



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

CERTIFICATION TEST REPORT

FOR

SMARTPHONE

MODEL NUMBER: A1863, A1907

**FCC ID: BCG-E3159A
IC: 579C-E3159A**

REPORT NUMBER: 11708541-E6V2

ISSUE DATE: AUGUST 09, 2017

Prepared for
**APPLE, INC.
1 INFINITE LOOP
CUPERTINO, CA 95014, U.S.A.**

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	7/25/2017	Initial Issue	Chin Pang
V2	8/09/2017	Address TCB's Questions	Chin Pang

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1. ATTESTATION OF TEST RESULTS

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

EUT DESCRIPTION: SMARTPHONE

MODEL: A1863, A1907

SERIAL NUMBER: C7CTP00MJ5TF

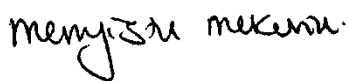
DATE TESTED: MARCH 14, 2017 – JULY 10, 2017

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.

Approved & Released For
UL Verification Services Inc. By:



MENGISTU MENKURIA
SENIOR ENGINEER
UL Verification Services Inc.

Prepared By:



TONY LI
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:

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

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
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
Temperature	± 0.9 °C
Supply voltages	± 0.45 %
Time	± 0.02 %

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, TD-SCDMA and CDMA 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.

* CE mode is NFC Card Emulation Mode

5.2. DIFFERENCE IN MODEL NUMBER

Model A1863 and A1907 are exactly the same. Two models numbers are allocated for marketing and logistic purpose only.

5.3. MAXIMUM FIELD STRENGTH

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	25.21
	Reader Mode	B	25.07

5.4. 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

5.5. 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 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

5.6. DESCRIPTION OF TEST SETUP

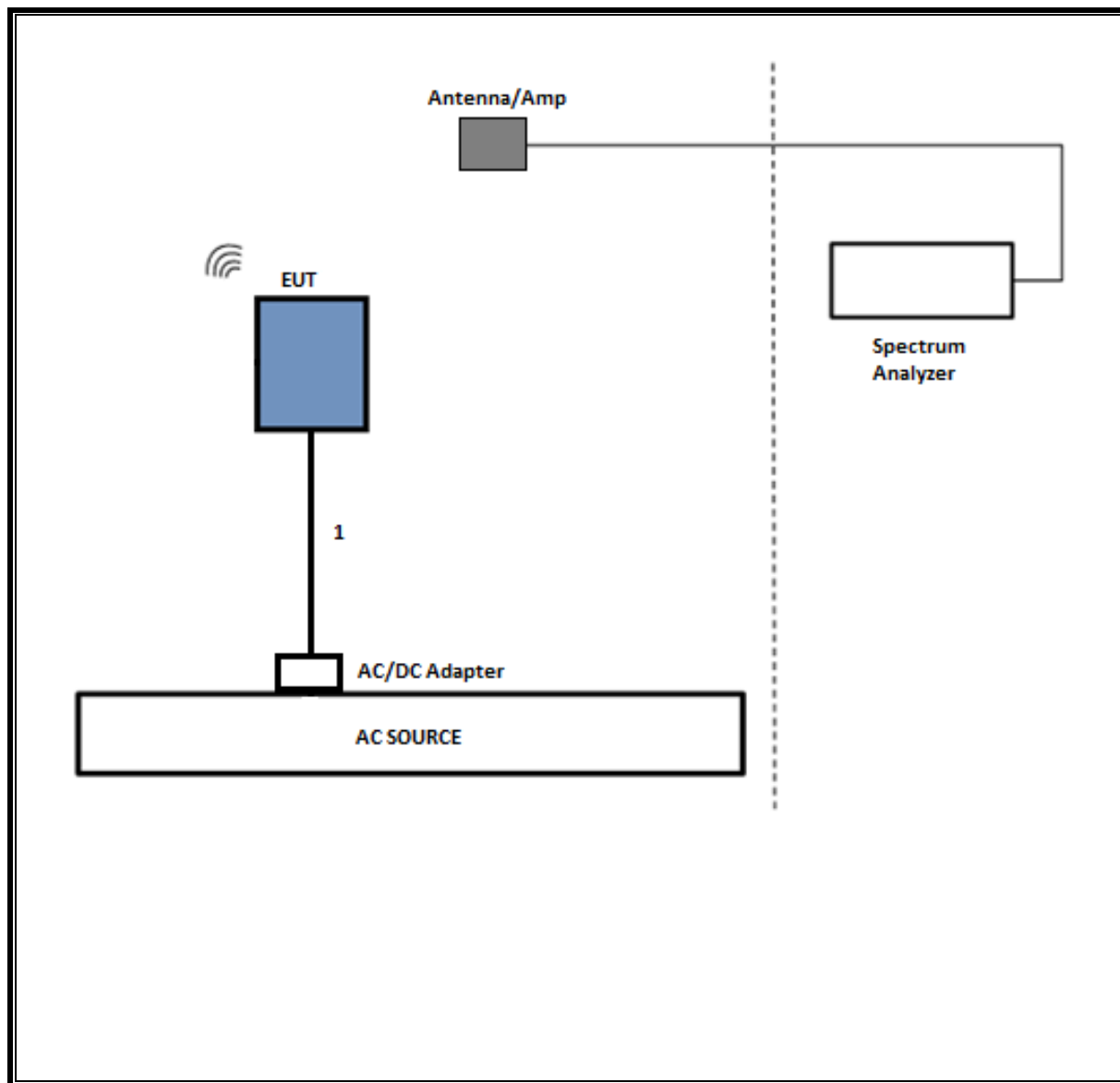
SUPPORT EQUIPMENT

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

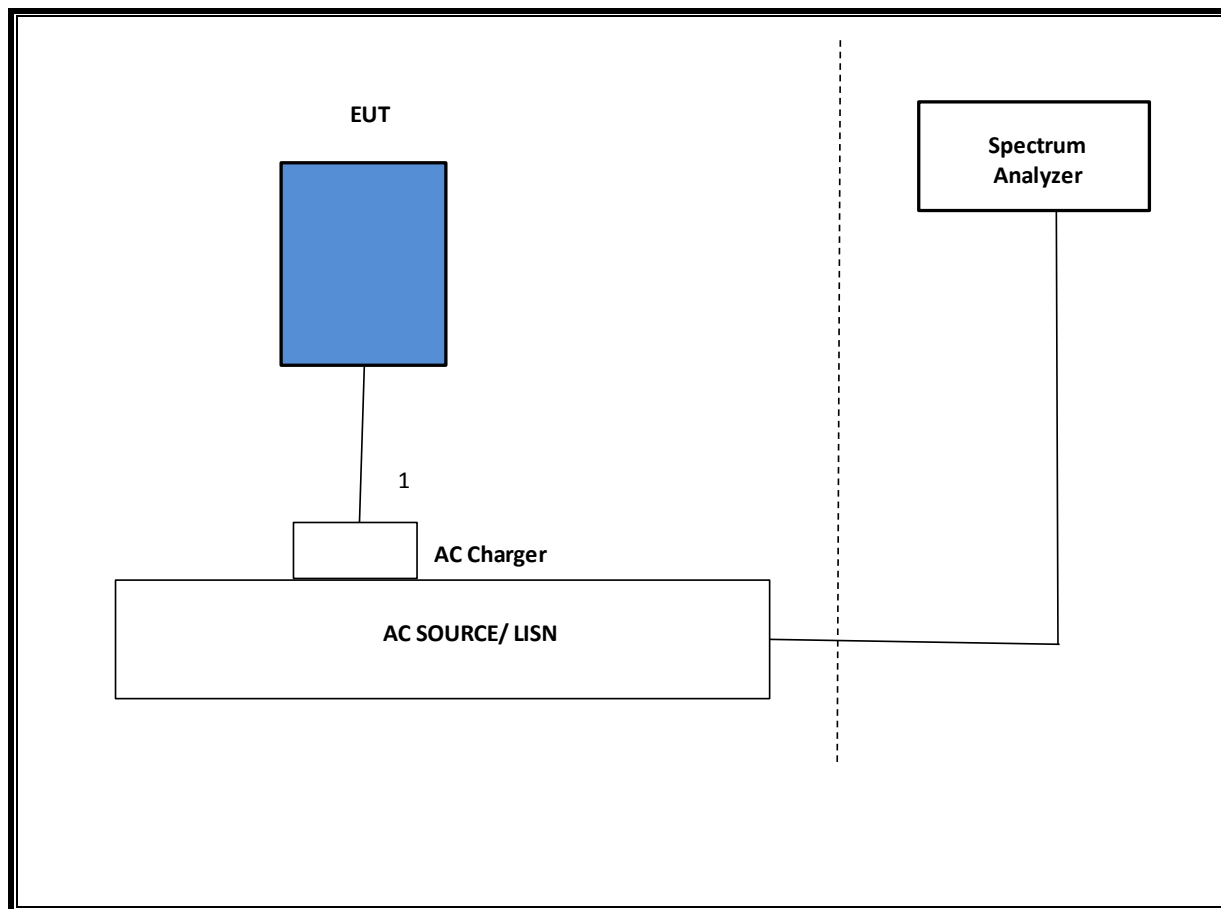
I/O CABLES (Radiated and AC Line)

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
Spectrum Analyzer, PXA 3Hz to 44GHz	Keysight	N9030A	T1113	12/20/2017
**Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB3	T900	5/3/2017
**Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	T835	6/18/2017
Spectrum Analyzer, PXA 3Hz to 44GHz	Keysight	N9030A	T1613	12/2/2017
Chamber, Environmental	Cincinnati Sub Zero	ZPHS-8-3.5-SCT/WC	T754	9/10/2017
Antenna, Active Loop 9KHz to 30MHz	ETS-Lindgren	6502	T757	12/22/2017
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: * indicates automation software version used in the compliance certification testing

**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 or 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:	50822	Date:	5/3/17
-----	-------	-------	--------

99% and 20dB BW

CE Mode

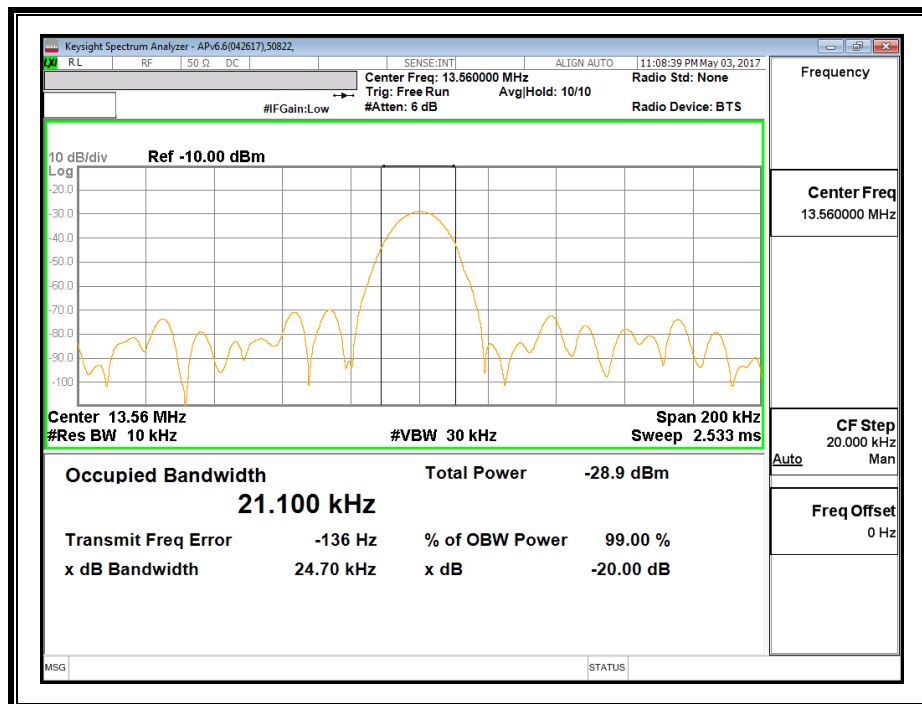
Moduation	Frequency	Data Rate	99% Bandwidth	20dB Bandwidth
	(MHz)	(Kbps)	(KHz)	(KHz)
Type B	13.56	848	21.10	24.70

READER

Moduation	Frequency	Data Rate	99% Bandwidth	20dB Bandwidth
	(MHz)	(Kbps)	(KHz)	(KHz)
Type B	13.56	848	21.932	25.60

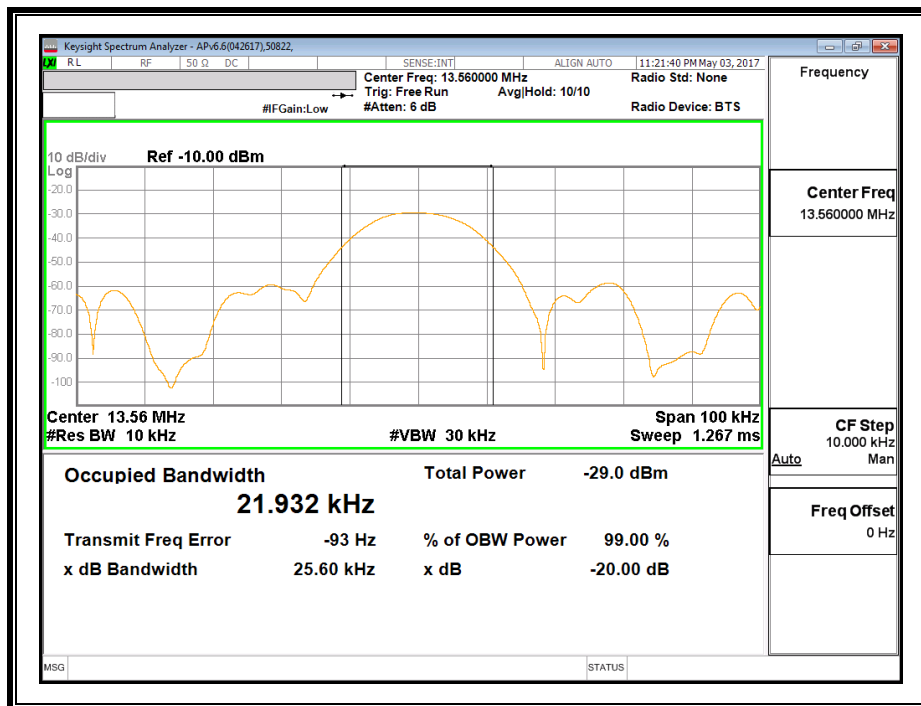
7.1. CE MODE

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 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

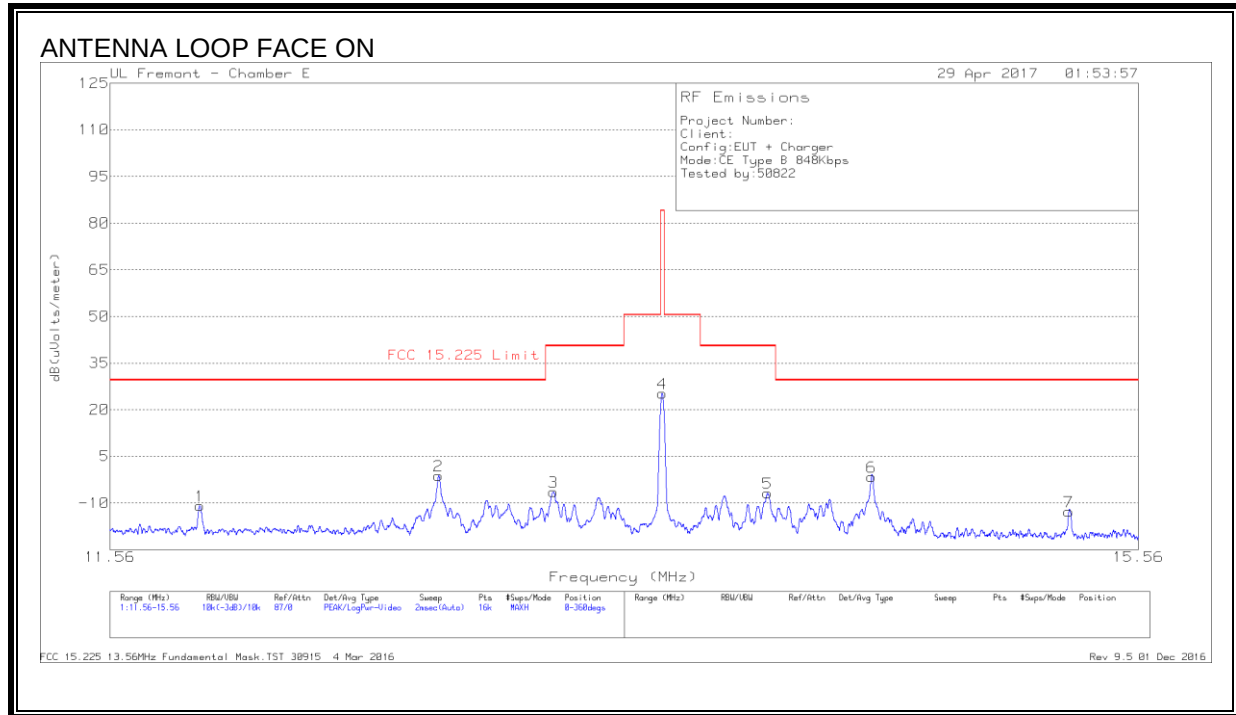
The EUT is an intentional radiator that incorporates a digital device, the highest fundamental frequency generated or used in the device is 13.56 MHz; therefore, the frequency range was investigated from 0.15 MHz to the 10th harmonic of the highest fundamental frequency, or 1000 MHz, whichever is greater.

RESULTS

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

8.2.1. CE MODE

848Kbps FUNDAMENTAL



DATA

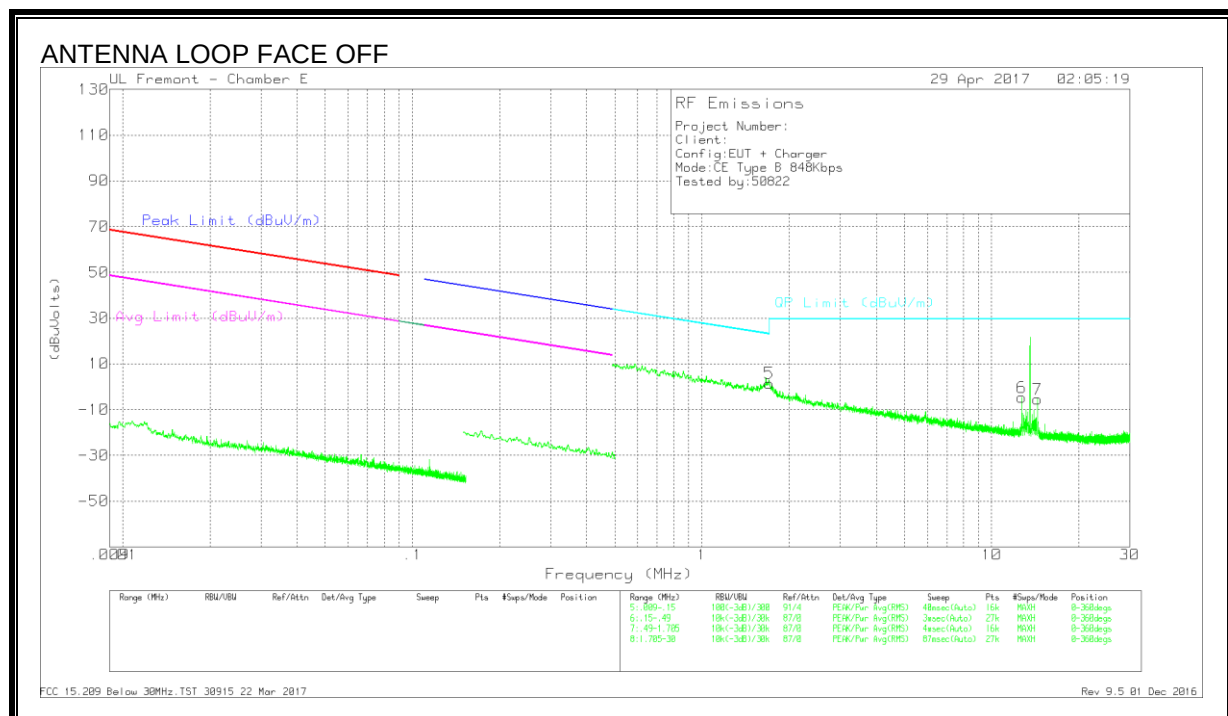
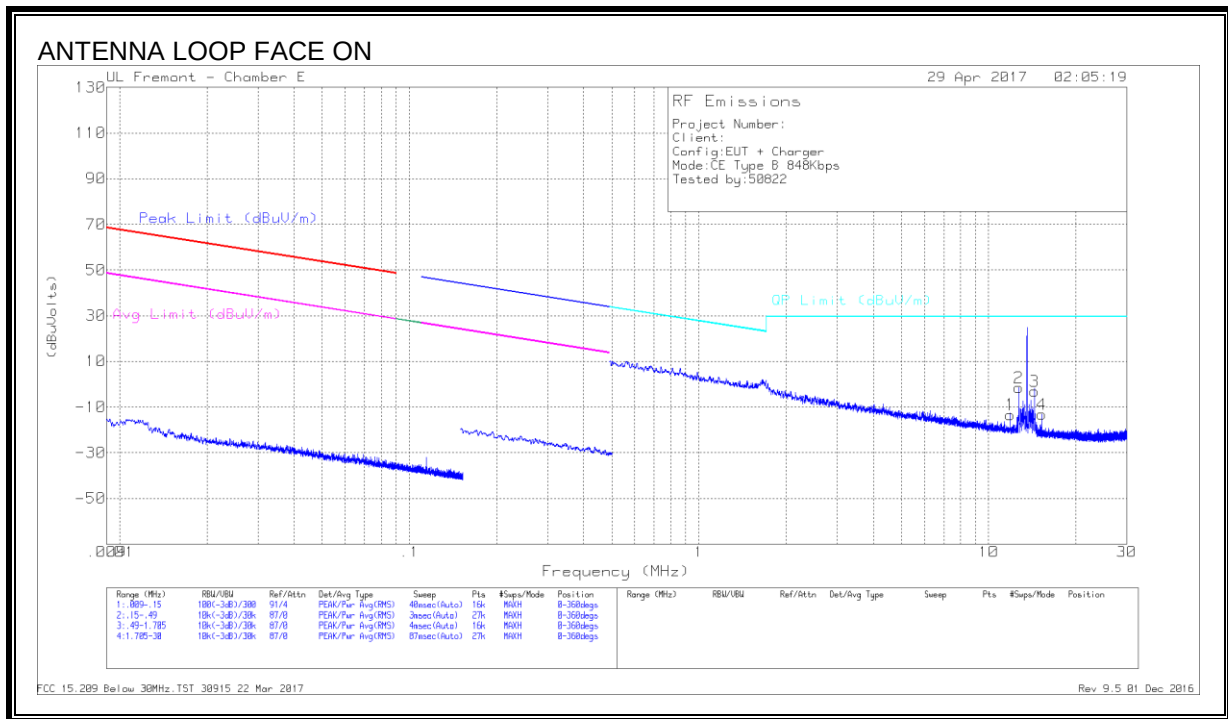
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cables (dB)	Dist Corr (dB) 40Log	Corrected Reading dB(uVolts/meter)	FCC 15.225 Limit	PK Margin (dB)	Azimuth (Degs)
1	11.86388	17.83	Pk	10.8	.5	-40	-10.87	29.54	-40.41	0-360
8	11.86599	14.4	Pk	10.8	.5	-40	-14.3	29.54	-43.84	0-360
9	12.71011	24.89	Pk	10.7	.5	-40	-3.91	29.54	-33.45	0-360
2	12.71188	27.56	Pk	10.7	.5	-40	-1.24	29.54	-30.78	0-360
10	13.1362	19.87	Pk	10.7	.5	-40	-8.93	40.51	-49.44	0-360
3	13.14063	22.31	Pk	10.7	.5	-40	-6.49	40.51	-47	0-360
11	13.55778	50.9	Pk	10.6	.5	-40	22	84	-62	0-360
4	13.55988	54.11	Pk	10.6	.5	-40	25.21	84	-58.79	0-360
12	13.97506	18.74	Pk	10.6	.5	-40	-10.16	40.51	-50.67	0-360
5	13.97938	22.02	Pk	10.6	.5	-40	-6.88	40.51	-47.39	0-360
6	14.40425	27.24	Pk	10.6	.5	-40	-1.66	29.54	-31.2	0-360
13	14.40589	24.47	Pk	10.6	.5	-40	-4.43	29.54	-33.97	0-360
7	15.2505	16.18	Pk	10.5	.5	-40	-12.82	29.54	-42.36	0-360
14	15.2506	13.16	Pk	10.5	.5	-40	-15.84	29.54	-45.38	0-360

Pk - Peak detector

FCC 15.225 13.56MHz Fundamental Mask.TST 30915 4 Mar 2016

Rev 9.5 01 Dec 2016

SPURIOUS EMISSION



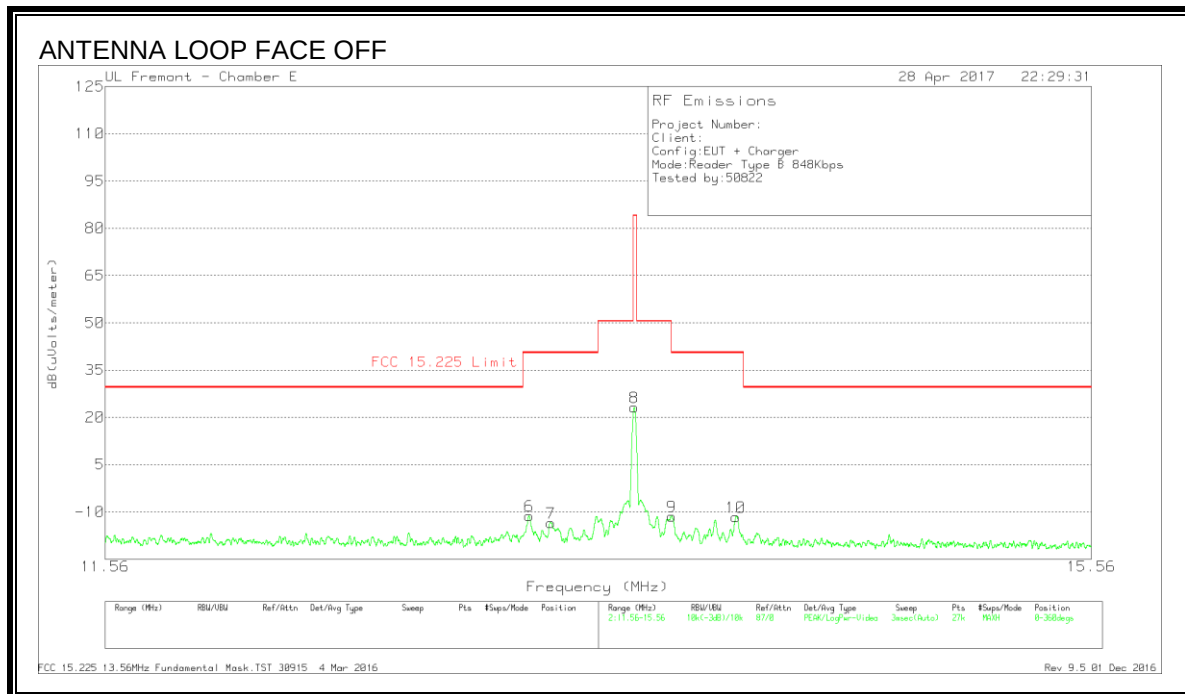
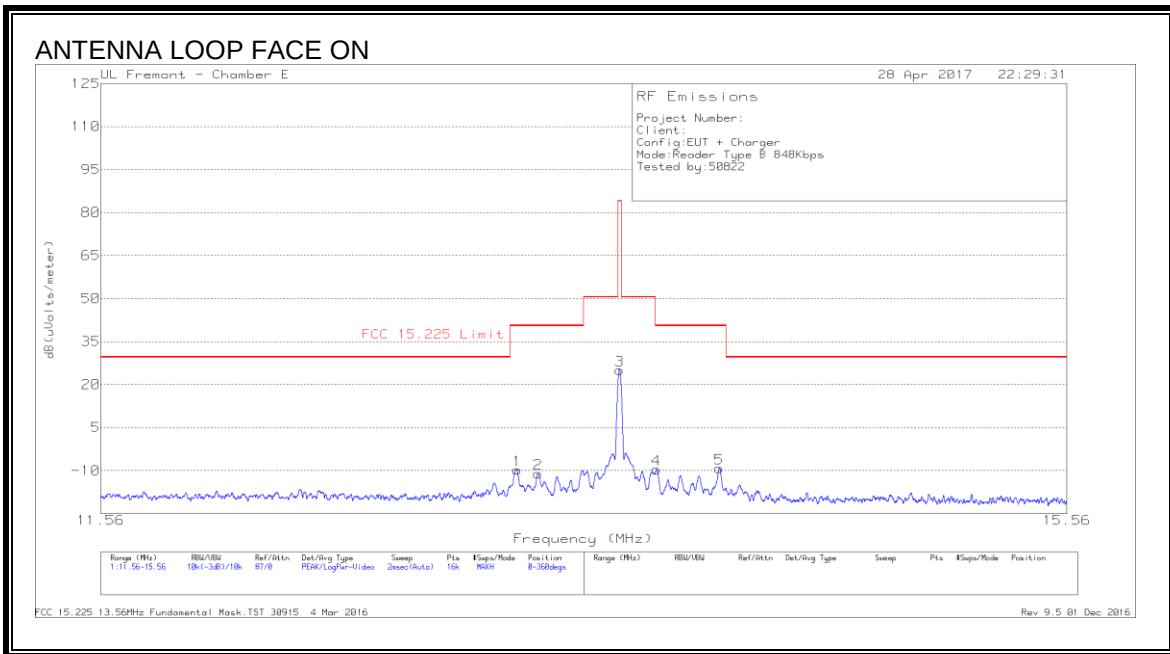
DATA

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	1.70867	29.67	Pk	11.7	.2	-40	1.57	29.5	-27.93	0-360
1	11.86222	15.59	Pk	10.6	.5	-40	-13.31	29.5	-42.81	0-360
2	12.71214	27.43	Pk	10.5	.5	-40	-1.57	29.5	-31.07	0-360
6	12.71214	24.26	Pk	10.5	.5	-40	-4.74	29.5	-34.24	0-360
7	14.4099	23.61	Pk	10.4	.5	-40	-5.49	29.5	-34.99	0-360
3	14.412	25.99	Pk	10.4	.5	-40	-3.11	29.5	-32.61	0-360
4	15.25564	15.97	Pk	10.3	.5	-40	-13.23	29.5	-42.73	0-360

Pk - Peak detector

FCC 15.209 Below 30MHz.TST 30915 22 Mar 2017
Rev 9.5 01 Dec 2016

8.2.2. READER MODE



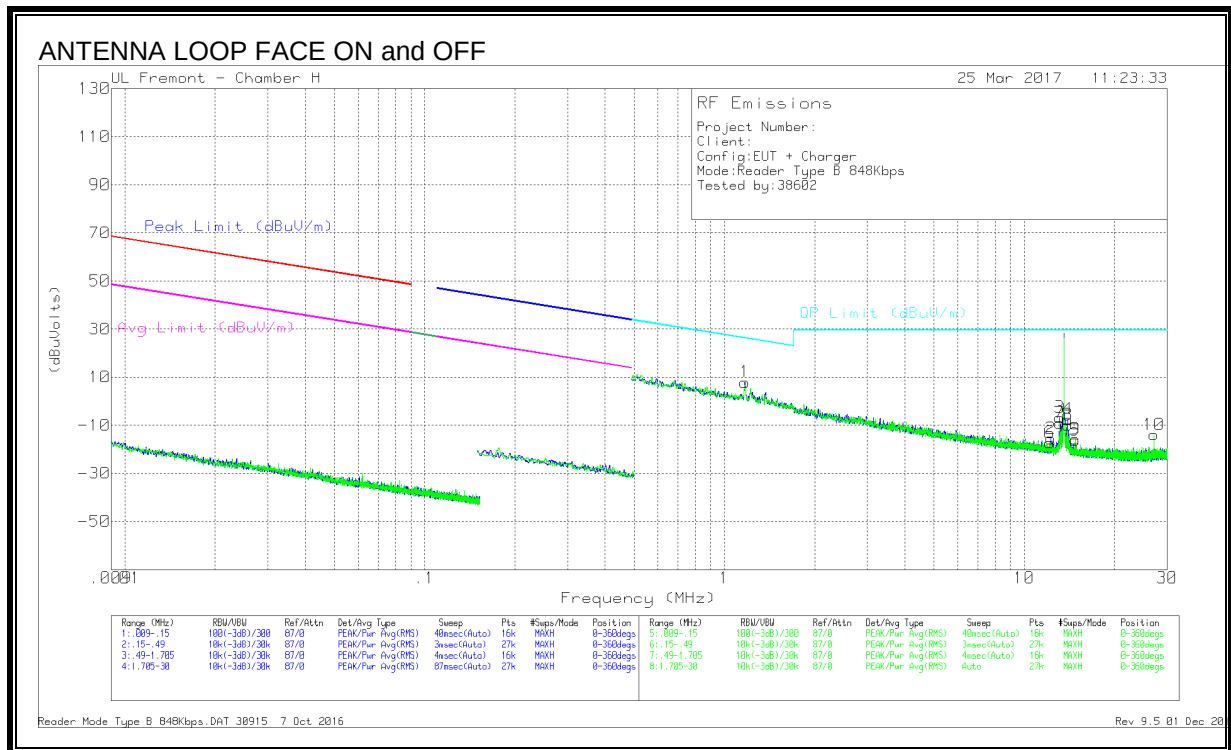
DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cables (dB)	Dist Corr (dB) 40Log	Corrected Reading dB(uVolts/m eter)	FCC 15.225 Limit	PK Margin (dB)	Azimuth (Degs)
6	13.13465	17.57	Pk	10.7	.5	-40	-11.23	40.51	-51.74	0-360
1	13.13925	18.95	Pk	10.7	.5	-40	-9.85	40.51	-50.36	0-360
7	13.22234	15.3	Pk	10.7	.5	-40	-13.5	40.51	-54.01	0-360
2	13.22438	17.77	Pk	10.7	.5	-40	-11.03	40.51	-51.54	0-360
8	13.5577	52.09	Pk	10.6	.5	-40	23.19	84	-60.81	0-360
3	13.56075	53.97	Pk	10.6	.5	-40	25.07	84	-58.93	0-360
9	13.71251	17.51	Pk	10.6	.5	-40	-11.39	40.51	-51.9	0-360
4	13.71513	19.26	Pk	10.6	.5	-40	-9.64	40.51	-50.15	0-360
10	13.97891	17.21	Pk	10.6	.5	-40	-11.69	40.51	-52.2	0-360
5	13.98175	19.67	Pk	10.6	.5	-40	-9.23	40.51	-49.74	0-360

Pk - Peak detector

FCC 15.225 13.56MHz Fundamental Mask.TST 30915 4 Mar 2016
Rev 9.5 01 Dec 2016

SPURIOUS EMISSION



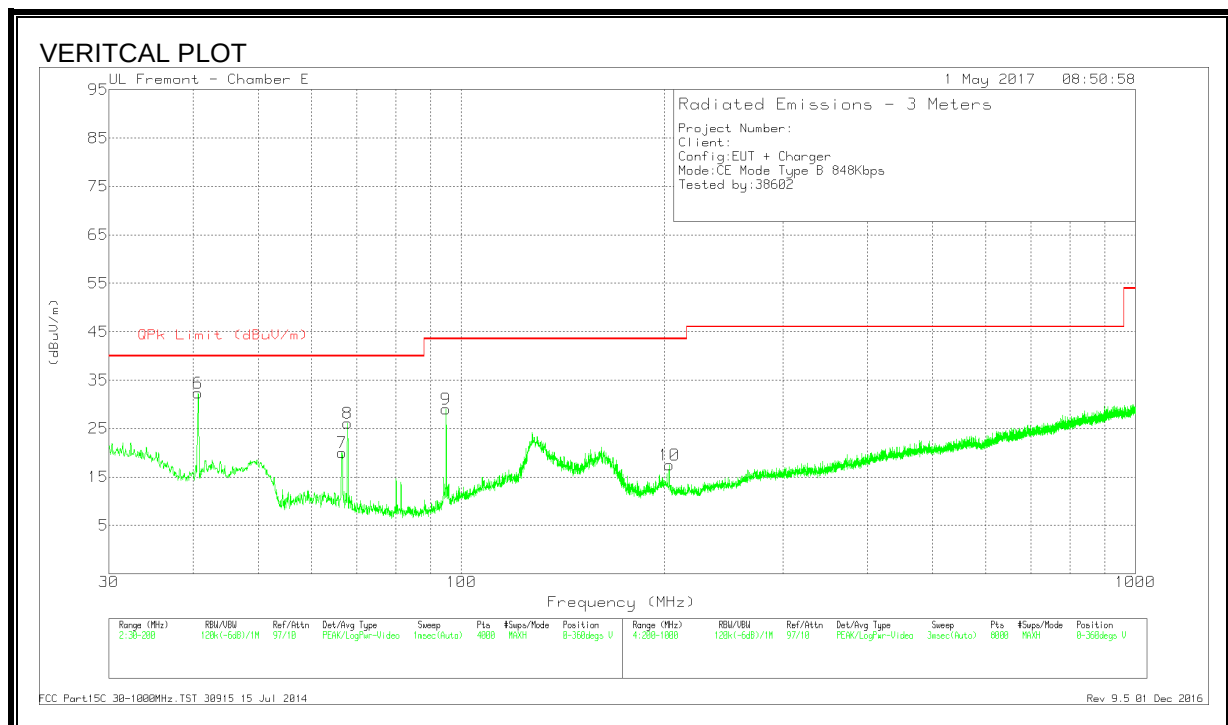
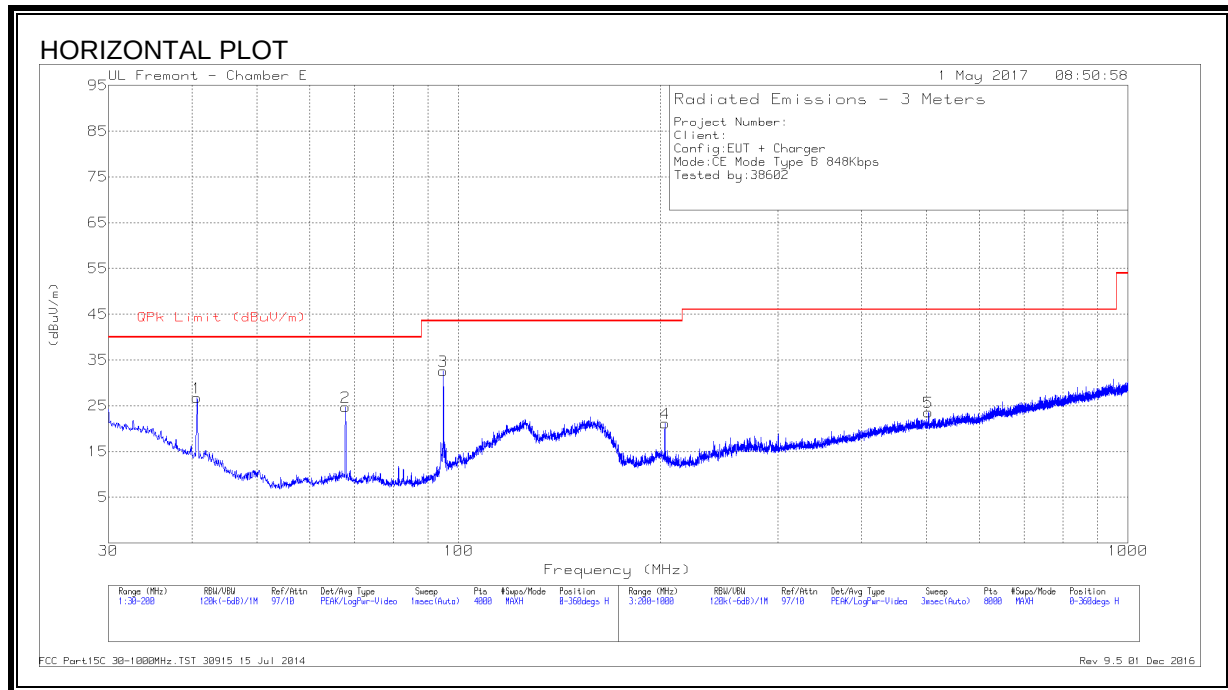
DATA

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)
1	1.17001	36.06	Pk	11.8	.1	-40	7.96	26.26	-18.3	0-360
6	12.17662	11.58	Pk	10.8	.4	-40	-17.22	29.5	-46.72	0-360
2	12.28823	13.26	Pk	10.8	.4	-40	-15.54	29.5	-45.04	0-360
7	13.13554	19.87	Pk	10.7	.4	-40	-9.03	29.5	-38.53	0-360
3	13.13658	22.15	Pk	10.7	.4	-40	-6.75	29.5	-36.25	0-360
4	13.98337	21.51	Pk	10.6	.4	-40	-7.49	29.5	-36.99	0-360
8	13.98546	19.14	Pk	10.6	.4	-40	-9.86	29.5	-39.36	0-360
5	14.83434	12.8	Pk	10.5	.4	-40	-16.3	29.5	-45.8	0-360
9	14.83592	13.34	Pk	10.5	.4	-40	-15.76	29.5	-45.26	0-360
10	27.1211	16.65	Pk	8.8	.6	-40	-13.95	29.5	-43.45	0-360

Pk - Peak detector

8.3. TX SPURIOUS EMISSION 30 TO 1000 MHz

8.3.1. CE MODE



Trace Markers

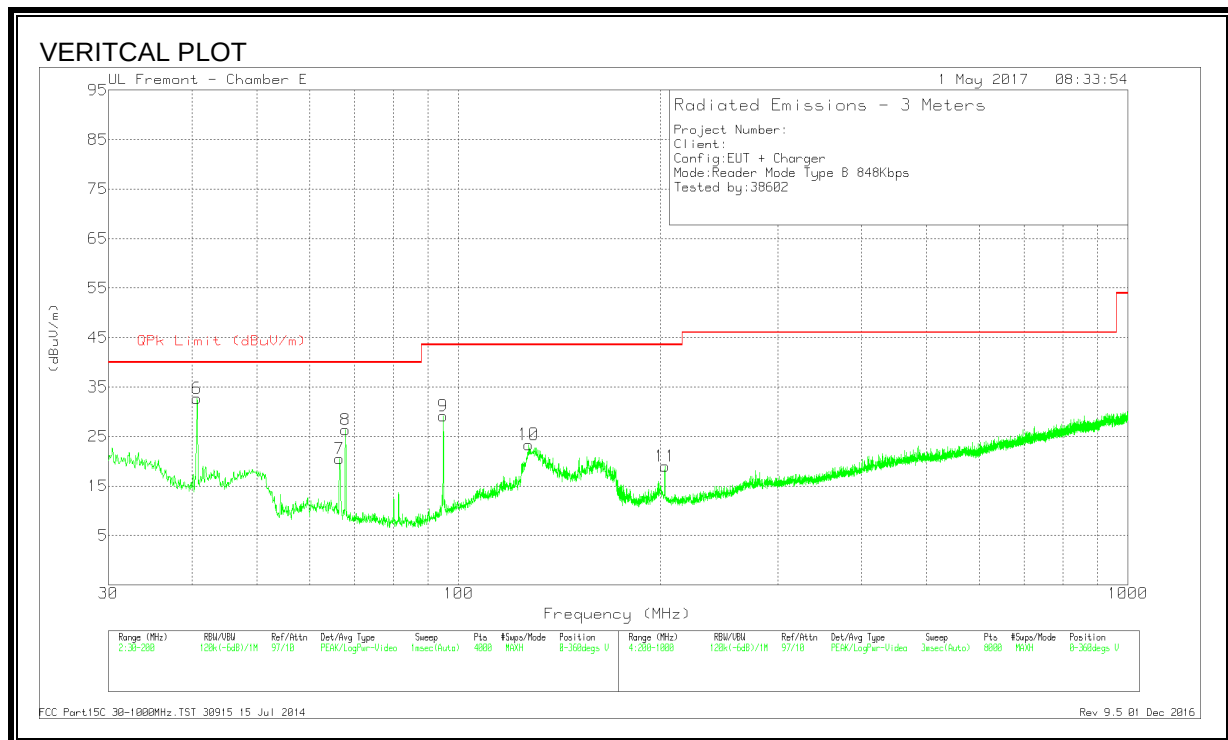
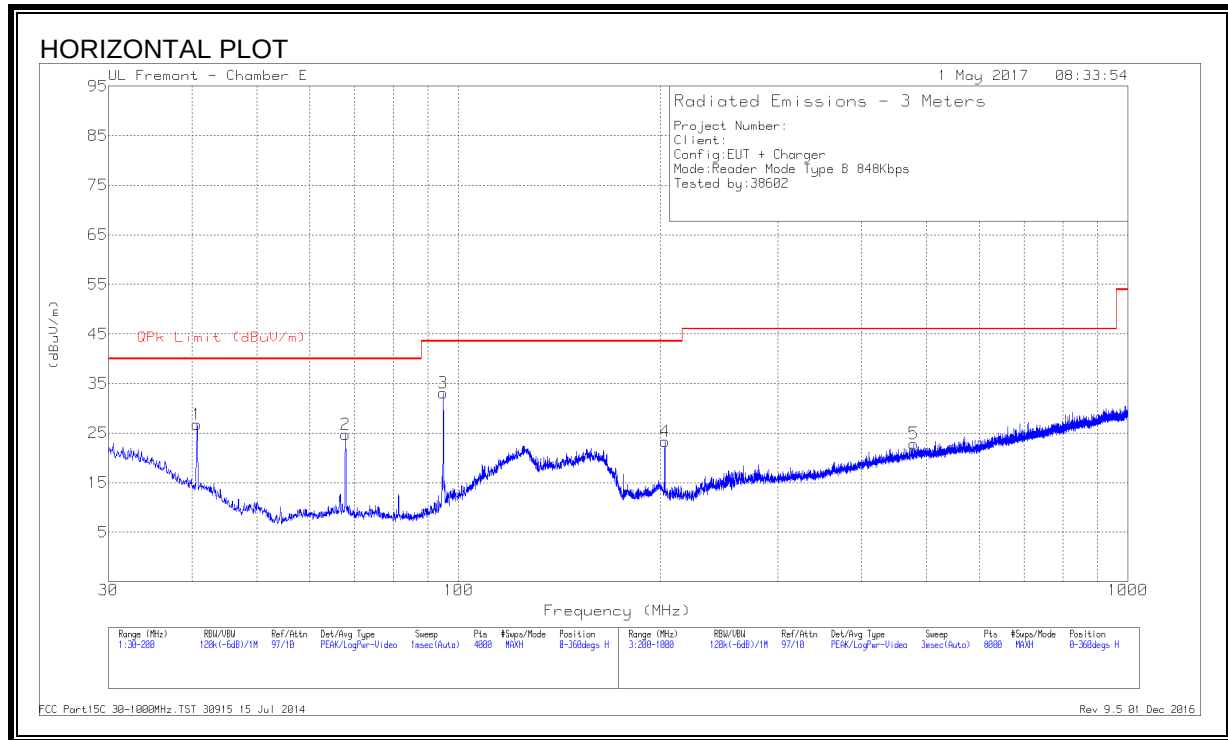
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T899 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	40.6703	40.54	Pk	17.7	-31.5	26.74	40	-13.26	0-360	300	H
6	40.6703	46.14	Pk	17.7	-31.5	32.34	40	-7.66	0-360	100	V
7	66.4744	39.17	Pk	12.1	-31.2	20.07	40	-19.93	0-360	100	V
2	67.7923	43.77	Pk	12.1	-31.2	24.67	40	-15.33	0-360	199	H
8	67.7923	45.22	Pk	12.1	-31.2	26.12	40	-13.88	0-360	100	V
3	94.9143	50.69	Pk	12.8	-30.9	32.59	43.52	-10.93	0-360	300	H
9	94.9143	47.12	Pk	12.8	-30.9	29.02	43.52	-14.5	0-360	100	V
4	203.4004	35.99	Pk	15.2	-30	21.19	43.52	-22.33	0-360	200	H
10	203.4004	32.33	Pk	15.2	-30	17.53	43.52	-25.99	0-360	100	V
5	503.7395	30.12	Pk	21.6	-28.2	23.52	46.02	-22.5	0-360	299	H

Pk - Peak detector

FCC Part15C 30-1000MHz.TST 30915 15 Jul 2014

Rev 9.5 01 Dec 2016

8.3.2. READER MODE



DATA

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	* 127.2652	36.28	Pk	17.7	-30.6	23.38	43.52	-20.14	0-360	100	V
1	40.6703	40.6	Pk	17.7	-31.5	26.8	40	-13.2	0-360	300	H
6	40.6703	46.55	Pk	17.7	-31.5	32.75	40	-7.25	0-360	100	V
7	66.3894	39.57	Pk	12.1	-31.2	20.47	40	-19.53	0-360	100	V
2	67.7923	43.83	Pk	12.1	-31.2	24.73	40	-15.27	0-360	200	H
8	67.7923	45.44	Pk	12.1	-31.2	26.34	40	-13.66	0-360	100	V
3	94.9143	51.15	Pk	12.8	-30.9	33.05	43.52	-10.47	0-360	300	H
9	94.9143	47.29	Pk	12.8	-30.9	29.19	43.52	-14.33	0-360	100	V
4	203.4004	38.06	Pk	15.2	-30	23.26	43.52	-20.26	0-360	200	H
11	203.4004	33.83	Pk	15.2	-30	19.03	43.52	-24.49	0-360	100	V
5	479.0363	29.77	Pk	21.5	-28.4	22.87	46.02	-23.15	0-360	400	H

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

Pk - Peak detector

FCC Part15C 30-1000MHz.TST 30915 15 Jul 2014

Rev 9.5 01 Dec 2016

9. FREQUENCY STABILITY

LIMIT

RSS-210 Issue 9 B.6.

§15.225 (e) The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ 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

ID:	50822	Date:	3/24/17
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No non-compliance noted.

9.1. CE Mode

848Kbps

Reference Frequency: EUT Channel 13.56 MHz @ 20°C Limit: ± 100 ppm = 1.356 kHz										
Power Supply	Envir. Temp	Frequency Deviation Measured with Time Elapse								
(VAC)	(°C)	Startup (MHz)	Delta (ppm)	@ 2 mins (MHz)	Delta (ppm)	@ 5 mins (MHz)	Delta (ppm)	@ 10 mins (MHz)	Delta (ppm)	Limit (ppm)
3.80	50	13.5596883	3.299	13.5596879	3.329	13.5596879	3.330	13.5596887	3.271	± 100
	40	13.5596866	3.426	13.5596867	3.421	13.5596869	3.407	13.5596870	3.396	± 100
	30	13.5596923	3.004	13.5596941	2.872	13.5596960	2.729	13.5596980	2.585	± 100
	20	13.5597330	0.000	13.5597318	0.091	13.5597317	0.099	13.5597315	0.116	± 100
	10	13.5597466	-1.001	13.5597504	-1.279	13.5597538	-1.529	13.5597567	-1.743	± 100
	0	13.5597752	-3.105	13.5597785	-3.354	13.5597817	-3.588	13.5597846	-3.804	± 100
	-10	13.5597969	-4.709	13.5598004	-4.967	13.5598041	-5.240	13.5598065	-5.413	± 100
	-20	13.5598116	-5.791	13.5598114	-5.780	13.5598112	-5.761	13.5598108	-5.733	± 100
3.23	20	13.5597328	0.018	13.5597316	0.107	13.5597313	0.129	13.5597310	0.151	± 100
4.37	20	13.5597329	0.011	13.5597319	0.085	13.5597315	0.114	13.5597316	0.107	± 100

9.2. Reader Mode

848Kbps

Reference Frequency: EUT Channel 13.56 MHz @ 20°C Limit: ± 100 ppm = 1.356 kHz										
Power Supply	Envir. Temp	Frequency Deviation Measured with Time Elapse								
(VAC)	(°C)	Startup (MHz)	Delta (ppm)	@ 2 mins (MHz)	Delta (ppm)	@ 5 mins (MHz)	Delta (ppm)	@ 10 mins (MHz)	Delta (ppm)	Limit (ppm)
3.80	50	13.5596971	1.383	13.5596925	1.723	13.5596893	1.962	13.5596882	2.043	± 100
	40	13.5596876	2.082	13.5596879	2.064	13.5596881	2.044	13.5596882	2.040	± 100
	30	13.5596936	1.642	13.5596954	1.513	13.5596971	1.382	13.5596987	1.263	± 100
	20	13.5597159	0.000	13.5597184	-0.189	13.5597213	-0.397	13.5597239	-0.591	± 100
	10	13.5597429	-1.997	13.5597468	-2.285	13.5597508	-2.573	13.5597544	-2.840	± 100
	0	13.5597738	-4.273	13.5597776	-4.551	13.5597811	-4.808	13.5597842	-5.036	± 100
	-10	13.5598005	-6.244	13.5598026	-6.398	13.5598045	-6.534	13.5598062	-6.658	± 100
	-20	13.5598119	-7.085	13.5598119	-7.085	13.5598118	-7.076	13.5598115	-7.054	± 100
3.23	20	13.5597158	0.005	13.5597181	-0.164	13.5597210	-0.378	13.5597235	-0.563	± 100
4.37	20	13.5597160	-0.010	13.5597183	-0.179	13.5597215	-0.415	13.5597240	-0.599	± 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 50 μ H/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 (dB μ V)	
	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

NORMAL OPERATION, 848 KBPS

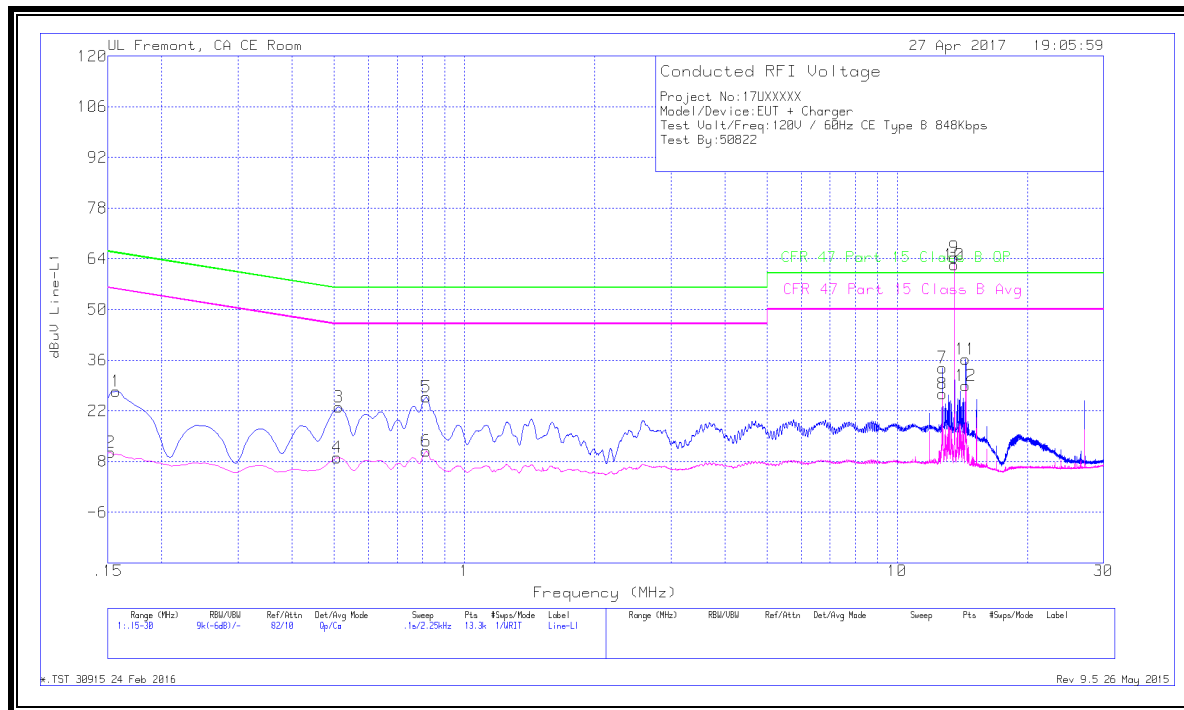
WORST EMISSIONS

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	.15675	17.2	Qp	0	.1	10.1	27.4	65.63	-38.23	-	-
2	.15225	.28	Ca	.1	.1	10.1	10.58	-	-	55.88	-45.3
3	.51225	12.78	Qp	0	.1	10.1	22.98	56	-33.02	-	-
4	.50775	-1.13	Ca	0	.1	10.1	9.07	-	-	46	-36.93
5	.816	15.57	Qp	0	.1	10.1	25.77	56	-30.23	-	-
6	.816	.63	Ca	0	.1	10.1	10.83	-	-	46	-35.17
7	12.71175	23.42	Qp	.1	.2	10.2	33.92	60	-26.08	-	-
8	12.71175	16.23	Ca	.1	.2	10.2	26.73	-	-	50	-23.27
9	13.56	53.96	Qp	.1	.2	10.2	64.46	60	4.46	-	-
10	13.56	51.79	Ca	.1	.2	10.2	62.29	-	-	50	12.29
11	14.40825	25.8	Qp	0	.2	10.2	36.2	60	-23.8	-	-
12	14.40825	18.57	Ca	0	.2	10.2	28.97	-	-	50	-21.03

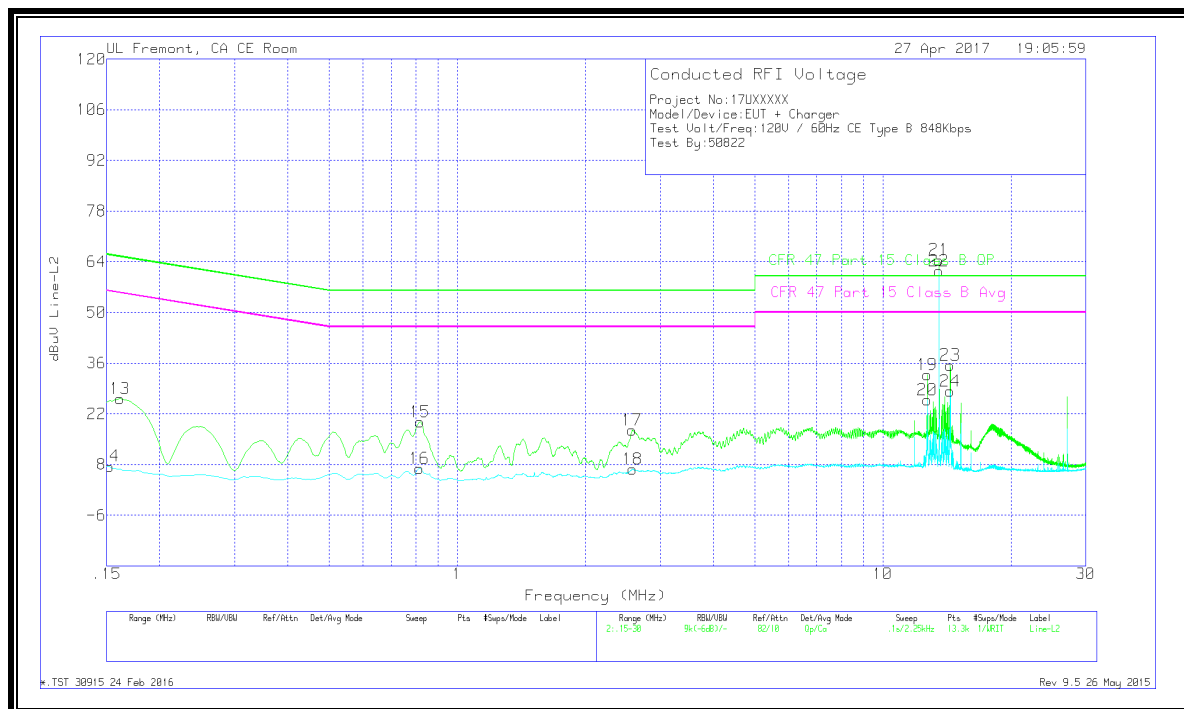
Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L2	LC Cables C2&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR)Margin (dB)
13	.16125	16.06	Qp	0	.1	10.1	26.26	65.4	-39.14	-	-
14	.15225	-2.6	Ca	0	0	10.1	7.5	-	-	55.88	-48.38
15	.81712	9.59	Qp	0	.1	10.1	19.79	56	-36.21	-	-
16	.81375	-3.24	Ca	0	.1	10.1	6.96	-	-	46	-39.04
17	2.57775	7.29	Qp	0	.1	10.1	17.49	56	-38.51	-	-
18	2.58225	-3.43	Ca	0	.1	10.1	6.77	-	-	46	-39.23
19	12.71175	22.27	Qp	.1	.2	10.2	32.77	60	-27.23	-	-
20	12.71175	15.4	Ca	.1	.2	10.2	25.9	-	-	50	-24.1
21	13.56	54.01	Qp	.1	.2	10.2	64.51	60	4.51	-	-
22	13.56	51.02	Ca	.1	.2	10.2	61.52	-	-	50	11.52
23	14.40825	24.98	Qp	.1	.2	10.2	35.48	60	-24.52	-	-
24	14.40825	17.74	Ca	.1	.2	10.2	28.24	-	-	50	-21.76

Qp - Quasi-Peak detector
Ca - CISPR average detection

LINE 1 RESULTS



LINE 2 RESULTS



10.1.2. WITH ANTENNA PORT TERMINATED

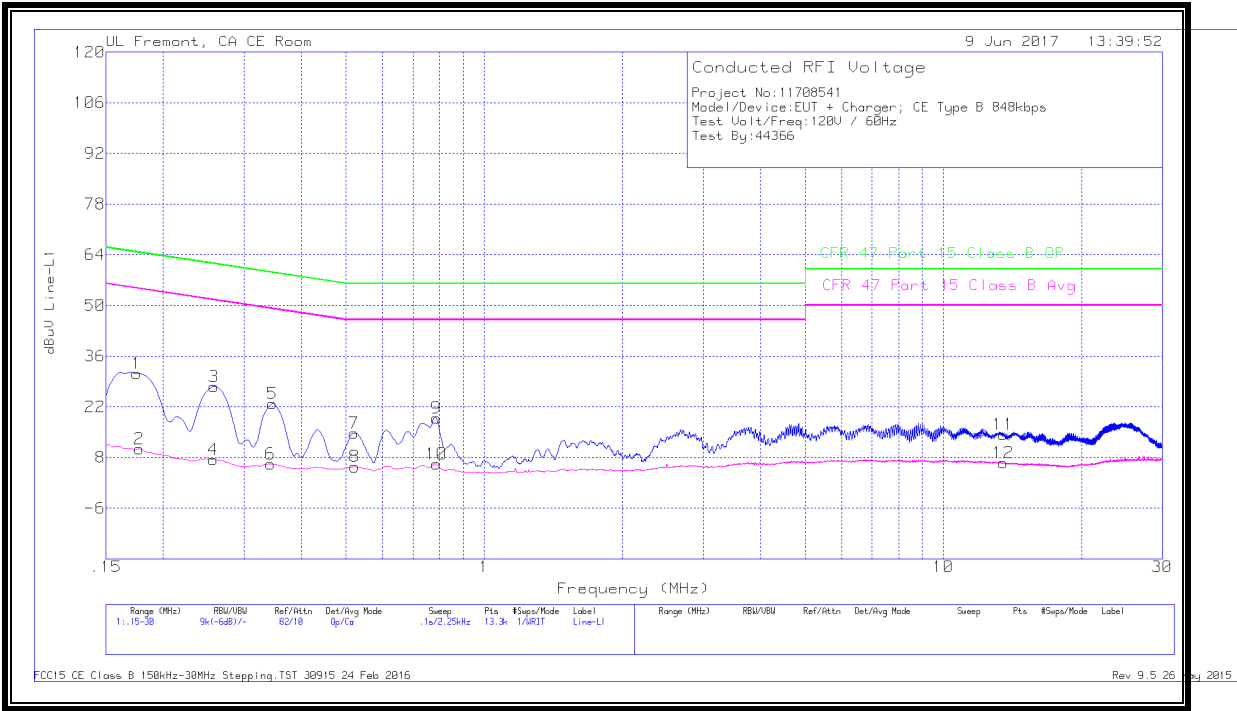
WORST EMISSIONS

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 R)Margin (dB)
1	.17475	20.03	Qp	1.1	0	10.1	31.23	64.73	-33.5	-	-
2	.177	-7.9	Ca	1	.1	10.1	10.41	-	-	54.63	-44.22
3	.258	16.82	Qp	.6	.1	10.1	27.62	61.5	-33.88	-	-
4	.25688	-3.32	Ca	.6	.1	10.1	7.48	-	-	51.53	-44.05
5	.34575	12.29	Qp	.4	.1	10.1	22.89	59.06	-36.17	-	-
6	.34237	-4.42	Ca	.4	.1	10.1	6.18	-	-	49.15	-42.97
7	.52125	4.27	Qp	.3	.1	10.1	14.77	56	-41.23	-	-
8	.52237	-5.08	Ca	.3	.1	10.1	5.42	-	-	46	-40.58
9	.78675	8.41	Qp	.2	.1	10.1	18.81	56	-37.19	-	-
10	.78675	-4.26	Ca	.2	.1	10.1	6.14	-	-	46	-39.86
11	13.5195	3.74	Qp	.2	.2	10.2	14.34	60	-45.66	-	-
12	13.5128	-4.09	Ca	.2	.2	10.2	6.51	-	-	50	-43.49

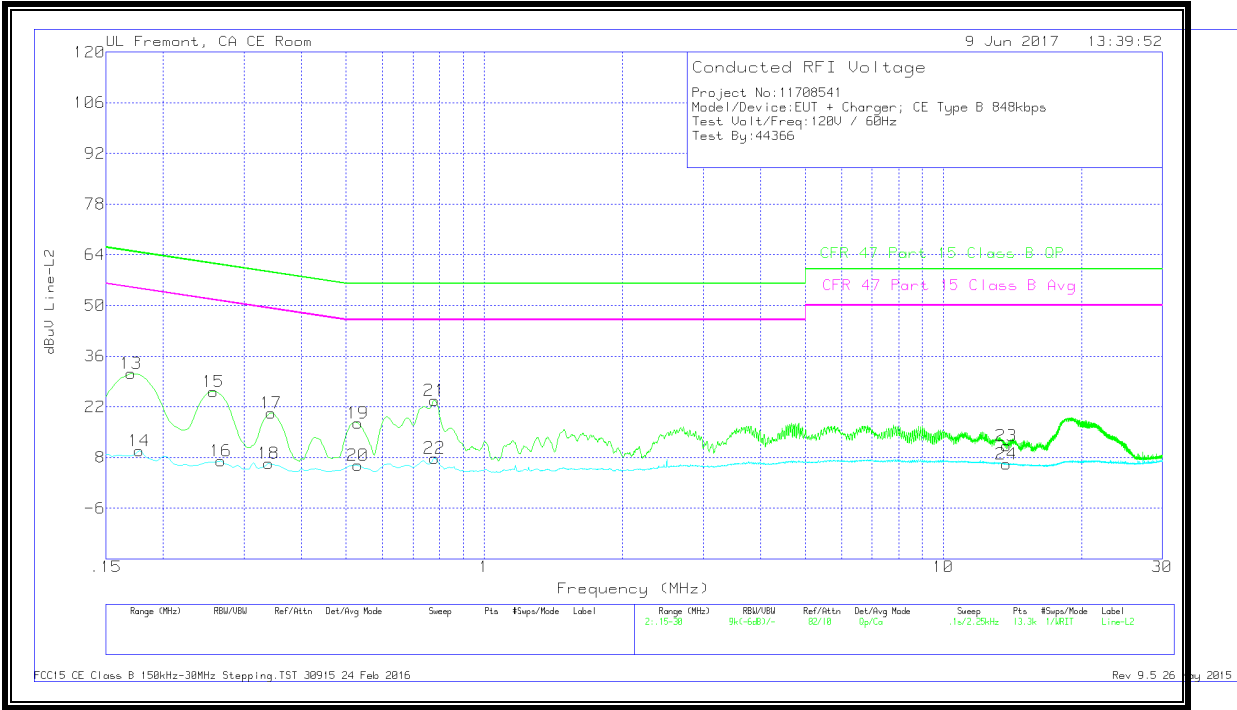
Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2	LC Cables C2&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR R)Margin (dB)
13	.17025	19.77	Qp	1.2	.1	10.1	31.17	64.95	-33.78	-	-
14	.177	-1.56	Ca	1.2	.1	10.1	9.84	-	-	54.63	-44.79
15	.25688	15.36	Qp	.7	.1	10.1	26.26	61.53	-35.27	-	-
16	.267	-3.89	Ca	.7	.1	10.1	7.01	-	-	51.21	-44.2
17	.3435	9.54	Qp	.5	.1	10.1	20.24	59.12	-38.88	-	-
18	.339	-4.36	Ca	.5	.1	10.1	6.34	-	-	49.23	-42.89
19	.53025	7	Qp	.3	.1	10.1	17.5	56	-38.5	-	-
20	.53025	-4.68	Ca	.3	.1	10.1	5.82	-	-	46	-40.18
21	.78	13.31	Qp	.3	.1	10.1	23.81	56	-32.19	-	-
22	.78	-2.66	Ca	.3	.1	10.1	7.84	-	-	46	-38.16
23	13.7333	.5	Qp	.3	.2	10.2	11.2	60	-48.8	-	-
24	13.7288	-4.55	Ca	.3	.2	10.2	6.15	-	-	50	-43.85

Qp - Quasi-Peak detector
Ca - CISPR average detection

LINE 1 RESULTS



LINE 2 RESULTS



10.1.3. READER MODE TYPE B

NORMAL OPERATION

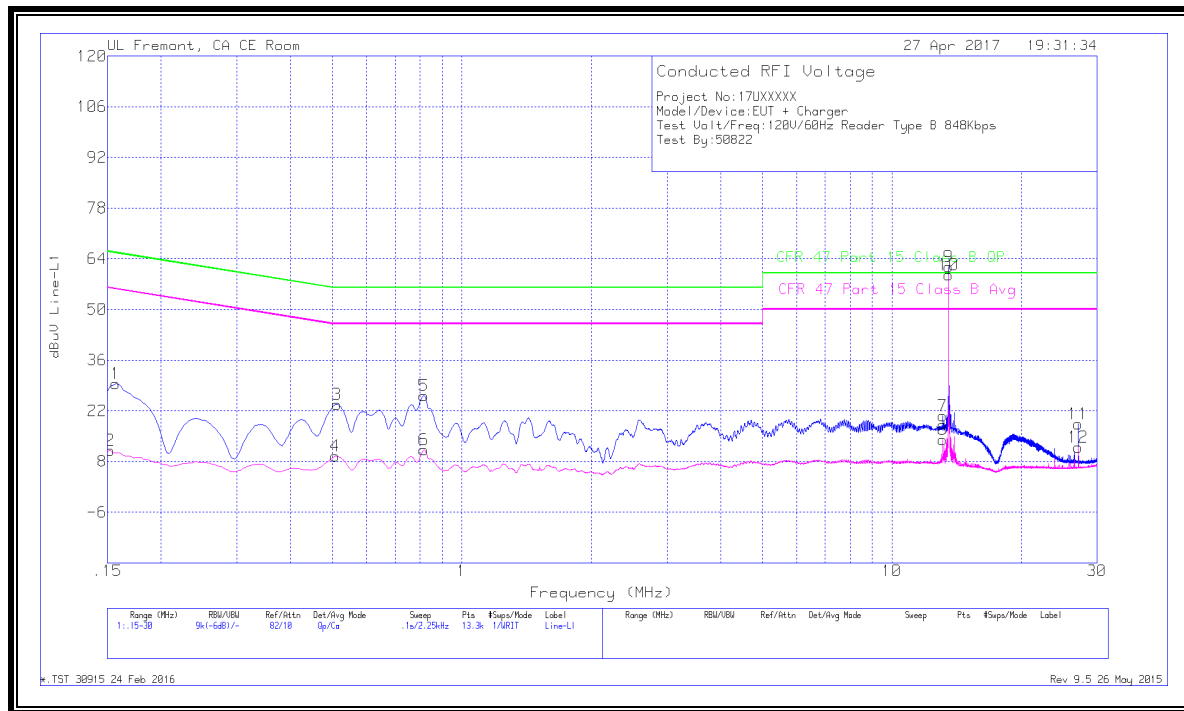
WORST EMISSIONS

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	.15675	19.22	Qp	0	.1	10.1	29.42	65.63	-36.21	-	-
2	.15225	.73	Ca	.1	.1	10.1	11.03	-	-	55.88	-44.85
3	.51225	13.54	Qp	0	.1	10.1	23.74	56	-32.26	-	-
4	.50775	-.74	Ca	0	.1	10.1	9.46	-	-	46	-36.54
5	.816	16.01	Qp	0	.1	10.1	26.21	56	-29.79	-	-
6	.816	.98	Ca	0	.1	10.1	11.18	-	-	46	-34.82
7	13.1359	10.1	Qp	.1	.2	10.2	20.6	60	-39.4	-	-
8	13.137	3.44	Ca	.1	.2	10.2	13.94	-	-	50	-36.06
9	13.56	51.24	Qp	.1	.2	10.2	61.74	60	1.74	-	-
10	13.56	49.1	Ca	.1	.2	10.2	59.6	-	-	50	9.6
11	27.1185	7.39	Qp	.1	.3	10.5	18.29	60	-41.71	-	-
12	27.1185	1.11	Ca	.1	.3	10.5	12.01	-	-	50	-37.99

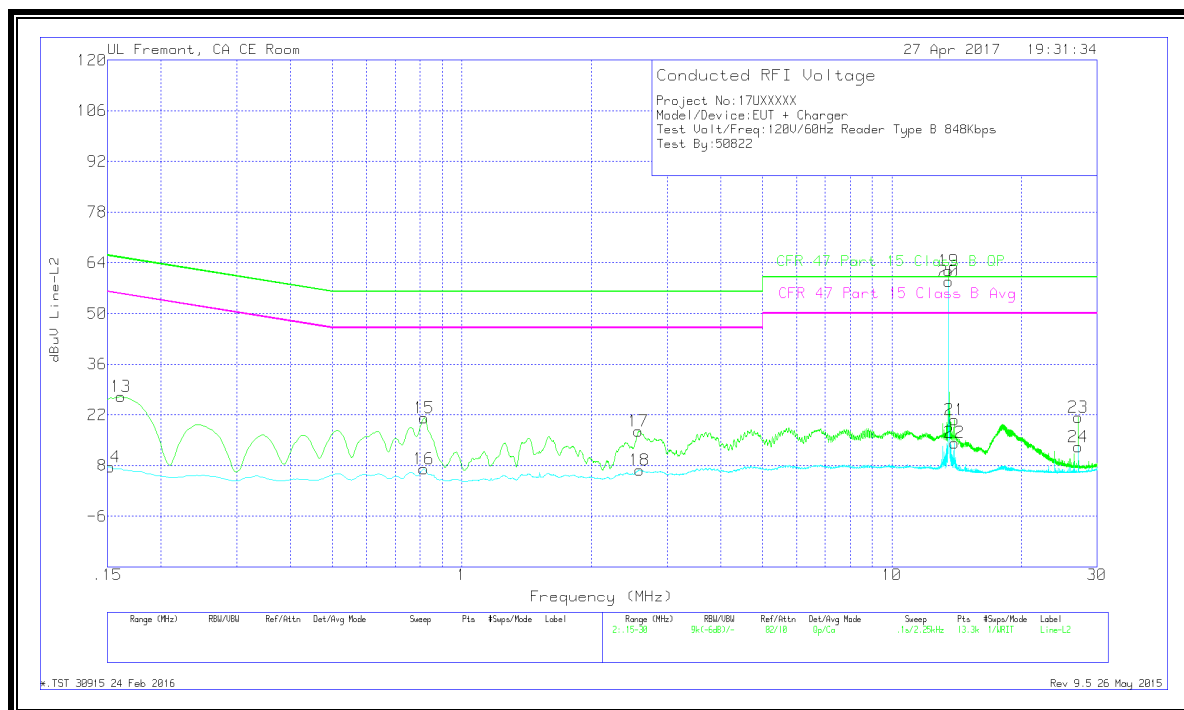
Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L2	LC Cables C2&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR)Margin (dB)
13	.16125	16.89	Qp	0	.1	10.1	27.09	65.4	-38.31	-	-
14	.15225	-2.52	Ca	0	0	10.1	7.58	-	-	55.88	-48.3
15	.81825	10.94	Qp	0	.1	10.1	21.14	56	-34.86	-	-
16	.816	-3.1	Ca	0	.1	10.1	7.1	-	-	46	-38.9
17	2.57775	7.33	Qp	0	.1	10.1	17.53	56	-38.47	-	-
18	2.58675	-3.42	Ca	0	.1	10.1	6.78	-	-	46	-39.22
19	13.56	51.28	Qp	.1	.2	10.2	61.78	60	1.78	-	-
20	13.56	48.41	Ca	.1	.2	10.2	58.91	-	-	50	8.91
21	13.983	10.19	Qp	.1	.2	10.2	20.69	60	-39.31	-	-
22	13.983	3.78	Ca	.1	.2	10.2	14.28	-	-	50	-35.72
23	27.1185	10.38	Qp	.1	.3	10.5	21.28	60	-38.72	-	-
24	27.1185	2.21	Ca	.1	.3	10.5	13.11	-	-	50	-36.89

Qp - Quasi-Peak detector
Ca - CISPR average detection

LINE 1 RESULTS



LINE 2 RESULTS



10.1.4. WITH ANTENNA PORT TERMINATED

WORST EMISSIONS

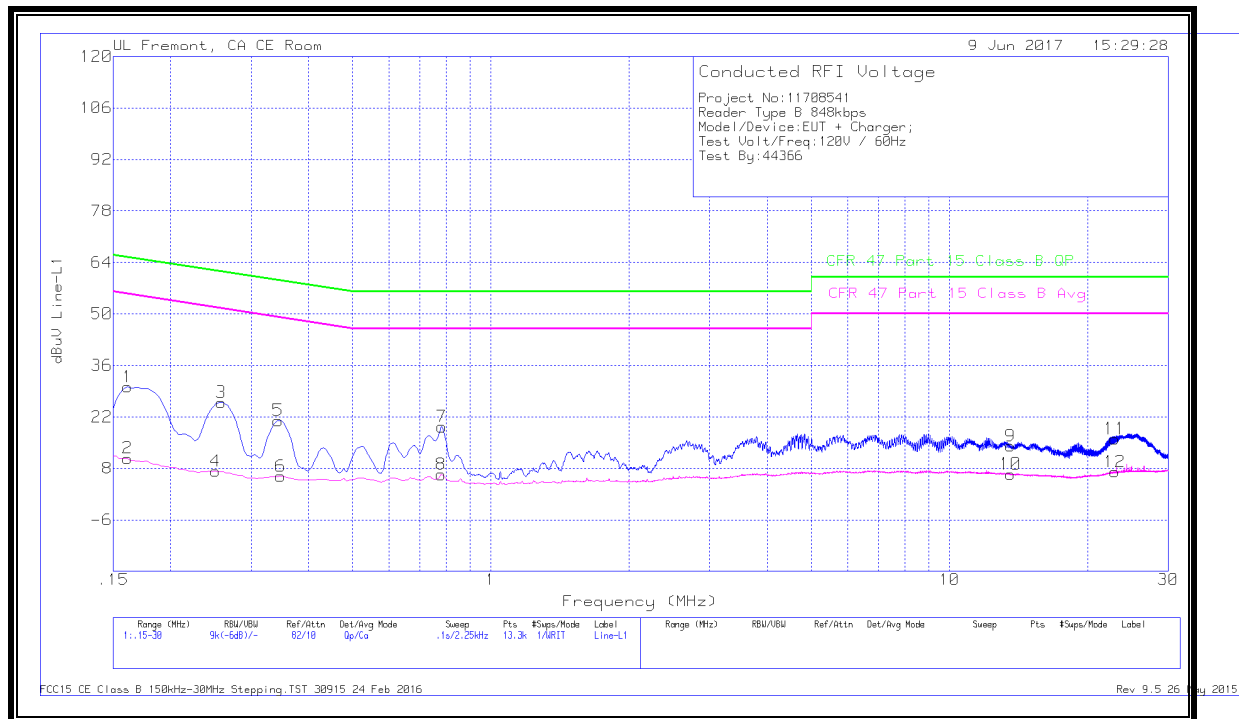
Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR)Margin (dB)
1	.16125	18.75	Qp	1.2	.1	10.1	30.15	65.4	-35.25	-	-
2	.16125	-.65	Ca	1.2	.1	10.1	10.75	-	-	55.4	-44.65
3	.258	15.12	Qp	.6	.1	10.1	25.92	61.5	-35.58	-	-
4	.25125	-3.57	Ca	.6	.1	10.1	7.23	-	-	51.72	-44.49
5	.3435	10.38	Qp	.4	.1	10.1	20.98	59.12	-38.14	-	-
6	.348	-4.72	Ca	.4	.1	10.1	5.88	-	-	49.01	-43.13
7	.78225	8.93	Qp	.2	.1	10.1	19.33	56	-36.67	-	-
8	.78	-4.08	Ca	.2	.1	10.1	6.32	-	-	46	-39.68
9	13.5915	3.48	Qp	.2	.2	10.2	14.08	60	-45.92	-	-
10	13.5746	-4.15	Ca	.2	.2	10.2	6.45	-	-	50	-43.55
11	22.9448	5.01	Qp	.3	.3	10.4	16.01	60	-43.99	-	-
12	22.9448	-3.96	Ca	.3	.3	10.4	7.04	-	-	50	-42.96

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	20.58	Qp	1.2	.1	10.1	31.98	64.95	-32.97	-	-
14	.177	-2.5	Ca	1.2	.1	10.1	8.9	-	-	54.63	-45.73
15	.258	16.62	Qp	.7	.1	10.1	27.52	61.5	-33.98	-	-
16	.25688	-3.8	Ca	.7	.1	10.1	7.1	-	-	51.53	-44.43
17	.34575	10.7	Qp	.5	.1	10.1	21.4	59.06	-37.66	-	-
18	.3435	-4.65	Ca	.5	.1	10.1	6.05	-	-	49.12	-43.07
19	.78	13.44	Qp	.3	.1	10.1	23.94	56	-32.06	-	-
20	.78	-2.69	Ca	.3	.1	10.1	7.81	-	-	46	-38.19
21	13.1685	2.28	Qp	.3	.2	10.2	12.98	60	-47.02	-	-
22	13.173	-4.21	Ca	.3	.2	10.2	6.49	-	-	50	-43.51
23	18.9274	8.09	Qp	.3	.3	10.3	18.99	60	-41.01	-	-
24	18.9285	-3.89	Ca	.3	.3	10.3	7.01	-	-	50	-42.99

Qp - Quasi-Peak detector

Ca - CISPR average detection

LINE 1 RESULTS



LINE 2 RESULTS

