



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

CERTIFICATION TEST REPORT

FOR

SMARTPHONE

MODEL NUMBER: A1897

**FCC ID: BCG-E3174A
IC: 579C-E3174A**

REPORT NUMBER: 11697707-E6V4

ISSUE DATE: JULY 27, 2017

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

Prepared by
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	6/28/2017	Initial Issue	Chin Pang
V2	7/19/2017	Address TCB questions	Chin Pang
V3	7/24/2017	Address TCB questions	Chin Pang
V4	7/27/2017	Updated RSE & Fundamental plot naming	Joe Vang

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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: A1897

SERIAL NUMBER: C39TQ009J6L8

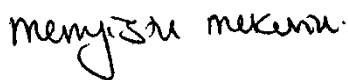
DATE TESTED: MARCH 15, 2017 – JULY 13, 2017

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.

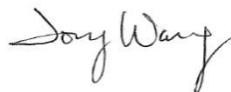
Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. 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 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:

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

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
Occupied Channel Bandwidth	± 0.39 %
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 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	28.19
	Reader		28.26

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 and F with CE mode and Reader mode data rates and ISO 15693 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 area 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

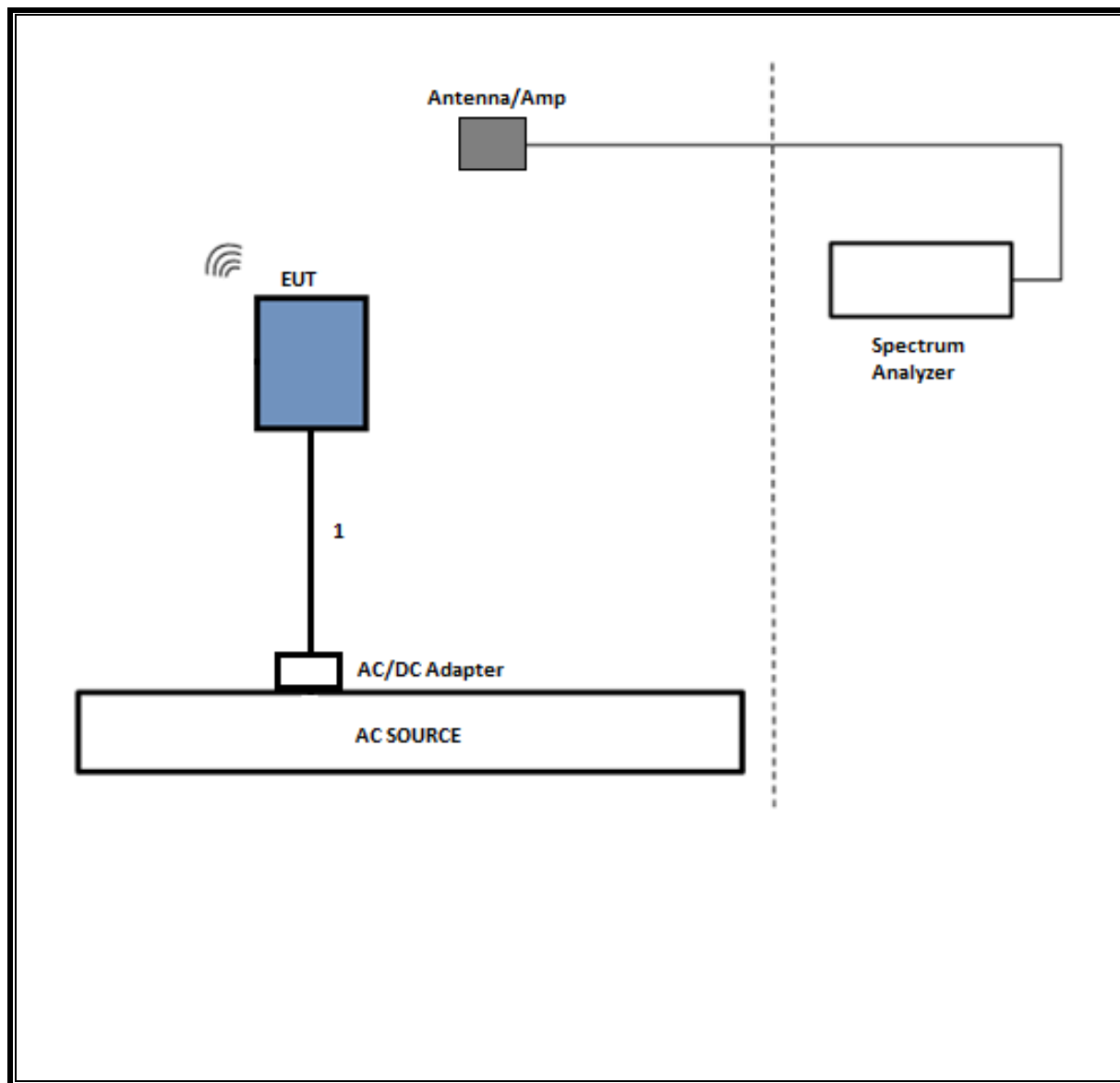
SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Apple	Mac Book Pro	W801200UD94	n/a
Laptop AC/DC Adapter	Apple	85W MagSafe Power adapter	A122	n/a
EUT AC/DC Adapter	Apple	A1385	D292365B2FQDHLHC7	n/a

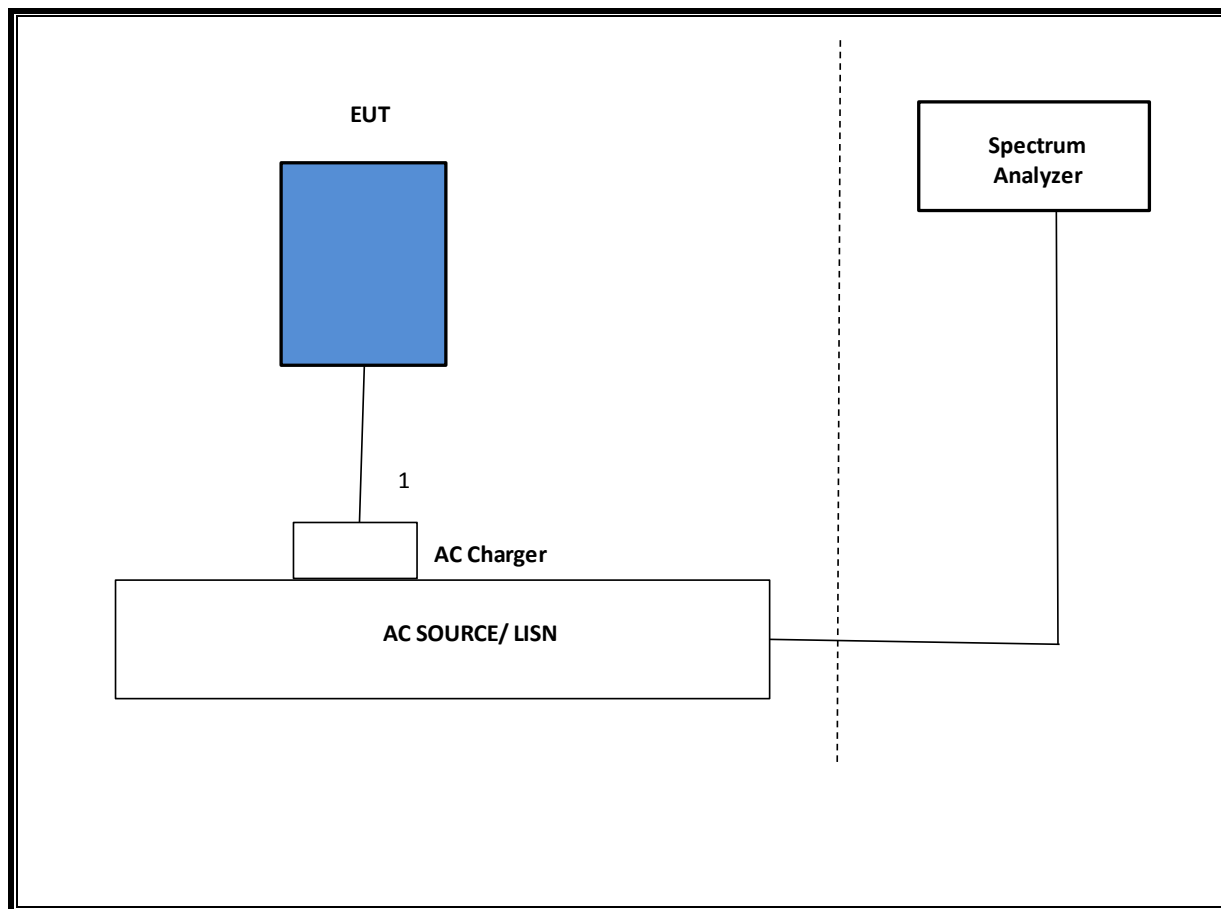
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	USB	1	lightning	Un-shielded	1	n/a
2	DC	2	Alligator	18 AWG strand	1	Insulated cable

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, Horn 1-18GHz	ETS Lindgren	3117	T863	6/9/2018
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB3	T900	5/31/2018
*Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	T285	6/20/2017
Amplifier, 1 to 18GHz	Miteq	AFS42-00101800-25-S-42	T740	11/29/2017
Spectrum Analyzer, PXA 3Hz to 44GHz	Keysight	N9030A	T1113	12/20/2017
Antenna, Horn 1-18GHz	ETS Lindgren	3117	T344	4/20/2018
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB1	T185	3/30/2018
Amplifier, 1 to 18GHz, 35dB	Ampical	AMP1G18-35	T1569	9/15/2017
*Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	T835	6/18/2017
Spectrum Analyzer, PXA 3Hz to 44GHz	Keysight	N9030A	T1613	12/2/2017
Antenna, Active Loop 9KHz to 30MHz	EMCO	6502	T1616	12/12/2017
Chamber, Environmental	Cincinnati Sub Zero	ZPHS-8-3.5-SCT/WC	754	9/10/2017
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent	N9030A	340	12/14/2017
EMI Test Receiver 9KHz-7GHz	Rohde & Schwarz	ESC17	T1436	1/6/2018
*LISN for Conducted Emissions CISPR-16	Fischer	50/250-25-2-01	T1310	6/8/2017
Power Cable, Line Conducted Emissions	UL	PG1	T861	9/1/2017
UL SOFTWARE				
*Radiated Software	UL	UL EMC	Fundamental mask, 5/7/15	
*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/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:	38602	Date:	3/16/17
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99% and 20dB BW

CE Mode

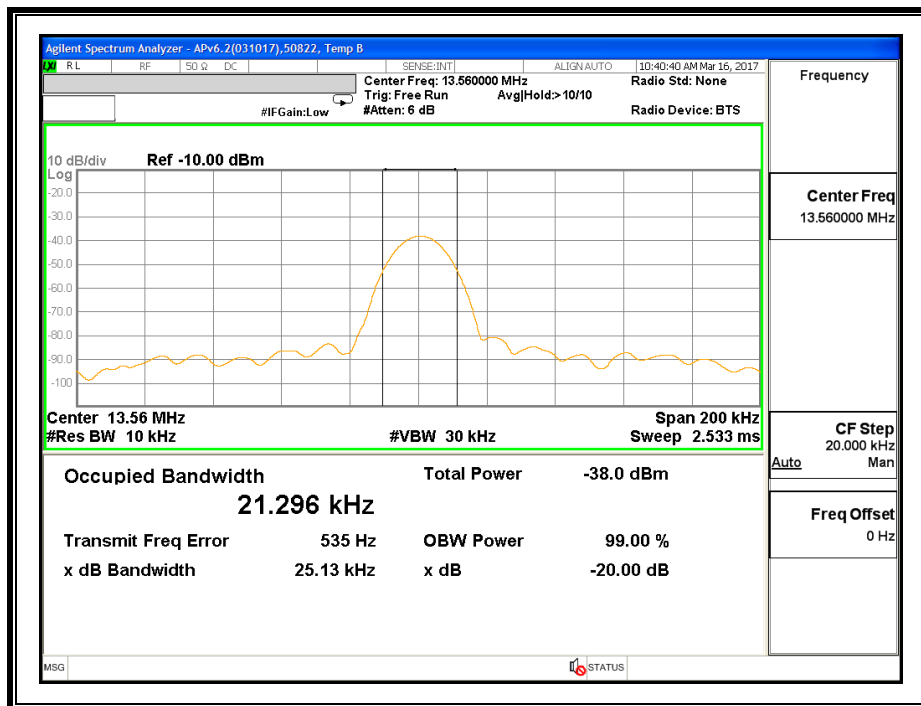
Moduation	Frequency	Data Rate	99% Bandwidth	20dB Bandwidth
	(MHz)	(Kbps)	(KHz)	(KHz)
Type B	13.56	848	21.296	25.13

READER

Moduation	Frequency	Data Rate	99% Bandwidth	20dB Bandwidth
	(MHz)	(Kbps)	(KHz)	(KHz)
Type B	13.56	848	21.81	25.01

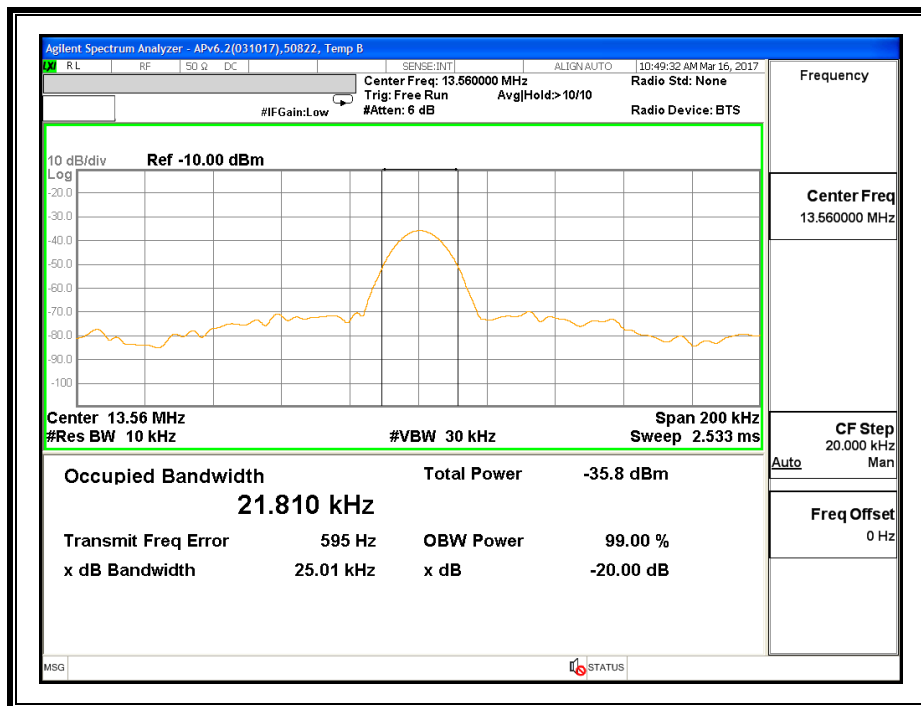
7.1. CE MODE

TYPE B, 848Kbps



7.2. READER

TYPE B, 848Kbps



8. RADIATED EMISSION TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMIT

§15.225

IC RSS-210, 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.

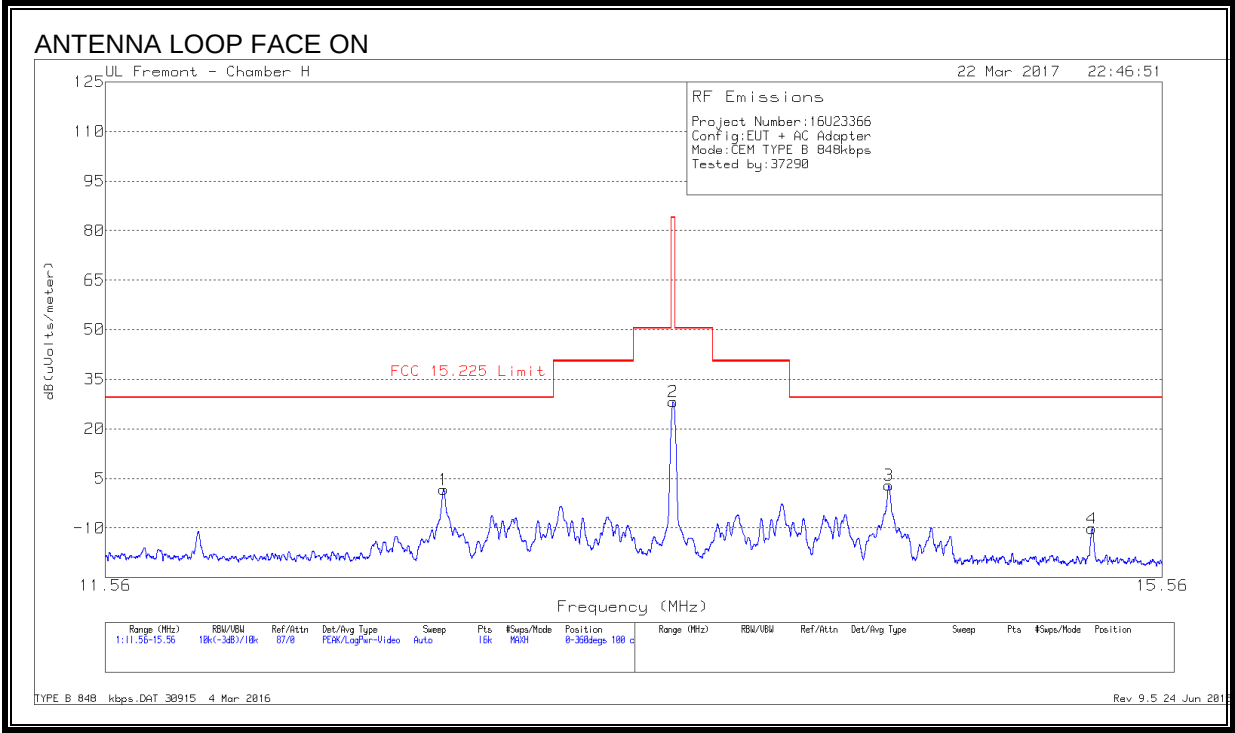
RESULTS

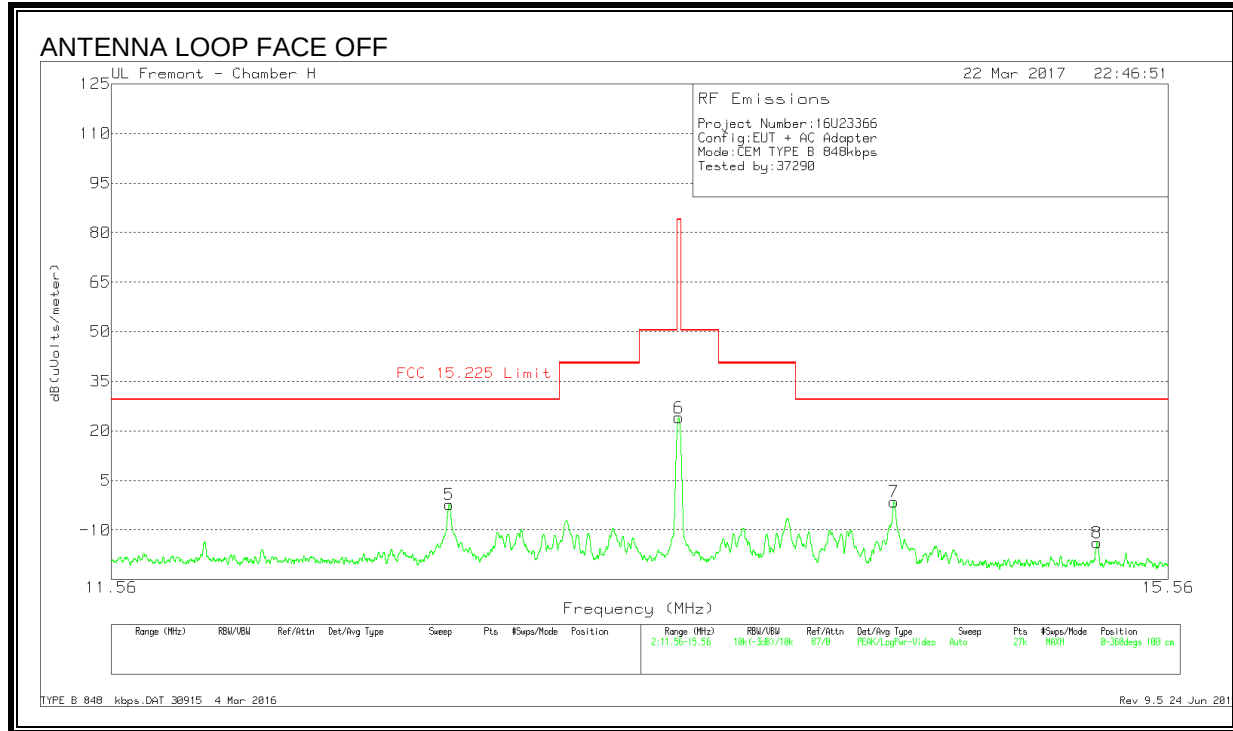
8.2. FUNDAMENTAL AND SPURIOUS EMISSIONS (0.15 – 30 MHz)

8.2.1. CE MODE

TYPE B

848Kbps FUNDAMENTAL





DATA

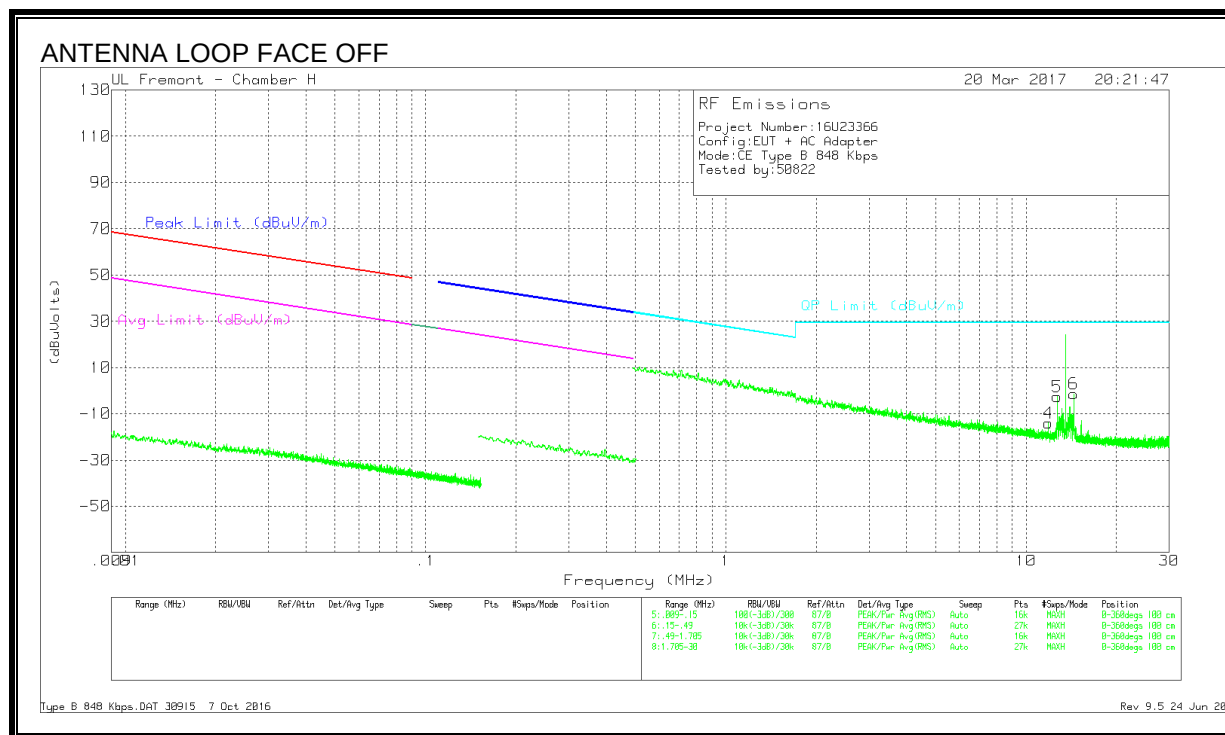
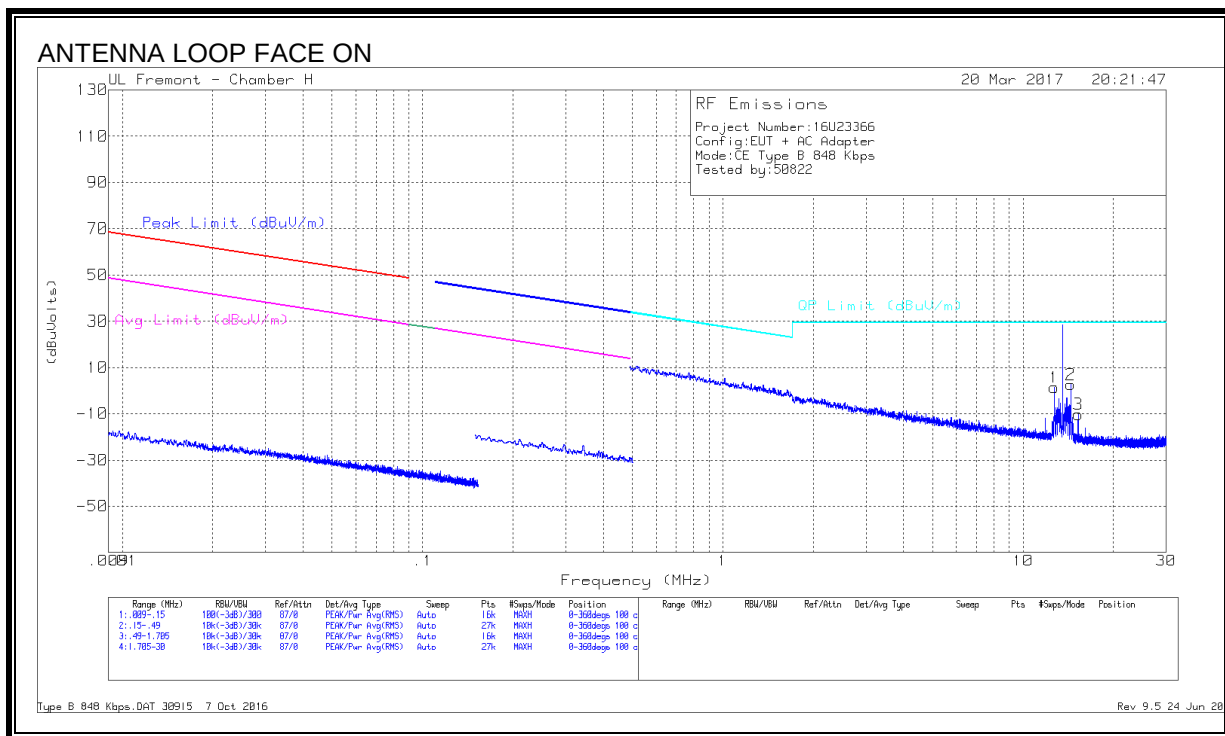
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cables (dB)	Dist Corr (dB) 40Log	Corrected Reading dB(uVolts/meter)	FCC 15.225 Limit	PK Margin (dB)	Azimuth (Degs)
5	12.71181	26.59	Pk	10.7	.4	-40	-2.31	29.54	-31.85	0-360
1	12.71288	30.55	Pk	10.7	.4	-40	1.65	29.54	-27.89	0-360
6	13.55867	53.01	Pk	10.6	.4	-40	24.01	84	-59.99	0-360
2	13.56063	57.19	Pk	10.6	.4	-40	28.19	84	-55.81	0-360
7	14.40537	27.53	Pk	10.6	.4	-40	-1.47	29.54	-31.01	0-360
3	14.40838	31.94	Pk	10.6	.4	-40	2.94	29.54	-26.6	0-360
8	15.25193	15.26	Pk	10.5	.4	-40	-13.84	29.54	-43.38	0-360
4	15.25538	18.93	Pk	10.5	.4	-40	-10.17	29.54	-39.71	0-360

Pk - Peak detector

TYPE F 424 kbps.DAT 30915 4 Mar 2016

Rev 9.5 26 Apr 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 (Degr)
4	11.86746	14.83	Pk	10.8	.4	-40	-13.97	29.5	-43.47	0-360
5	12.71319	26.27	Pk	10.7	.4	-40	-2.63	29.5	-32.13	0-360
1	12.71424	30.31	Pk	10.7	.4	-40	1.41	29.5	-28.09	0-360
6	14.40886	27.61	Pk	10.6	.4	-40	-1.39	29.5	-30.89	0-360
2	14.40938	31.68	Pk	10.6	.4	-40	2.68	29.5	-26.82	0-360
3	15.25774	18.85	Pk	10.5	.4	-40	-10.25	29.5	-39.75	0-360

Pk - Peak detector

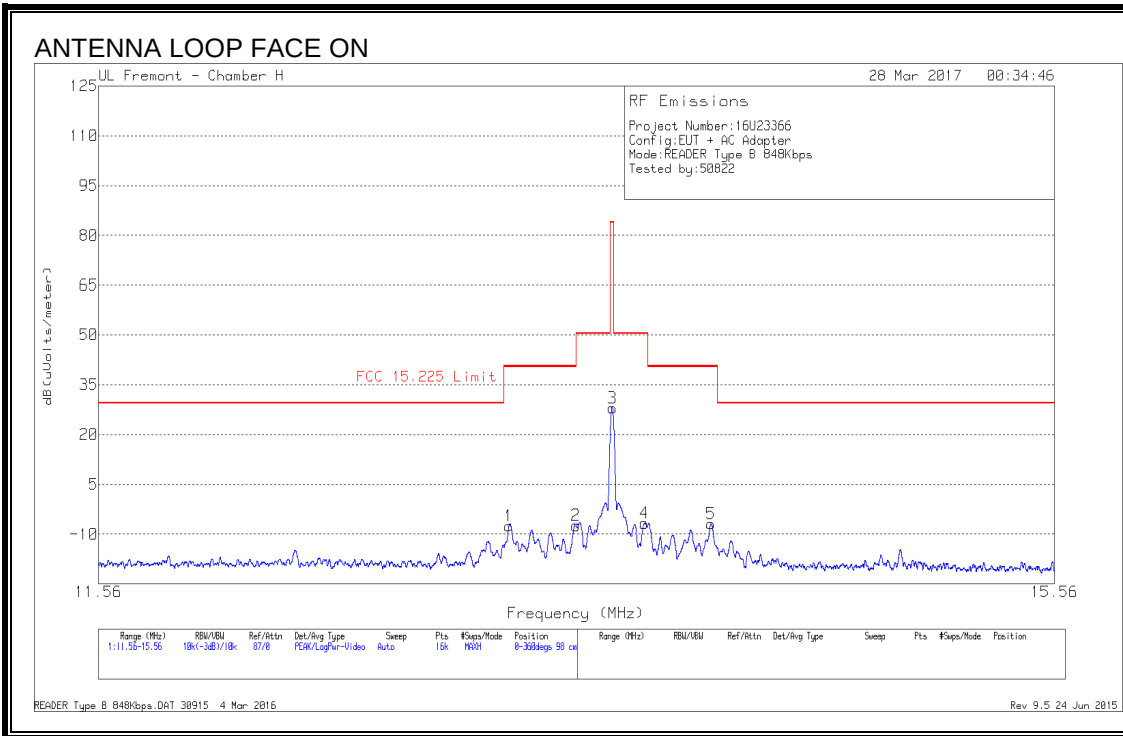
FCC 15.209 Below 30MHz.TST 30915 7 Oct 2016

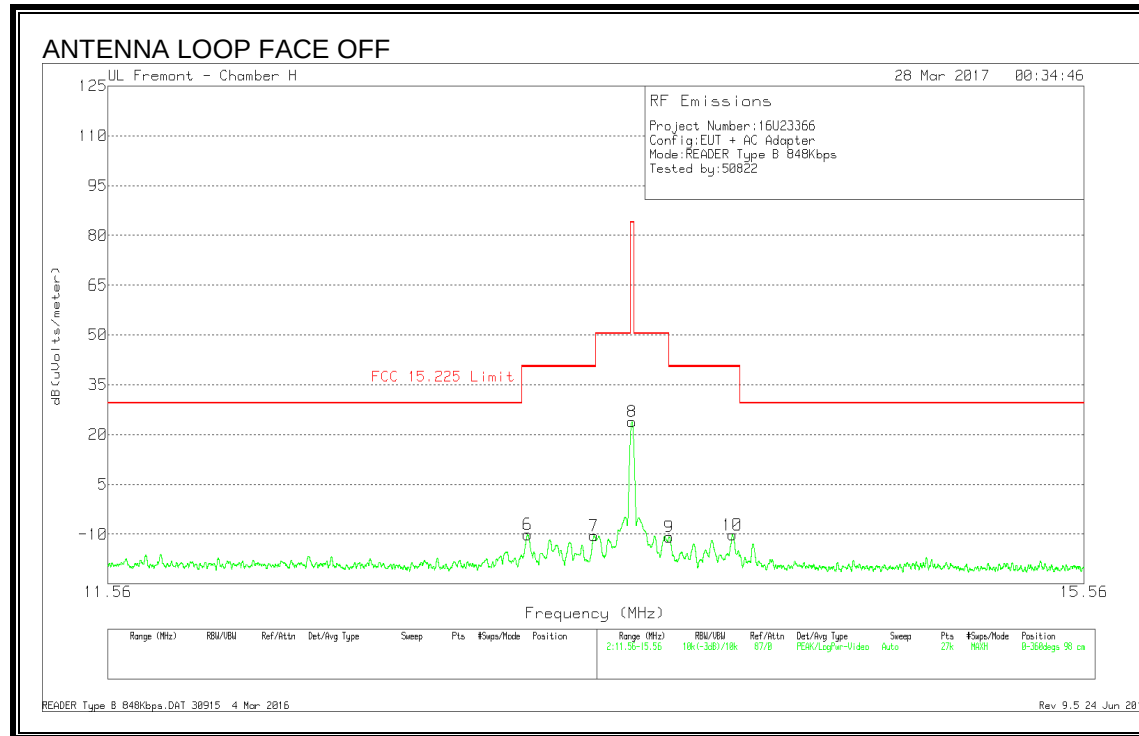
Rev 9.5 26 Apr 2016

8.2.2. READER MODE

TYPE B

848bps FUNDAMENTAL





DATA

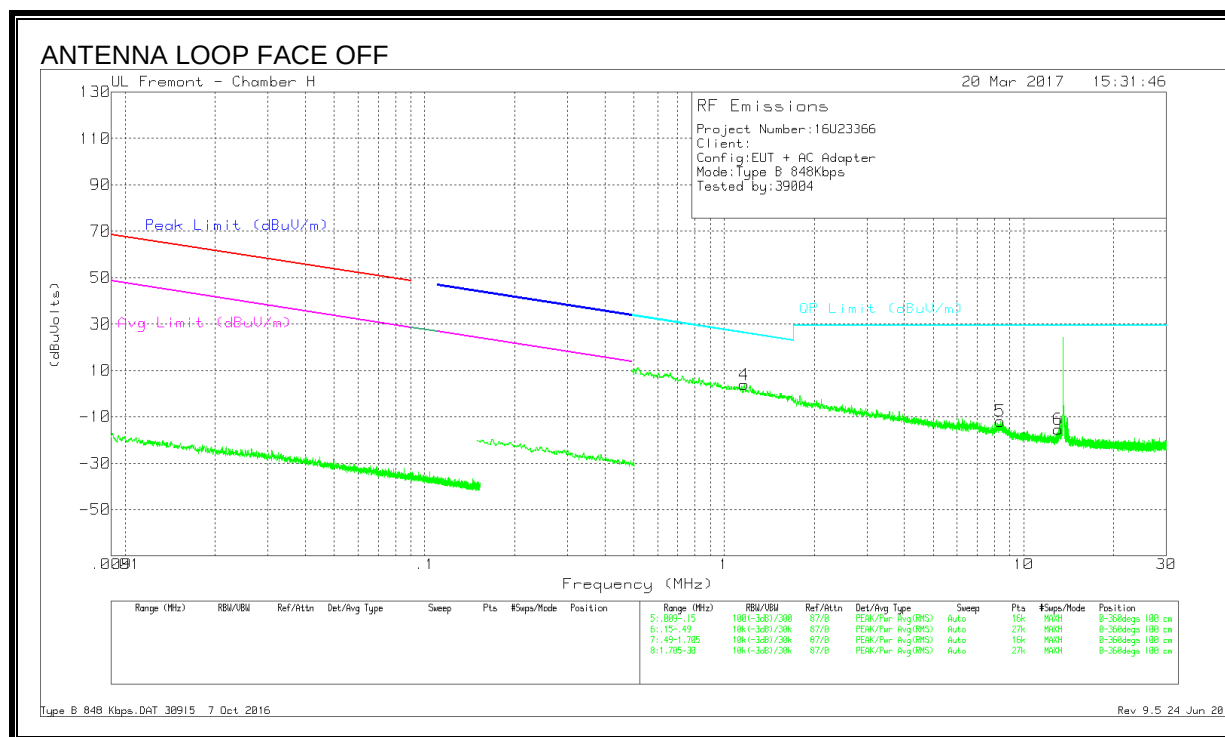
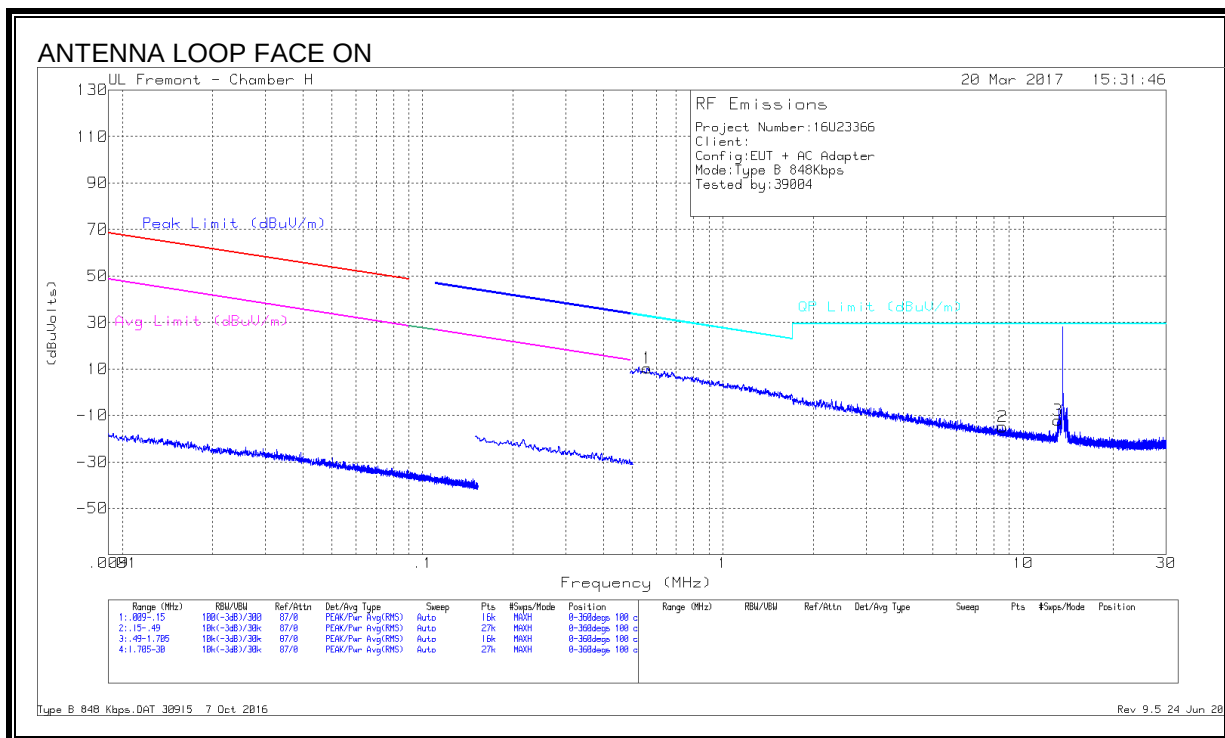
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cables (dB)	Dist Corr (dB) 40Log	Corrected Reading dB(uVolts/meter)	FCC 15.225 Limit	PK Margin (dB)	Azimuth (Degs)
1	13.13225	21.31	Pk	10.7	.4	-40	-7.59	40.51	-48.10	0-360
6	13.13539	18.75	Pk	10.7	.4	-40	-10.15	40.51	-50.66	0-360
7	13.40386	18.46	Pk	10.7	.4	-40	-10.44	40.51	-50.95	0-360
2	13.40925	21.5	Pk	10.7	.4	-40	-7.4	40.51	-47.91	0-360
8	13.55867	52.89	Pk	10.6	.4	-40	23.89	84	-60.11	0-360
3	13.562	57.26	Pk	10.6	.4	-40	28.26	84	-55.74	0-360
4	13.69725	22.29	Pk	10.6	.4	-40	-6.71	50.5	-57.21	0-360
9	13.71421	18.16	Pk	10.6	.4	-40	-10.84	40.51	-51.35	0-360
10	13.98032	18.78	Pk	10.6	.4	-40	-10.22	40.51	-50.73	0-360
5	13.98363	22.13	Pk	10.6	.4	-40	-6.87	40.51	-47.38	0-360

Pk - Peak detector

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

Rev 9.5 26 Apr 2016

SPURIOUS EMISSION



DATA

Marker	Frequenc y (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	.5611	38.57	Pk	11.7	.1	-40	10.37	32.63	-22.26	0-360
4	1.16849	31.98	Pk	11.8	.1	-40	3.88	26.27	-22.39	0-360
5	8.35718	16.63	Pk	11.2	.3	-40	-11.87	29.5	-41.37	0-360
2	8.53586	13.74	Pk	11.1	.3	-40	-14.86	29.5	-44.36	0-360
3	13.0517	16.82	Pk	10.7	.4	-40	-12.08	29.5	-41.58	0-360
6	13.05222	13.51	Pk	10.7	.4	-40	-15.39	29.5	-44.89	0-360

Pk - Peak detector

Type B 848 Kbps.DAT 30915 7 Oct 2016

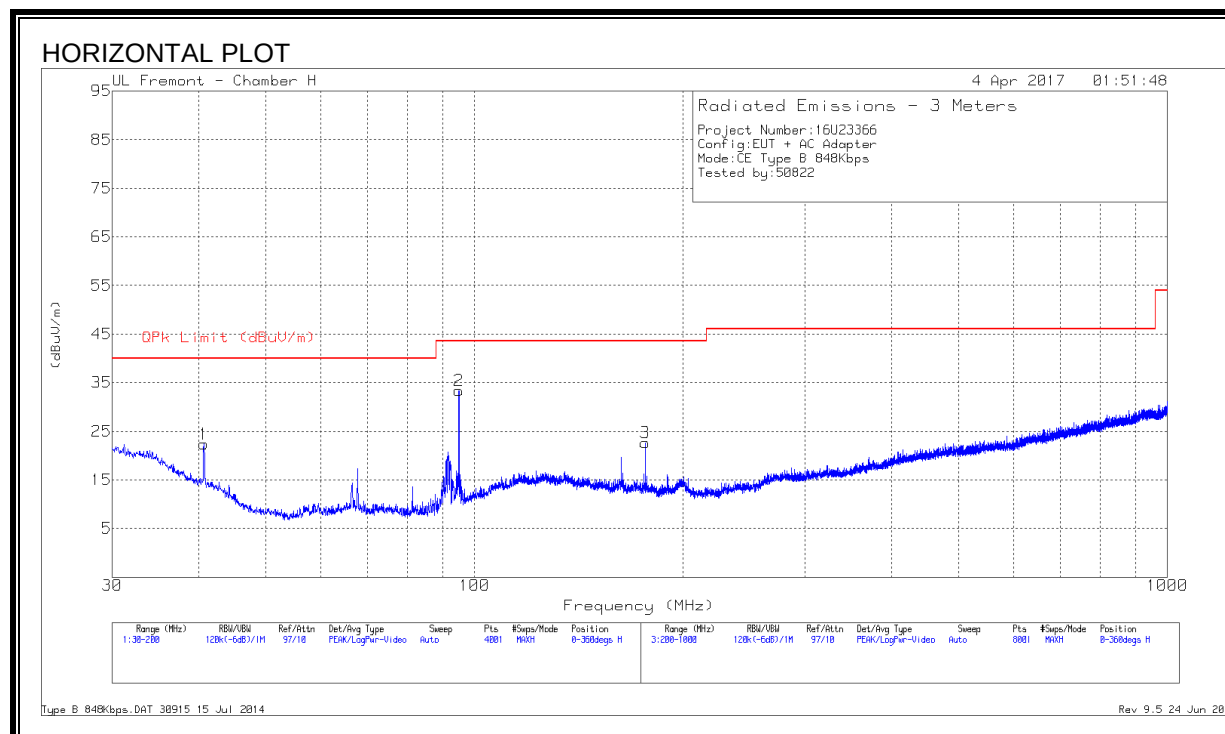
Rev 9.5 26 Apr 2016

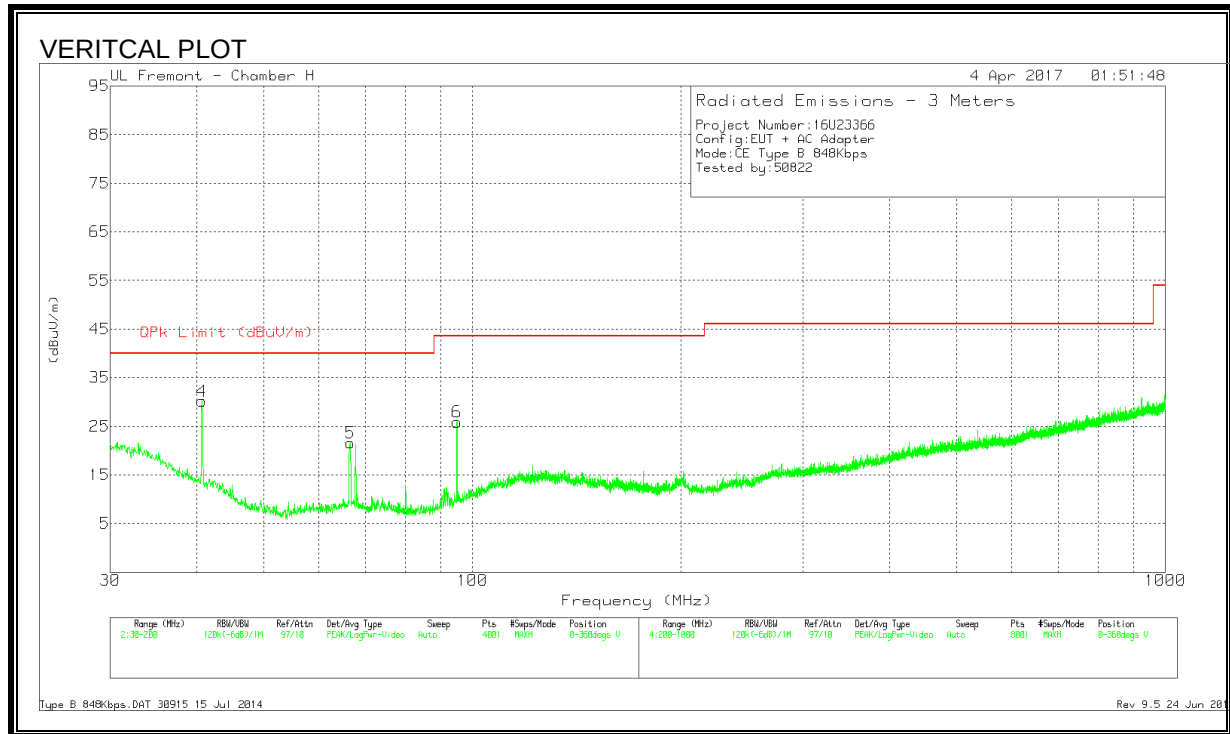
9. TX SPURIOUS EMISSION 30 TO 1000 MHz

9.1.1. CE MODE

TYPE B

848Kbps





RESULTS

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	40.6675	36.18	Pk	17.7	-31.5	22.38	40	-17.62	0-360	399	H
4	40.6675	43.99	Pk	17.7	-31.5	30.19	40	-9.81	0-360	100	V
5	66.635	40.67	Pk	12.1	-31.2	21.57	40	-18.43	0-360	100	V
2	94.8975	51.46	Pk	12.8	-30.9	33.36	43.52	-10.16	0-360	300	H
6	94.9188	43.97	Pk	12.8	-30.9	25.87	43.52	-17.65	0-360	100	V
3	176.285	37.56	Pk	15.3	-30.2	22.66	43.52	-20.86	0-360	199	H

Pk - Peak detector

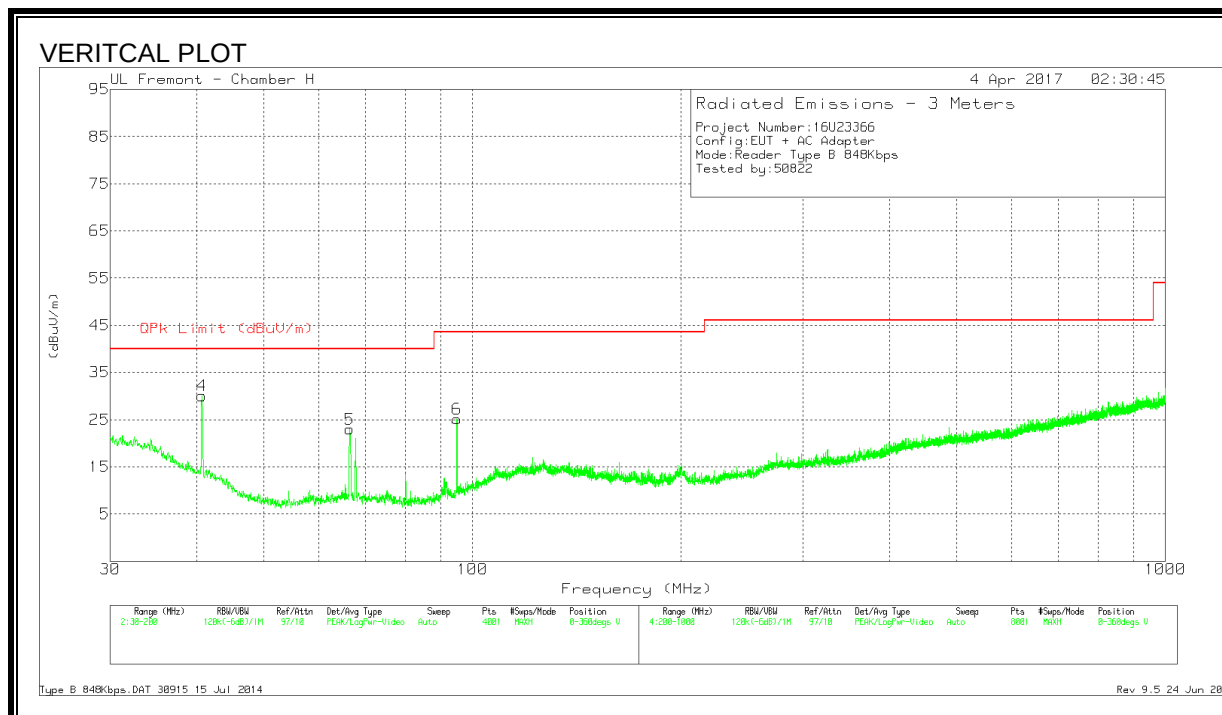
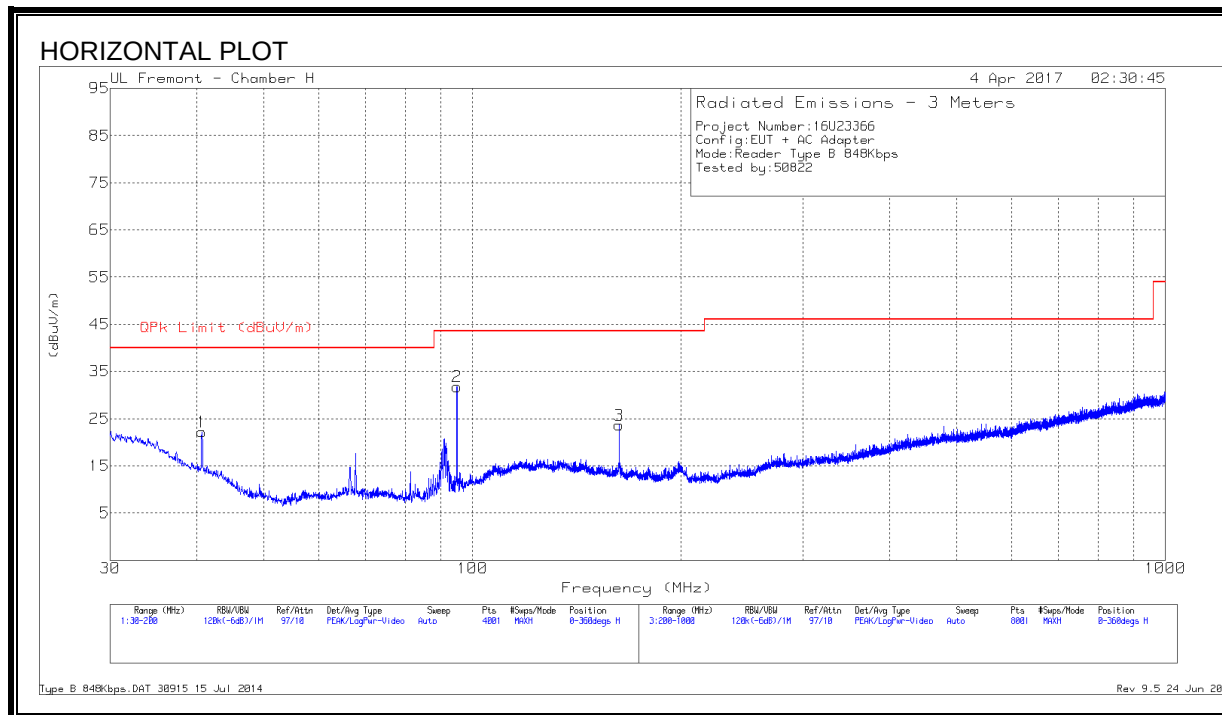
FCC Part15C 30-1000MHz.TST 30915 15 Jul 2014

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9.1.2. READER MODE

TYPE B

848Kbps



RESULTS

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
3	* 162.7275	38.03	Pk	15.8	-30.2	23.63	43.52	-19.89	0-360	200	H
1	40.6675	36	Pk	17.7	-31.5	22.2	40	-17.8	0-360	400	H
4	40.6675	43.87	Pk	17.7	-31.5	30.07	40	-9.93	0-360	100	V
5	66.465	42.09	Pk	12.1	-31.2	22.99	40	-17.01	0-360	100	V
2	94.94	49.87	Pk	12.8	-30.9	31.77	43.52	-11.75	0-360	299	H
6	94.94	43.24	Pk	12.8	-30.9	25.14	43.52	-18.38	0-360	100	V

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

Pk - Peak detector

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10. FREQUENCY STABILITY

LIMIT

IC RSS-210, 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:	38602	Date:	3/17/17
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No non-compliance noted.

10.1. CE Mode

TYPE B 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	13.5603458	-0.013	13.5603459	-0.018	13.5603462	-0.044	13.56034654	-0.067	± 100
	40	13.5603464	-0.055	13.5603464	-0.053	13.5603463	-0.047	13.56034622	-0.043	± 100
	30	13.5603463	-0.052	13.5603464	-0.055	13.5603465	-0.060	13.56034641	-0.056	± 100
	20	13.5603456	0.000	13.5603458	-0.008	13.5603457	-0.003	13.5603458	-0.009	± 100
	10	13.5603457	-0.006	13.5603457	-0.003	13.5603456	0.001	13.5603457	-0.005	± 100
	0	13.5603458	-0.015	13.5603458	-0.012	13.5603458	-0.009	13.5603457	-0.004	± 100
	-10	13.5603454	0.021	13.5603453	0.027	13.5603452	0.033	13.5603447	0.067	± 100
	-20	13.5603449	0.053	13.5603450	0.049	13.5603450	0.045	13.5603452	0.033	± 100
3.23	20	13.5603458	-0.012	13.5603461	-0.034	13.5603463	-0.049	13.5603460	-0.026	± 100
4.37	20	13.5603455	0.010	13.5603457	-0.004	13.5603458	-0.012	13.5603455	0.010	± 100

10.2. Reader Mode

TYPE B 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	13.5603611	-0.237	13.5603613	-0.256	13.5603616	-0.276	13.5603621	-0.308	± 100
	40	13.5603618	-0.288	13.5603615	-0.267	13.5603613	-0.253	13.5603613	-0.253	± 100
	30	13.5603606	-0.202	13.5603606	-0.199	13.5603601	-0.165	13.5603597	-0.136	± 100
	20	13.5603579	0.000	13.5603573	0.040	13.5603568	0.078	13.5603563	0.116	± 100
	10	13.5603549	0.220	13.5603546	0.242	13.5603541	0.279	13.5603537	0.309	± 100
	0	13.5603528	0.377	13.5603526	0.389	13.5603526	0.390	13.5603524	0.407	± 100
	-10	13.5603517	0.453	13.5603515	0.473	13.5603513	0.484	13.5603511	0.500	± 100
	-20	13.5603513	0.484	13.5603515	0.469	13.5603517	0.453	13.5603520	0.430	± 100
3.23	20	13.5603588	-0.068	13.5603585	-0.046	13.5603581	-0.017	13.5603579	-0.002	± 100
4.37	20	13.5603563	0.116	13.5603566	0.094	13.5603564	0.109	13.5603561	0.131	± 100

11. AC MAINS LINE CONDUCTED EMISSIONS

LIMITS

§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:

11.1. CE MODE TYPE B

11.1.1. NORMAL OPERATION, 848 KBPS

6 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	.3345	35.15	Qp	0	.1	10.1	45.35	59.34	-13.99	-	-
2	.3345	28.43	Ca	0	.1	10.1	38.63	-	-	49.34	-10.71
3	.66975	35.18	Qp	0	.1	10.1	45.38	56	-10.62	-	-
4	.66975	28.04	Ca	0	.1	10.1	38.24	-	-	46	-7.76
5	1.005	34.05	Qp	0	.1	10.1	44.25	56	-11.75	-	-
6	1.005	28.59	Ca	0	.1	10.1	38.79	-	-	46	-7.21
7	1.34025	28.67	Qp	0	.1	10.1	38.87	56	-17.13	-	-
8	1.34025	23.99	Ca	0	.1	10.1	34.19	-	-	46	-11.81
9	2.34375	27.86	Qp	0	.1	10.1	38.06	56	-17.94	-	-
10	2.34375	22.27	Ca	0	.1	10.1	32.47	-	-	46	-13.53
11	13.56	58.5	Qp	.1	.2	10.2	69	60	9	-	-
12	13.56	53.53	Ca	.1	.2	10.2	64.03	-	-	50	14.03

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	.3345	37.3	Qp	0	.1	10.1	47.5	59.34	-11.84	-	-
14	.3345	30.9	Ca	0	.1	10.1	41.1	-	-	49.34	-8.24
15	.66975	35.9	Qp	0	.1	10.1	46.1	56	-9.9	-	-
16	.66975	31.09	Ca	0	.1	10.1	41.29	-	-	46	-4.71
17	1.005	34.68	Qp	0	.1	10.1	44.88	56	-11.12	-	-
18	1.005	30.89	Ca	0	.1	10.1	41.09	-	-	46	-4.91
19	1.34025	29.11	Qp	0	.1	10.1	39.31	56	-16.69	-	-
20	1.34025	25.74	Ca	0	.1	10.1	35.94	-	-	46	-10.06
21	2.346	27.99	Qp	0	.1	10.1	38.19	56	-17.81	-	-
22	2.346	23.98	Ca	0	.1	10.1	34.18	-	-	46	-11.82
23	13.56	57.33	Qp	.1	.2	10.2	67.83	60	7.83	-	-
24	13.56	50.97	Ca	.1	.2	10.2	61.47	-	-	50	11.47

Qp - Quasi-Peak detector

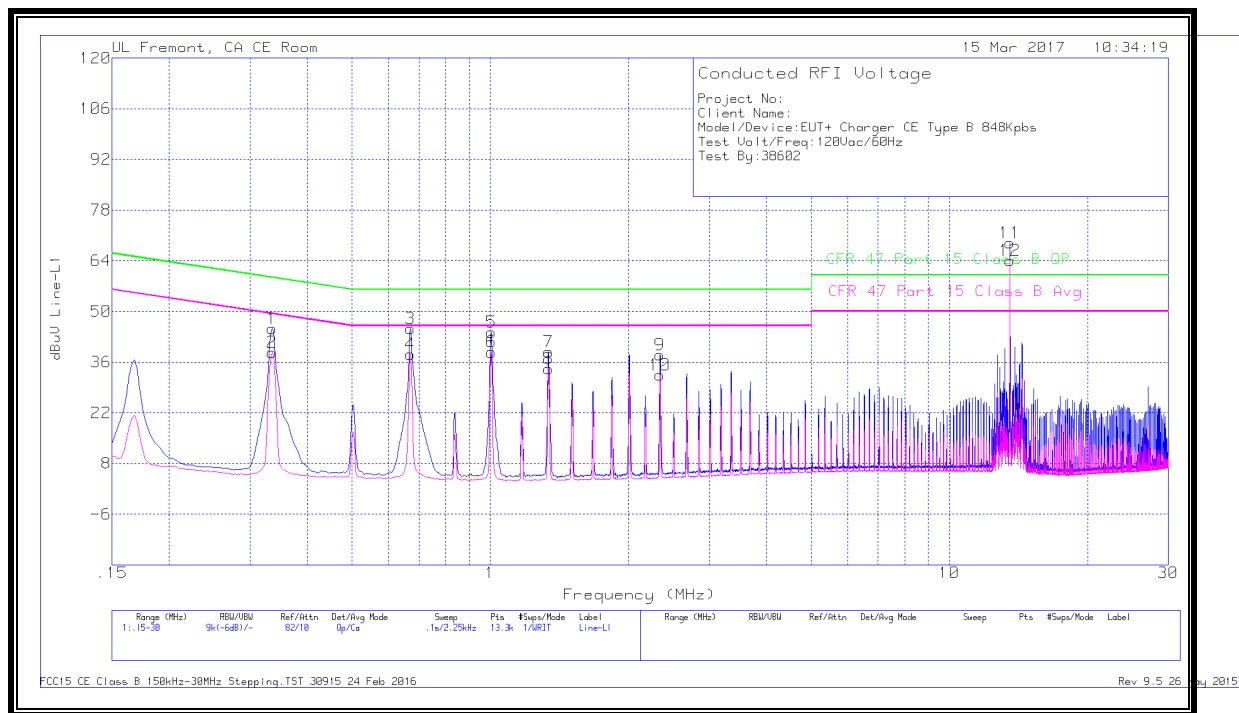
Ca - CISPR average detection

FCC15 CE Class B 150kHz-30MHz Stepping.TST 30915 24 Feb 2016

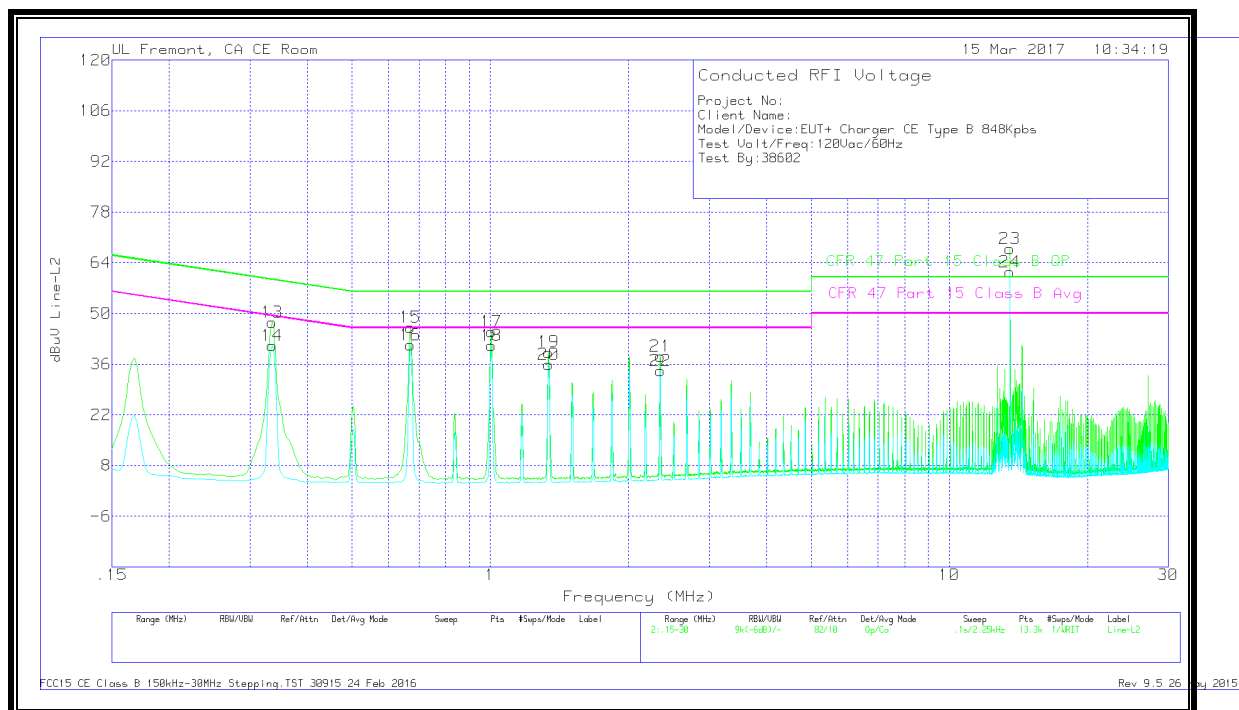
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Note: 13.56MHz is a fundamental frequency of the EUT. Data under the following section indicate that when the antenna terminal is terminated the fundamental amplitude is lowering below the limit line.

LINE 1 RESULTS



LINE 2 RESULTS



11.1.2. 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	.16125	19.07	Qp	1.2	.1	10.1	30.47	65.4	-34.93	-	-
2	.159	.13	Ca	1.2	.1	10.1	11.53	-	-	55.52	-43.99
3	.25125	14.95	Qp	.6	.1	10.1	25.75	61.72	-35.97	-	-
4	.25125	-2.54	Ca	.6	.1	10.1	8.26	-	-	51.72	-43.46
5	.34012	10.79	Qp	.4	.1	10.1	21.39	59.2	-37.81	-	-
6	.339	-3.65	Ca	.4	.1	10.1	6.95	-	-	49.23	-42.28
7	.771	12.79	Qp	.2	.1	10.1	23.19	56	-32.81	-	-
8	.771	.4	Ca	.2	.1	10.1	10.8	-	-	46	-35.2
9	13.461	6.38	Qp	.2	.2	10.2	16.98	60	-43.02	-	-
10	13.4723	-2.32	Ca	.2	.2	10.2	8.28	-	-	50	-41.72
11	22.2855	8.4	Qp	.3	.3	10.4	19.4	60	-40.6	-	-
12	22.2855	-1.43	Ca	.3	.3	10.4	9.57	-	-	50	-40.43

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	19.31	Qp	1.2	.1	10.1	30.71	64.95	-34.24	-	-
14	.177	-.59	Ca	1.2	.1	10.1	10.81	-	-	54.63	-43.82
15	.2535	14.74	Qp	.7	.1	10.1	25.64	61.64	-36	-	-
16	.25575	-1.98	Ca	.7	.1	10.1	8.92	-	-	51.57	-42.65
17	.339	8.61	Qp	.5	.1	10.1	19.31	59.23	-39.92	-	-
18	.34125	-2.52	Ca	.5	.1	10.1	8.18	-	-	49.17	-40.99
19	.77325	16.3	Qp	.3	.1	10.1	26.8	56	-29.2	-	-
20	.77325	3.6	Ca	.3	.1	10.1	14.1	-	-	46	-31.9
21	13.2135	4.88	Qp	.3	.2	10.2	15.58	60	-44.42	-	-
22	13.2011	-2.82	Ca	.3	.2	10.2	7.88	-	-	50	-42.12
23	21.8108	9.14	Qp	.3	.3	10.4	20.14	60	-39.86	-	-
24	21.8175	-.77	Ca	.3	.3	10.4	10.23	-	-	50	-39.77

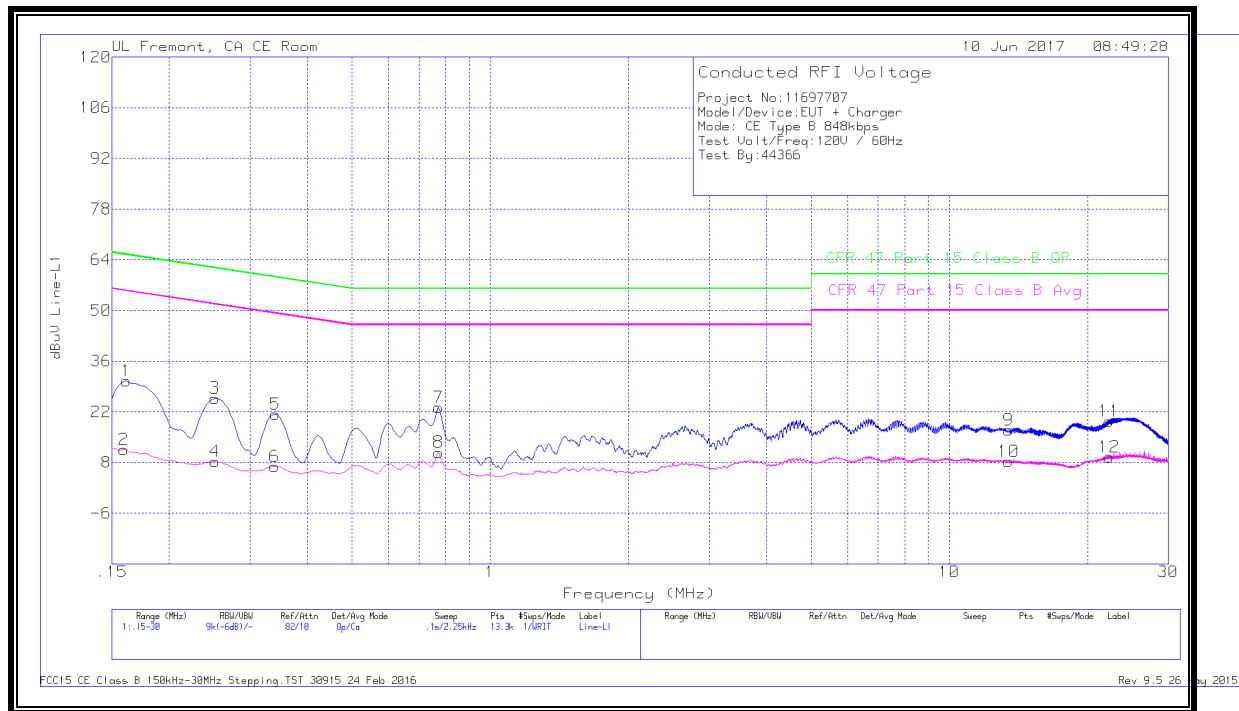
Qp - Quasi-Peak detector

Ca - CISPR average detection

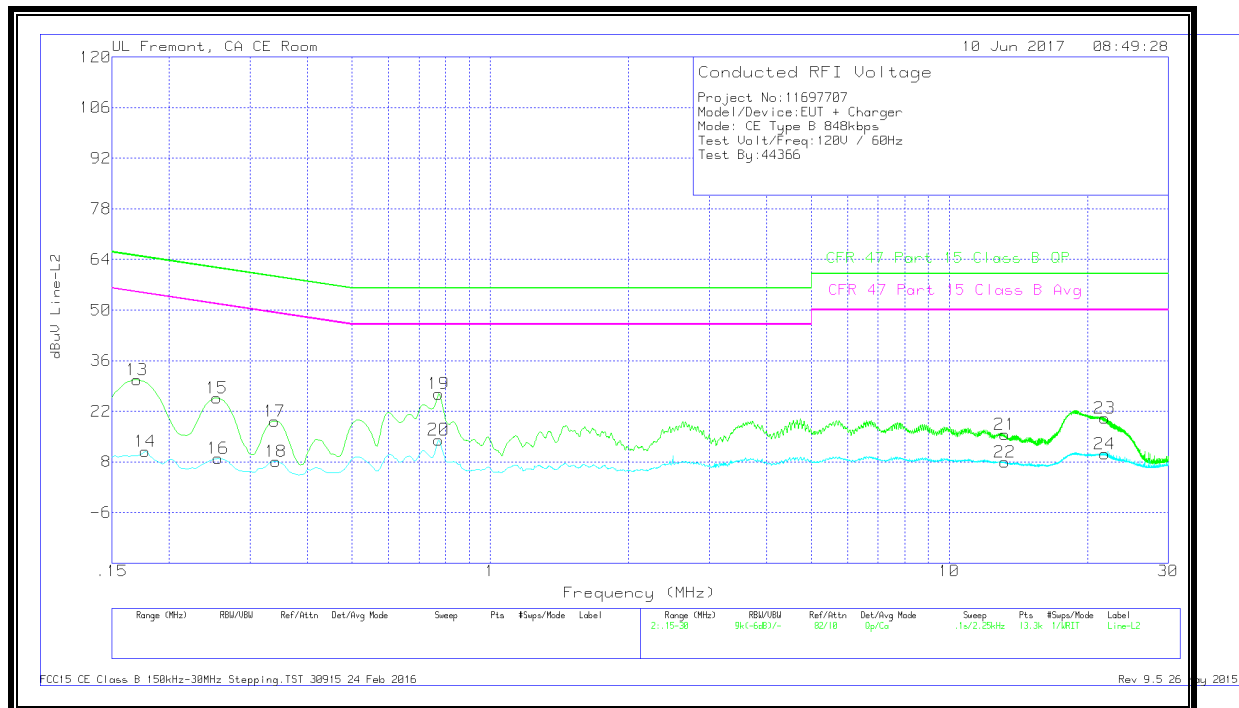
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LINE 1 RESULTS



LINE 2 RESULTS



11.2. READER MODE TYPE B

11.2.1. NORMAL OPERATION, 848 KBPS

6 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	.3345	35.76	Qp	0	.1	10.1	45.96	59.34	-13.38	-	-
2	.3345	29.43	Ca	0	.1	10.1	39.63	-	-	49.34	-9.71
3	.66975	35.88	Qp	0	.1	10.1	46.08	56	-9.92	-	-
4	.66975	28.97	Ca	0	.1	10.1	39.17	-	-	46	-6.83
5	1.005	34.76	Qp	0	.1	10.1	44.96	56	-11.04	-	-
6	1.005	29.36	Ca	0	.1	10.1	39.56	-	-	46	-6.44
7	1.34025	29.4	Qp	0	.1	10.1	39.6	56	-16.4	-	-
8	1.34025	24.75	Ca	0	.1	10.1	34.95	-	-	46	-11.05
9	13.2248	33.18	Qp	.1	.2	10.2	43.68	60	-16.32	-	-
10	13.2248	18.7	Ca	.1	.2	10.2	29.2	-	-	50	-20.8
11	13.56	62.05	Qp	.1	.2	10.2	72.55	60	12.55	-	-
12	13.56	57.22	Ca	.1	.2	10.2	67.72	-	-	50	17.72

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	.3345	37.72	Qp	0	.1	10.1	47.92	59.34	-11.42	-	-
14	.3345	31.62	Ca	0	.1	10.1	41.82	-	-	49.34	-7.52
15	.66975	36.59	Qp	0	.1	10.1	46.79	56	-9.21	-	-
16	.66975	31.72	Ca	0	.1	10.1	41.92	-	-	46	-4.08
17	1.005	35.34	Qp	0	.1	10.1	45.54	56	-10.46	-	-
18	1.005	31.45	Ca	0	.1	10.1	41.65	-	-	46	-4.35
19	1.34025	29.69	Qp	0	.1	10.1	39.89	56	-16.11	-	-
20	1.34138	26.23	Ca	0	.1	10.1	36.43	-	-	46	-9.57
21	2.34825	28.79	Qp	0	.1	10.1	38.99	56	-17.01	-	-
22	2.34825	24.77	Ca	0	.1	10.1	34.97	-	-	46	-11.03
23	13.56	60.75	Qp	.1	.2	10.2	71.25	60	11.25	-	-
24	13.56	54.72	Ca	.1	.2	10.2	65.22	-	-	50	15.22

Qp - Quasi-Peak detector

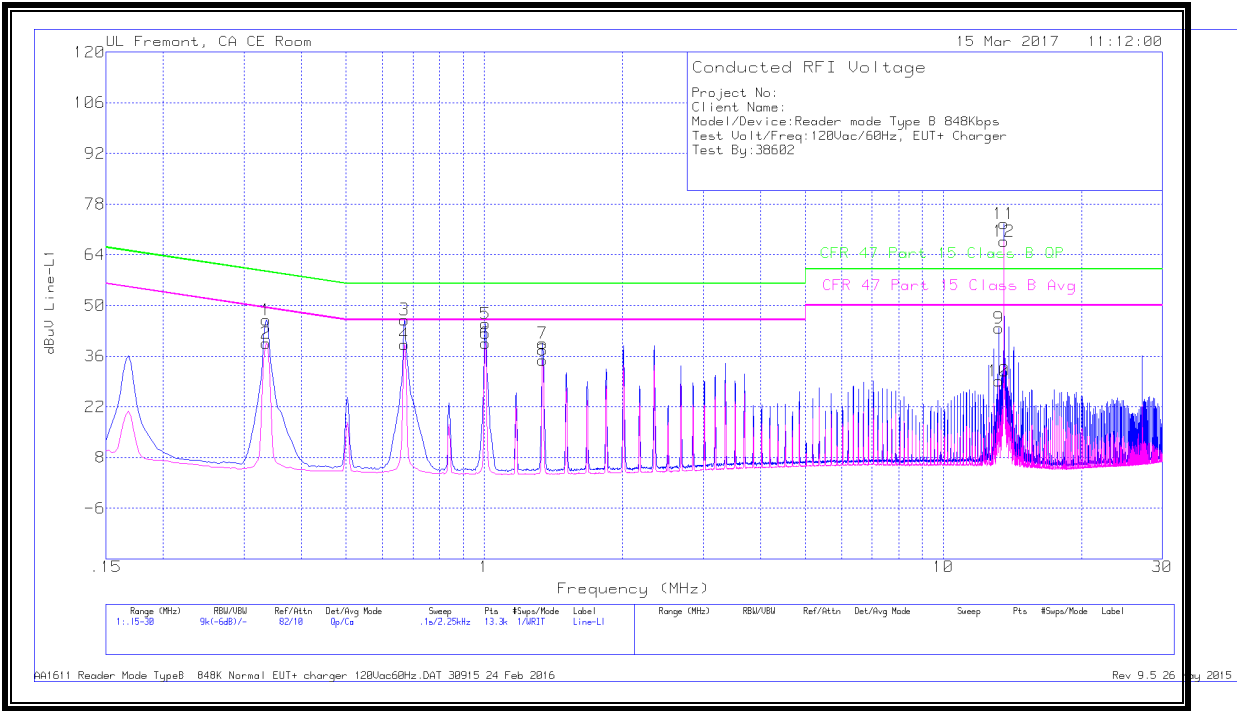
Ca - CISPR average detection

AA1611 Reader Mode TypeB 848K Normal EUT+ charger 120Vac60Hz.DAT 30915 24 Feb 2016

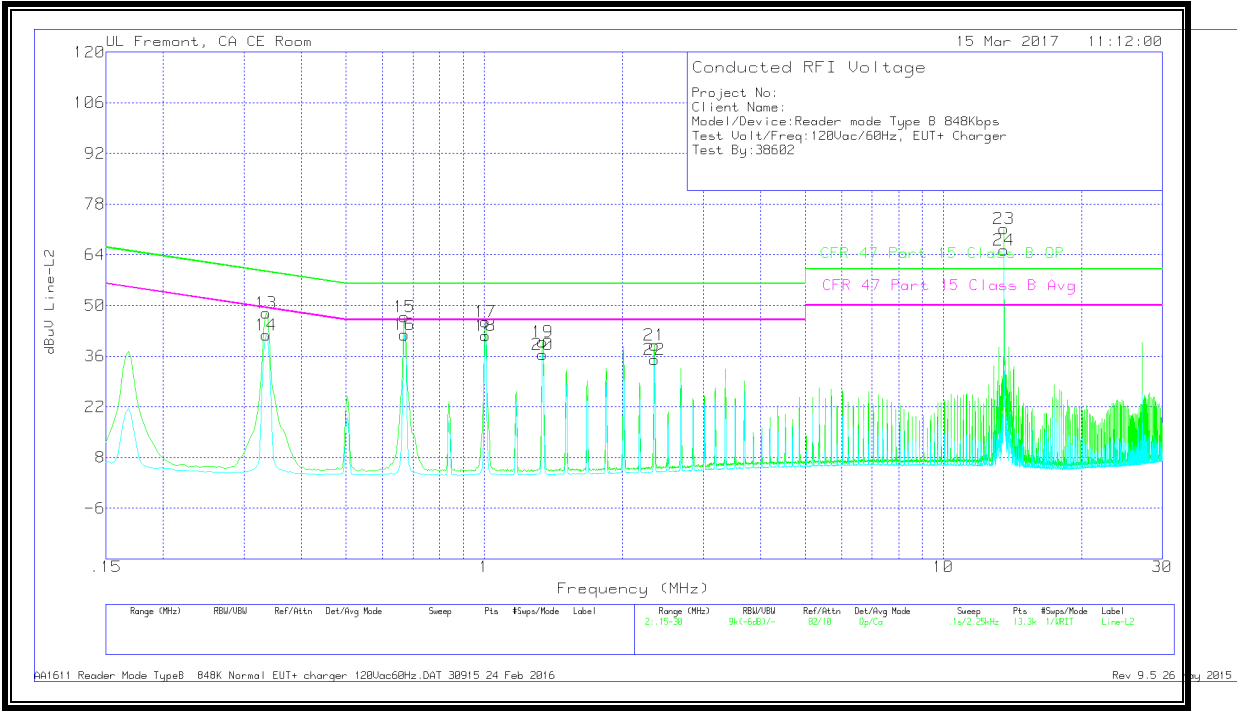
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Note: 13.56MHz is a fundamental frequency of the EUT. Data under the following section indicate that when the antenna terminal is terminated the fundamental amplitude is lowering below the limit line.

LINE 1 RESULTS



LINE 2 RESULTS



11.2.2. 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	.17025	24.25	Qp	1.1	.1	10.1	35.55	64.95	-29.4	-	-
2	.17025	1.1	Ca	1.1	.1	10.1	12.4	-	-	54.95	-42.55
3	.258	20.3	Qp	.6	.1	10.1	31.1	61.5	-30.4	-	-
4	.25125	-1.39	Ca	.6	.1	10.1	9.41	-	-	51.72	-42.31
5	.34575	15.37	Qp	.4	.1	10.1	25.97	59.06	-33.09	-	-
6	.34575	-2.91	Ca	.4	.1	10.1	7.69	-	-	49.06	-41.37
7	.78225	12.43	Qp	.2	.1	10.1	22.83	56	-33.17	-	-
8	.78225	1.64	Ca	.2	.1	10.1	12.04	-	-	46	-33.96
9	13.587	6.13	Qp	.2	.2	10.2	16.73	60	-43.27	-	-
10	13.605	-1.91	Ca	.2	.2	10.2	8.69	-	-	50	-41.31
11	26.0115	8.19	Qp	.3	.3	10.5	19.29	60	-40.71	-	-
12	26.0171	-.74	Ca	.3	.3	10.5	10.36	-	-	50	-39.64

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	24.96	Qp	1.2	.1	10.1	36.36	64.95	-28.59	-	-
14	.177	.65	Ca	1.2	.1	10.1	12.05	-	-	54.63	-42.58
15	.25575	20.45	Qp	.7	.1	10.1	31.35	61.57	-30.22	-	-
16	.26025	-.75	Ca	.7	.1	10.1	10.15	-	-	51.42	-41.27
17	.348	14.11	Qp	.5	.1	10.1	24.81	59.01	-34.2	-	-
18	.348	-1.94	Ca	.5	.1	10.1	8.76	-	-	49.01	-40.25
19	.78225	15.67	Qp	.3	.1	10.1	26.17	56	-29.83	-	-
20	.78225	5.09	Ca	.3	.1	10.1	15.59	-	-	46	-30.41
21	13.5398	3.92	Qp	.3	.2	10.2	14.62	60	-45.38	-	-
22	13.5521	-2.82	Ca	.3	.2	10.2	7.88	-	-	50	-42.12
23	21.7523	8.09	Qp	.3	.3	10.4	19.09	60	-40.91	-	-
24	21.7523	-.06	Ca	.3	.3	10.4	10.94	-	-	50	-39.06

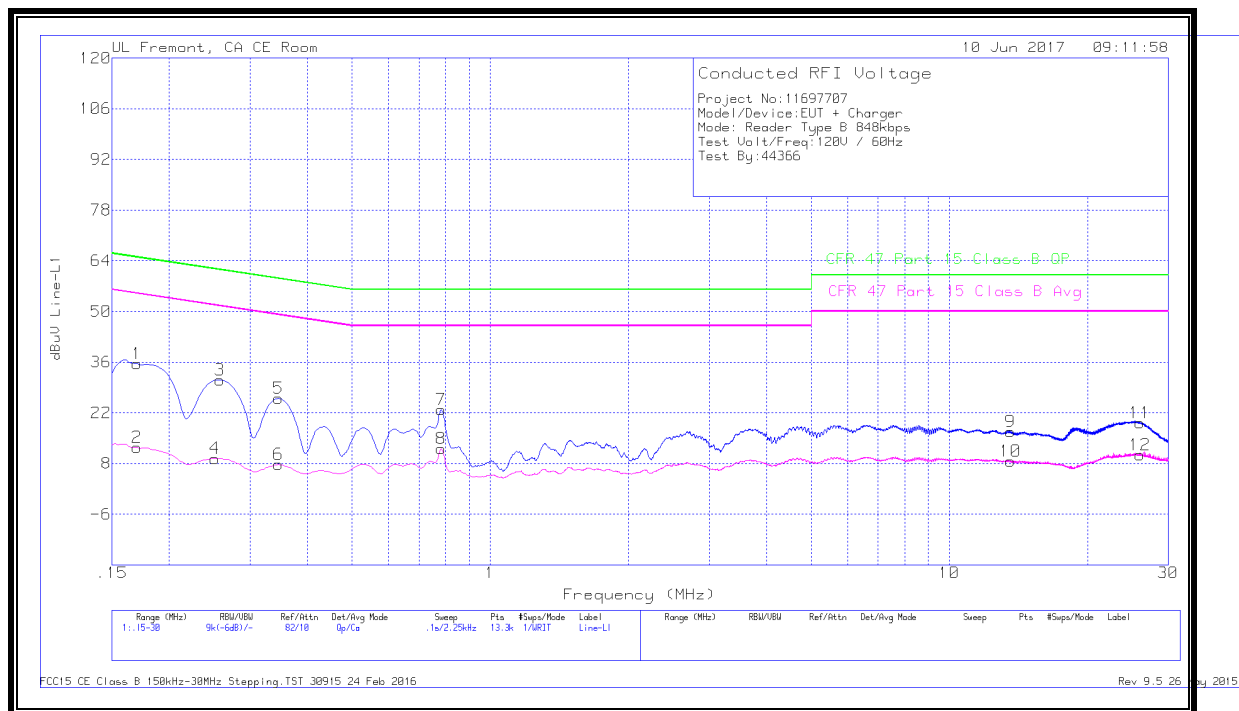
Qp - Quasi-Peak detector

Ca - CISPR average detection

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LINE 1 RESULTS



LINE 2 RESULTS

