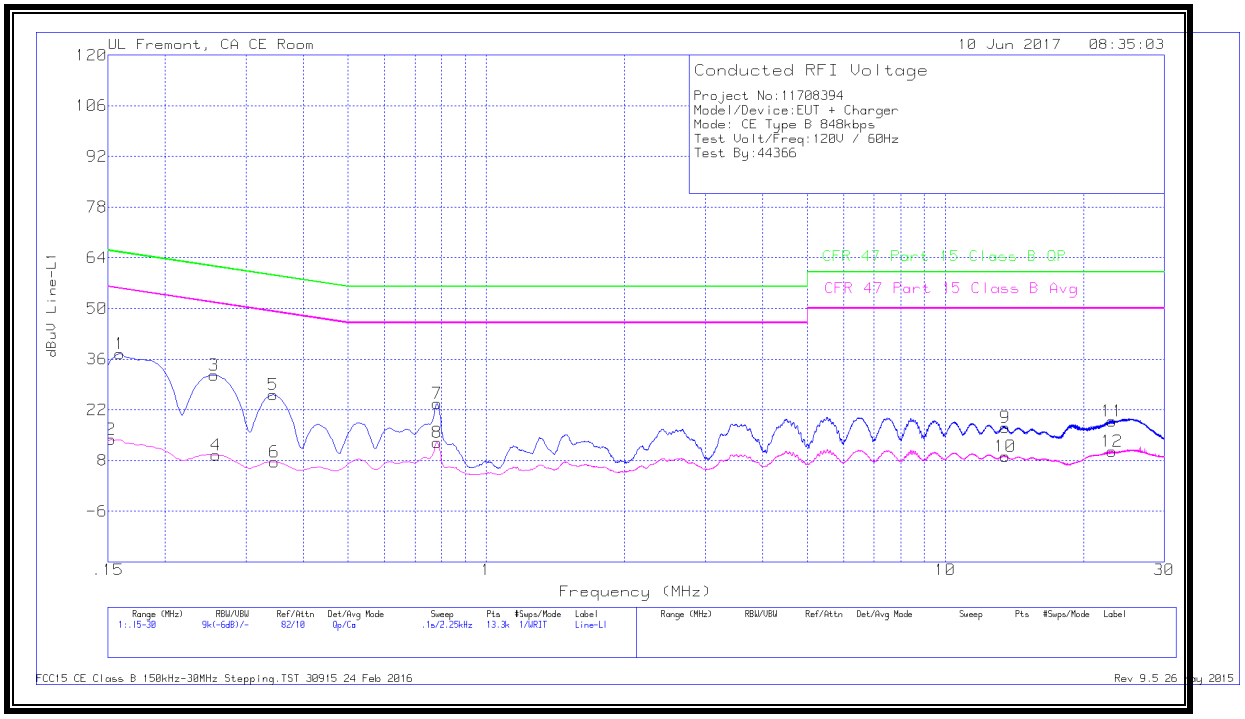
Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR)Margin (dB)
1	.159	26.08	Qp	1.2	.1	10.1	37.48	65.52	-28.04	-	-
2	.15225	2.34	Ca	1.3	.1	10.1	13.84	-	-	55.88	-42.04
3	.25575	20.74	Qp	.6	.1	10.1	31.54	61.57	-30.03	-	-
4	.258	-1.28	Ca	.6	.1	10.1	9.52	-	-	51.5	-41.98
5	.3435	15.52	Qp	.4	.1	10.1	26.12	59.12	-33	-	-
6	.34575	-2.95	Ca	.4	.1	10.1	7.65	-	-	49.06	-41.41
7	.78225	13.28	Qp	.2	.1	10.1	23.68	56	-32.32	-	-
8	.78225	2.62	Ca	.2	.1	10.1	13.02	-	-	46	-32.98
9	13.5105	6.55	Qp	.2	.2	10.2	17.15	60	-42.85	-	-
10	13.5184	-1.45	Ca	.2	.2	10.2	9.15	-	-	50	-40.85
11	23.0798	7.96	Qp	.3	.3	10.4	18.96	60	-41.04	-	-
12	23.0708	-.44	Ca	.3	.3	10.4	10.56	-	-	50	-39.44

Qp - Quasi-Peak detector
Ca - CISPR average detection

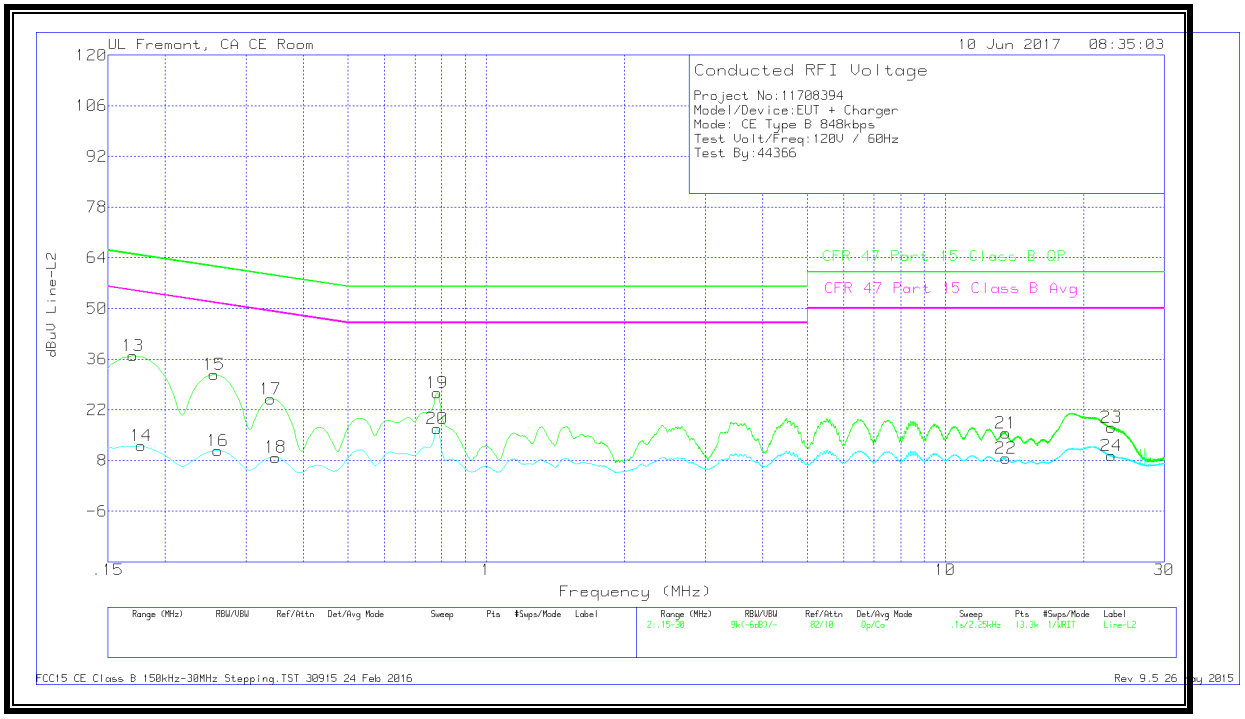
Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2	LC Cables C2&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR)Margin (dB)
13	.17025	25.5	Qp	1.2	.1	10.1	36.9	64.95	-28.05	-	-
14	.177	.64	Ca	1.2	.1	10.1	12.04	-	-	54.63	-42.59
15	.25575	20.83	Qp	.7	.1	10.1	31.73	61.57	-29.84	-	-
16	.26025	-.19	Ca	.7	.1	10.1	10.71	-	-	51.42	-40.71
17	.339	14.29	Qp	.5	.1	10.1	24.99	59.23	-34.24	-	-
18	.348	-1.81	Ca	.5	.1	10.1	8.89	-	-	49.01	-40.12
19	.78225	16.18	Qp	.3	.1	10.1	26.68	56	-29.32	-	-
20	.78225	6.31	Ca	.3	.1	10.1	16.81	-	-	46	-29.19
21	13.5623	4.84	Qp	.3	.2	10.2	15.54	60	-44.46	-	-
22	13.542	-2.14	Ca	.3	.2	10.2	8.56	-	-	50	-41.44
23	22.9988	6.07	Qp	.3	.3	10.4	17.07	60	-42.93	-	-
24	22.9988	-1.65	Ca	.3	.3	10.4	9.35	-	-	50	-40.65

Qp - Quasi-Peak detector
Ca - CISPR average detection
.TST 30915 24 Feb 2016

LINE 1 RESULTS



LINE 2 RESULTS



10.1.3. READER MODE TYPE B

NORMAL OPERATION, 848 KBPS

WORST EMISSIONS

Range 1: Line-L1 .15 - 30MHz

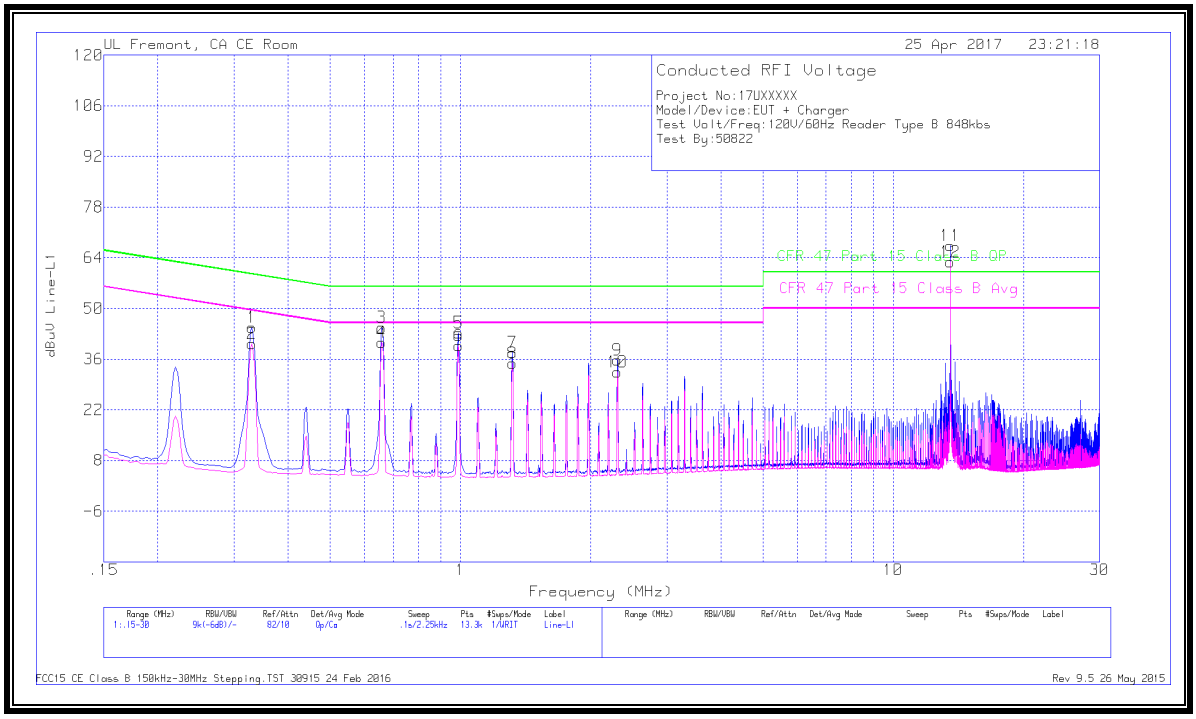
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR)Margin (dB)
1	.33	34.6	Qp	0	.1	10.1	44.8	59.45	-14.65	-	-
2	.33	30.06	Ca	0	.1	10.1	40.26	-	-	49.45	-9.19
3	.6585	34.5	Qp	0	.1	10.1	44.7	56	-11.3	-	-
4	.6585	30.35	Ca	0	.1	10.1	40.55	-	-	46	-5.45
5	.98925	33.1	Qp	0	.1	10.1	43.3	56	-12.7	-	-
6	.98925	29.5	Ca	0	.1	10.1	39.7	-	-	46	-6.3
7	1.31775	27.6	Qp	0	.1	10.1	37.8	56	-18.2	-	-
8	1.31775	24.74	Ca	0	.1	10.1	34.94	-	-	46	-11.06
9	2.30775	25.49	Qp	0	.1	10.1	35.69	56	-20.31	-	-
10	2.30775	22.18	Ca	0	.1	10.1	32.38	-	-	46	-13.62
11	13.56	56.94	Qp	.1	.2	10.2	67.44	**60**	**7.44**	-	-
12	13.56	52.3	Ca	.1	.2	10.2	62.8	-	-	**50**	**12.8**

Range 2: Line-L2 .15 - 30MHz

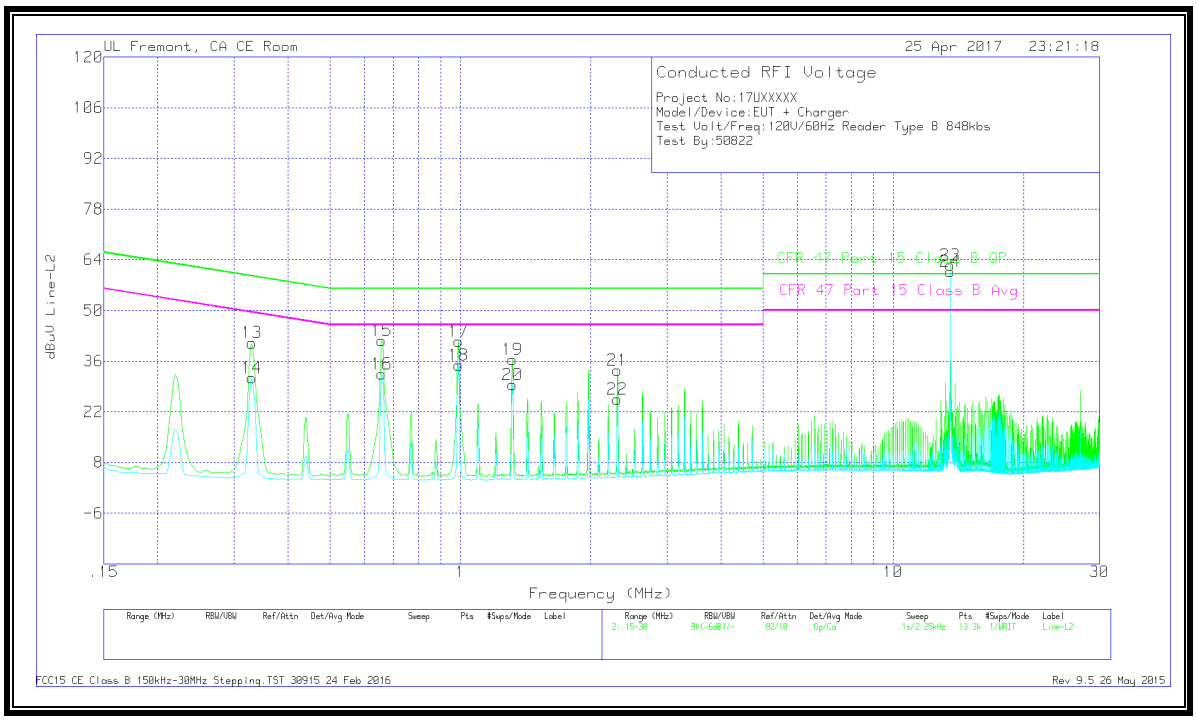
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L2	LC Cables C2&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR)Margin (dB)
13	.33	30.85	Qp	0	.1	10.1	41.05	59.45	-18.4	-	-
14	.33	21.15	Ca	0	.1	10.1	31.35	-	-	49.45	-18.1
15	.6585	31.44	Qp	0	.1	10.1	41.64	56	-14.36	-	-
16	.6585	22.17	Ca	0	.1	10.1	32.37	-	-	46	-13.63
17	.98925	31.24	Qp	0	.1	10.1	41.44	56	-14.56	-	-
18	.98925	24.68	Ca	0	.1	10.1	34.88	-	-	46	-11.12
19	1.31775	26.19	Qp	0	.1	10.1	36.39	56	-19.61	-	-
20	1.31775	19.24	Ca	0	.1	10.1	29.44	-	-	46	-16.56
21	2.30775	23.24	Qp	0	.1	10.1	33.44	56	-22.56	-	-
22	2.30775	15.31	Ca	0	.1	10.1	25.51	-	-	46	-20.49
23	13.56	52.08	Qp	.1	.2	10.2	62.58	**60**	**2.58**	-	-
24	13.56	50.35	Ca	.1	.2	10.2	60.85	-	-	**50**	**10.85**

Qp - Quasi-Peak detector
Ca - CISPR average detection
FCC15 CE Class B 150kHz-30MHz Stepping.TST 30915 24 Feb 2016
Rev 9.5 26 May 2015

LINE 1 RESULTS



LINE 2 RESULTS



10.1.4. WITH ANTENNA PORT TERMINATED, 848 KBPS

WORST EMISSIONS

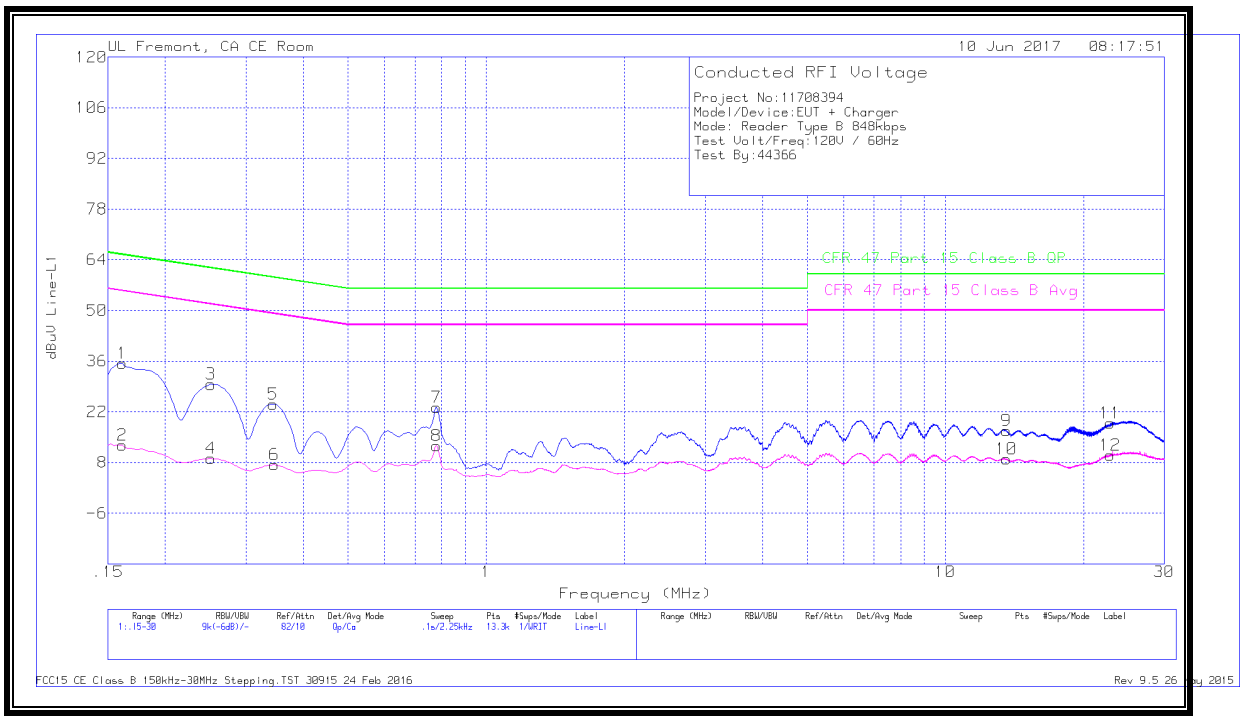
Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR)Margin (dB)
1	.16125	23.96	Qp	1.2	.1	10.1	35.36	65.4	-30.04	-	-
2	.16125	1.35	Ca	1.2	.1	10.1	12.75	-	-	55.4	-42.65
3	.25125	18.78	Qp	.6	.1	10.1	29.58	61.72	-32.14	-	-
4	.25125	-1.66	Ca	.6	.1	10.1	9.14	-	-	51.72	-42.58
5	.3435	13.56	Qp	.4	.1	10.1	24.16	59.12	-34.96	-	-
6	.34575	-3.26	Ca	.4	.1	10.1	7.34	-	-	49.06	-41.72
7	.78	12.8	Qp	.2	.1	10.1	23.2	56	-32.8	-	-
8	.78	2.2	Ca	.2	.1	10.1	12.6	-	-	46	-33.4
9	13.5825	6.2	Qp	.2	.2	10.2	16.8	60	-43.2	-	-
10	13.5834	-1.67	Ca	.2	.2	10.2	8.93	-	-	50	-41.07
11	22.8705	7.82	Qp	.3	.3	10.4	18.82	60	-41.18	-	-
12	22.875	-.91	Ca	.3	.3	10.4	10.09	-	-	50	-39.91

Qp - Quasi-Peak detector
Ca - CISPR average detection

Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL 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	.17025	23.96	Qp	1.2	.1	10.1	35.36	64.95	-29.59	-	-
14	.17025	-.01	Ca	1.2	.1	10.1	11.39	-	-	54.95	-43.56
15	.2535	19.34	Qp	.7	.1	10.1	30.24	61.64	-31.4	-	-
16	.26025	-.66	Ca	.7	.1	10.1	10.24	-	-	51.42	-41.18
17	.339	12.98	Qp	.5	.1	10.1	23.68	59.23	-35.55	-	-
18	.34125	-2.13	Ca	.5	.1	10.1	8.57	-	-	49.17	-40.6
19	.78	15.94	Qp	.3	.1	10.1	26.44	56	-29.56	-	-
20	.78	5.93	Ca	.3	.1	10.1	16.43	-	-	46	-29.57
21	13.497	4.64	Qp	.3	.2	10.2	15.34	60	-44.66	-	-
22	13.497	-2.31	Ca	.3	.2	10.2	8.39	-	-	50	-41.61
23	22.0864	7.21	Qp	.3	.3	10.4	18.21	60	-41.79	-	-
24	22.0965	-.76	Ca	.3	.3	10.4	10.24	-	-	50	-39.76

Qp - Quasi-Peak detector
Ca - CISPR average detection
FCC15 CE Class B 150kHz-30MHz Stepping.TST 30915 24 Feb 2016

LINE 1 RESULTS



LINE 2 RESULTS