



FCC 47 CFR PART 15 SUBPART B

TEST REPORT

FOR

**UMTS (850/1900)/(E)GPRS (850/1900) w/ 1TX ant. + LTE (B2/4/5/17, 1 TX ant.)
USB MODEM**

MODEL NUMBER: AC340U

REPORT NUMBER: 12U14542-2

ISSUE DATE: NOVEMBER 08, 2012

Prepared for
**SIERRA WIRELESS INC
13811 WIRELESS WAY
RICHMOND, BC V6V 3A4 CANADA**

Prepared by
**UL CCS
47173 BENICIA STREET
FREMONT, CA 94538, U.S.A.
TEL: (510) 771-1000
FAX: (510) 661-0888**



NVLAP LAB CODE 200065-0

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
--	11/08/12	Initial Issue	F. de Anda

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. <i>MEASURING INSTRUMENT CALIBRATION</i>	5
4.2. <i>SAMPLE CALCULATION</i>	5
4.3. <i>MEASUREMENT UNCERTAINTY</i>	5
5. EQUIPMENT UNDER TEST	6
5.1. <i>DESCRIPTION OF EUT</i>	6
5.2. <i>TEST CONFIGURATION</i>	6
5.3. <i>MODE(S) OF OPERATION</i>	6
5.4. <i>SOFTWARE AND FIRMWARE</i>	6
5.5. <i>MODIFICATIONS</i>	6
5.6. <i>DETAILS OF TESTED SYSTEM</i>	7
6. TEST AND MEASUREMENT EQUIPMENT	9
7. APPLICABLE LIMITS AND TEST RESULTS	10
7.1. <i>RADIATED EMISSIONS</i>	10
7.2. <i>AC MAINS LINE CONDUCTED EMISSIONS</i>	15
8. SETUP PHOTOS	19

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SIERRA WIRELESS INC
13811 WIRELESS WAY
RICHMOND, BC V6V 3A4 CANADA.

EUT DESCRIPTION: UMTS (850/1900)/(E)GPRS (850/1900) w/ 1TX ant.+LTE
(B2/4/5/17, 1 TX ant.) USB modem

MODEL: AC340U

SERIAL NUMBER: FCC1

DATE TESTED: OCT 18 and 24, 2012

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 15 SUBPART B	Pass

UL CCS 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 CCS 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 CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL CCS 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.



FRANCISCO DE ANDA
EMC SUPERVISOR
UL CCS



CHIN PANG
EMC ENGINEER
UL CCS

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

UL CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://www.ccsemc.com>.

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:

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

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a UMTS (850/1900) / (E)GPRS (850/1900) w/ 1TX ant.+LTE (B2/4/5/17, 1 TX ant.) USB modem.

5.2. TEST CONFIGURATION

EUT Configuration	Description
Worst case	EUT with USB cable connected to a laptop PC.

5.3. MODE(S) OF OPERATION

Mode	Description
Normal mode	EUT was connected to Laptop with minimum configuration.

5.4. SOFTWARE AND FIRMWARE

The utility program installed in the EUT during testing was Watcher.

5.5. MODIFICATIONS

No modifications were made during testing.

5.6. DETAILS OF TESTED SYSTEM

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop PC	Lenovo	ThinkPad	R8-OPZWF	DoC
AC Adapter	Lenovo	42T4418	11S42T4418Z1ZGWWG076ETZ	DoC
USB Mouse	Dell	M-UK	OYH95B	DoC
HUB	Netgear	EN104	ENT413SD	DoC
AC Adapter	Netgear	PWR-024-001	4103	DoC

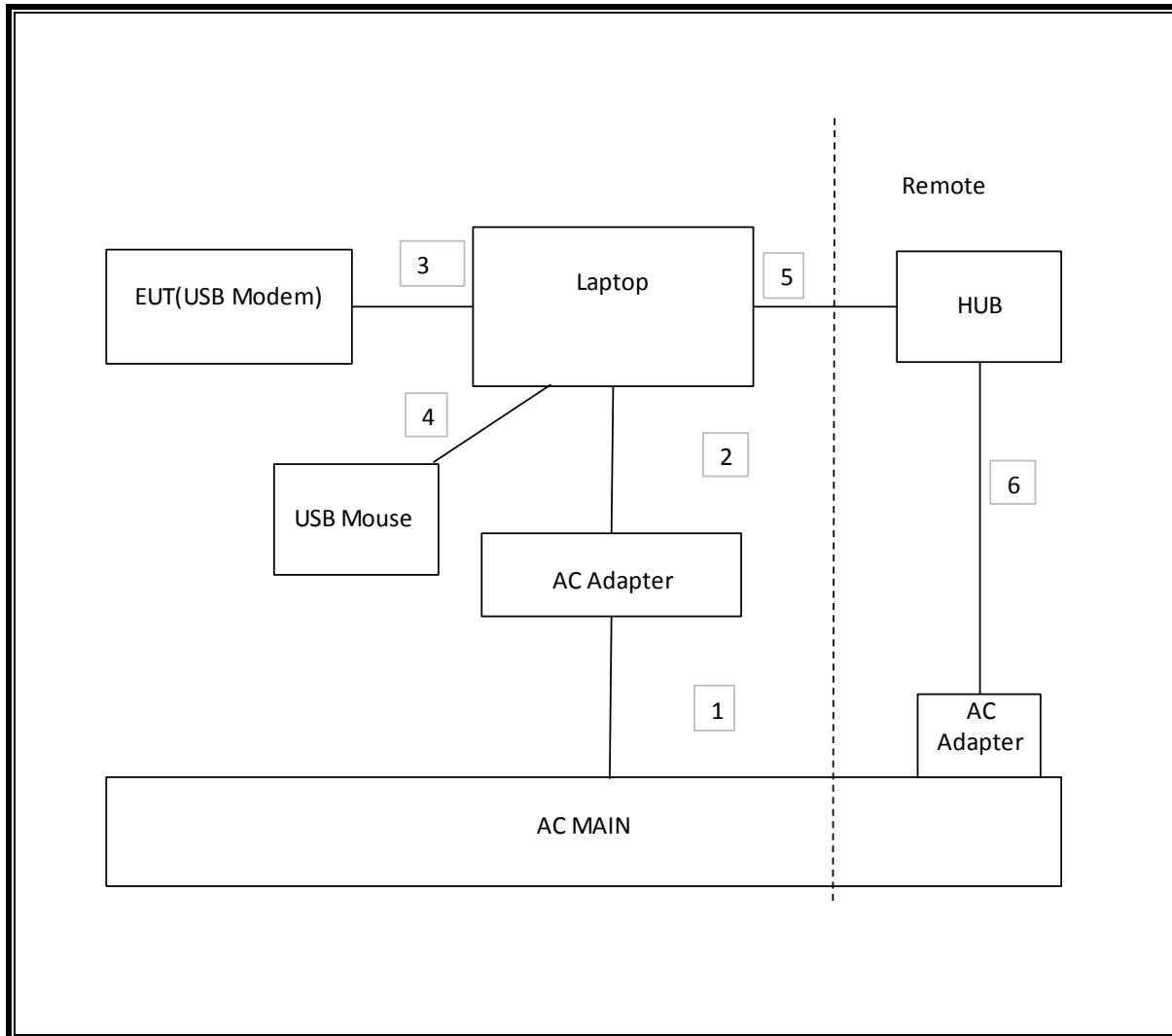
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	US 2-blade	Unshielded	2 m	NA
2	DC	1	Barrel	Unshielded	2 m	NA
3	USB	1	USB-A	Shielded	0.8 m	NA
4	USB	1	USB-A	Shielded	1.8 m	NA
5	Ethernet	1	RJ45	Unshielded	6 m	NA
6	DC	1	Barrel	Unshielded	1.8 m	NA

TEST SETUP

The EUT was installed in the configuration shown in the following diagram.

TEST SETUP DIAGRAM



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	Serial Number	Calibration Due
EMI Test Receiver	R & S	ESHS 20	827129/006	8/19/2013
LISN, 10 kHz - 30 MHz	FCC	LISN50/250-25-2	C00626	12/13/2012
Spectrum analyzer, 44 GHz	Agilent	E4446A	C00986	3/22/2013
Preamplifier, 1300 MHz	Agilent	8447D	C00885	11/11/2012
Spectrum analyzer, 44 GHz	Agilent	E4446A	C01069	12/15/2012
Antenna, Bilog, 2 GHz	Sunol	JB1	T243	2/7/2013
Antenna, Horn, 18GHz	EMCO	3115	C00783	12/29/2012
Preamplifier, 26.5 GHz	Agilent	8449B	C01063	12/7/2012

7. APPLICABLE LIMITS AND TEST RESULTS

7.1. RADIATED EMISSIONS

TEST PROCEDURE

ANSI C63.4

The highest clock frequency generated or used in the Laptop is 2.4 GHz; therefore the frequency range was investigated from 30 MHz to 12 GHz.

LIMIT

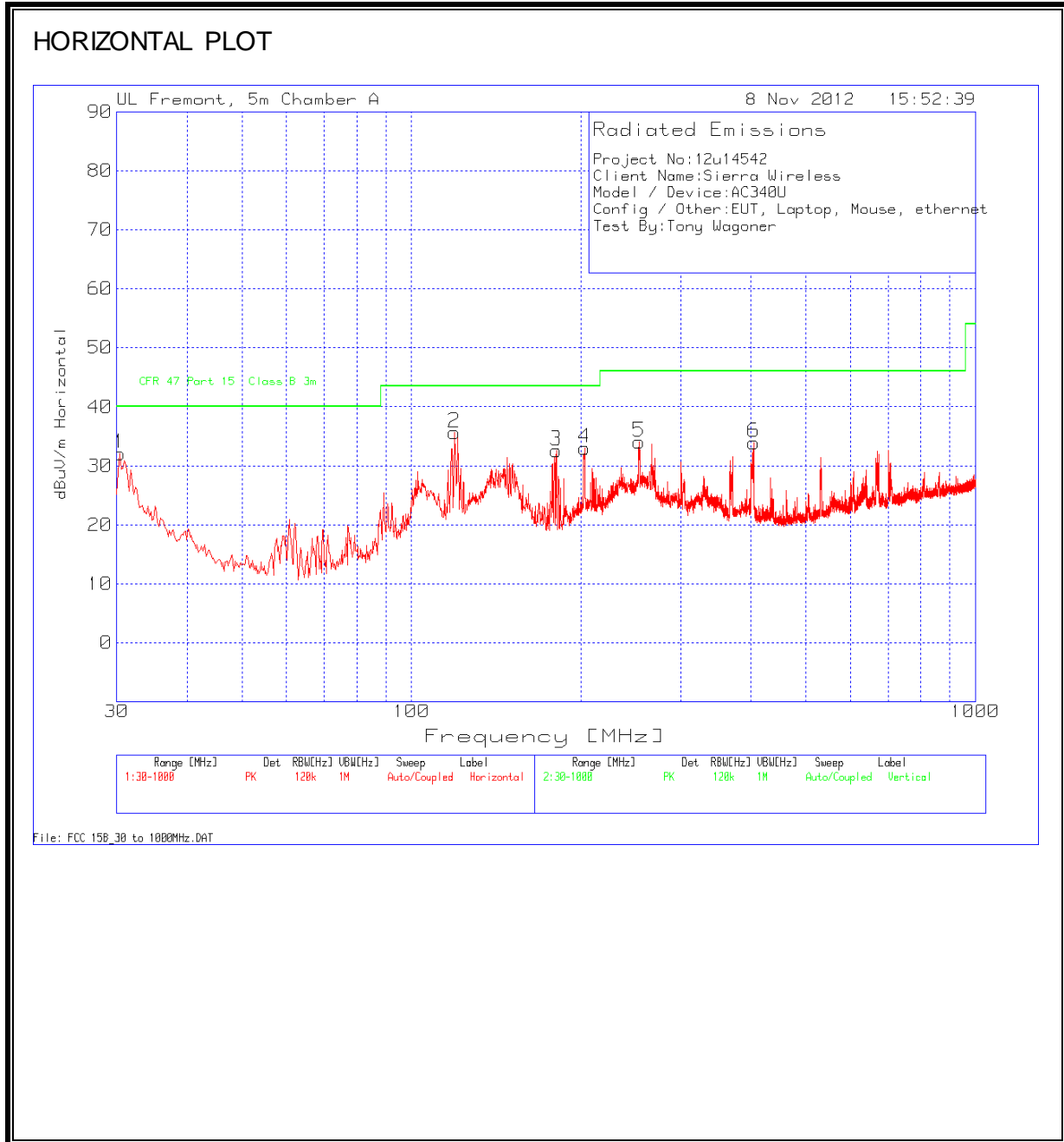
§15.109 (a) Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Limits for radiated disturbance of Class B ITE at measuring distance of 3 m	
Frequency range (MHz)	Quasi-peak limits (dB μ V/m)
30 to 88	40
88 to 216	43.5
216 to 960	46
Above 960 MHz	54

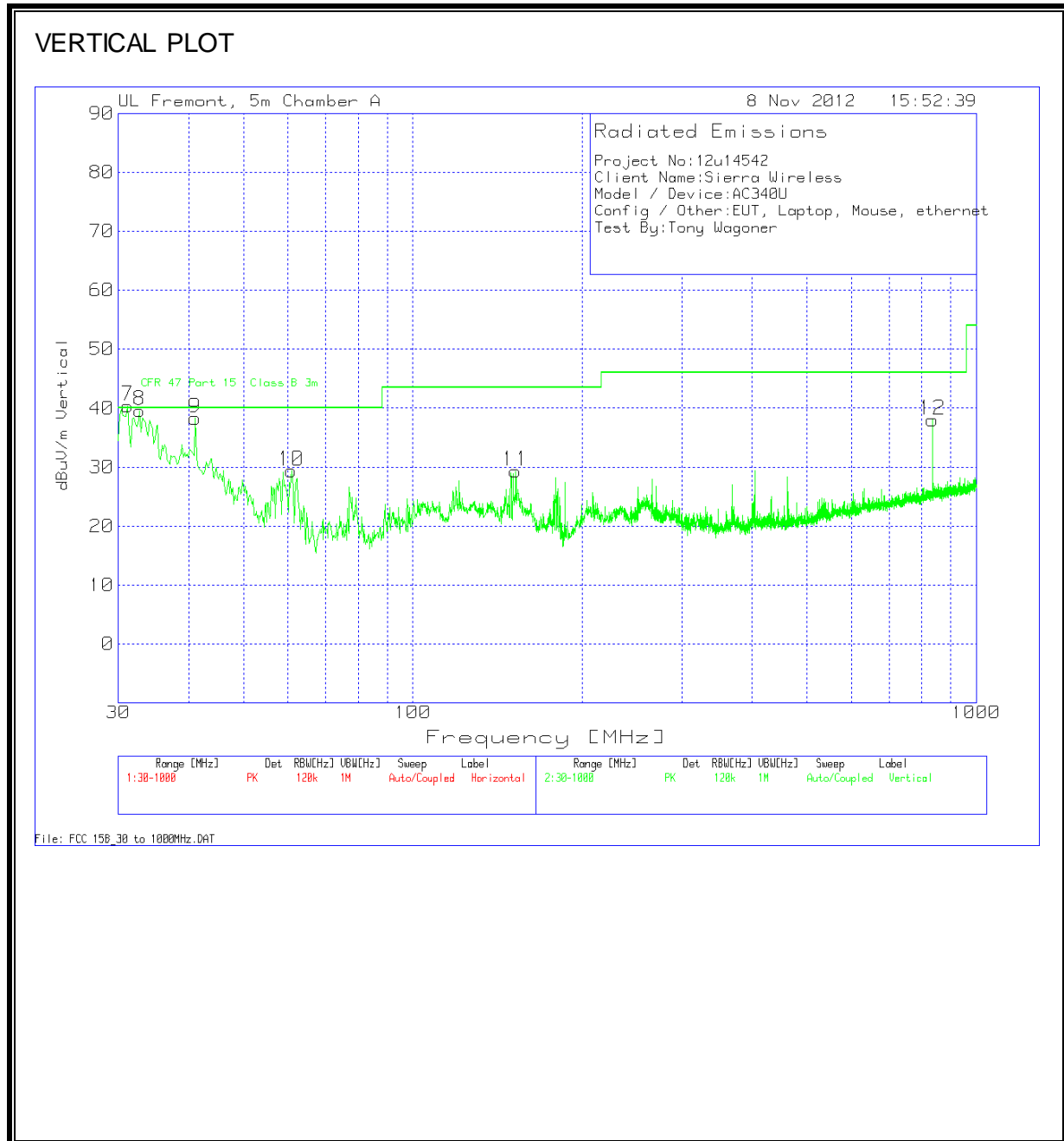
Note: The lower limit shall apply at the transition frequency.

RESULTS

RADIATED EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)



RADIATED EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)



HORIZONTAL & VERTICAL DATA

Project No:12u14542
 Client Name:Sierra Wireless
 Model / Device:AC340U
 Config / Other:EUT, Laptop, Mouse, ethernet
 Test By:Tony Wagoner

Test Frequency MHz	Meter Reading dB(μV)	Detector	Chamber 5m B Amp dB	Antenna Factor dB	Corrected dBμV/m	CFR 47 Part 15 Class B 3m	Margin dB	Height cm	Polarity
Horizontal 30 - 1000MHz									
30.3877	38.56	PK	-27.5	21	32.06	40	-7.94	200	Horz
119.1687	48.43	PK	-26.7	13.9	35.63	43.5	-7.87	200	Horz
180.6175	47.87	PK	-26.4	11.1	32.57	43.5	-10.93	100	Horz
202.7158	47.69	PK	-26.2	11.5	32.99	43.5	-10.51	200	Horz
253.3094	48.43	PK	-26	11.6	34.03	46	-11.97	100	Horz
404.7022	43.55	PK	-25.4	15.8	33.95	46	-12.05	100	Horz
Vertical 30 - 1000MHz									
30.6838	41.34	QP	-27.5	20.7	34.54	40	-5.46	105	Vert
32.7183	39.63	QP	-27.6	19.2	31.23	40	-8.77	169	Vert
41.0489	47.69	QP	-27.4	13.3	33.59	40	-6.41	131	Vert
60.8213	49.16	PK	-27.2	7.4	29.36	40	-10.64	100	Vert
152.1223	43.83	PK	-26.6	12.1	29.33	43.5	-14.17	100	Vert
836.3949	40	PK	-23.3	21.3	38	46	-8	200	Vert

PK - Peak detector
 QP - Quasi-Peak detector

RADIATED EMISSIONS ABOVE 1 GHz (WORST-CASE CONFIGURATION)

Note: No emissions were detected above the system noise floor.

7.2. AC MAINS LINE CONDUCTED EMISSIONS

TEST PROCEDURE

ANSI C63.4

LIMIT

§15.107 (a) Except for Class A digital devices, for equipment 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.

Limits for conducted disturbance of Class B ITE		
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

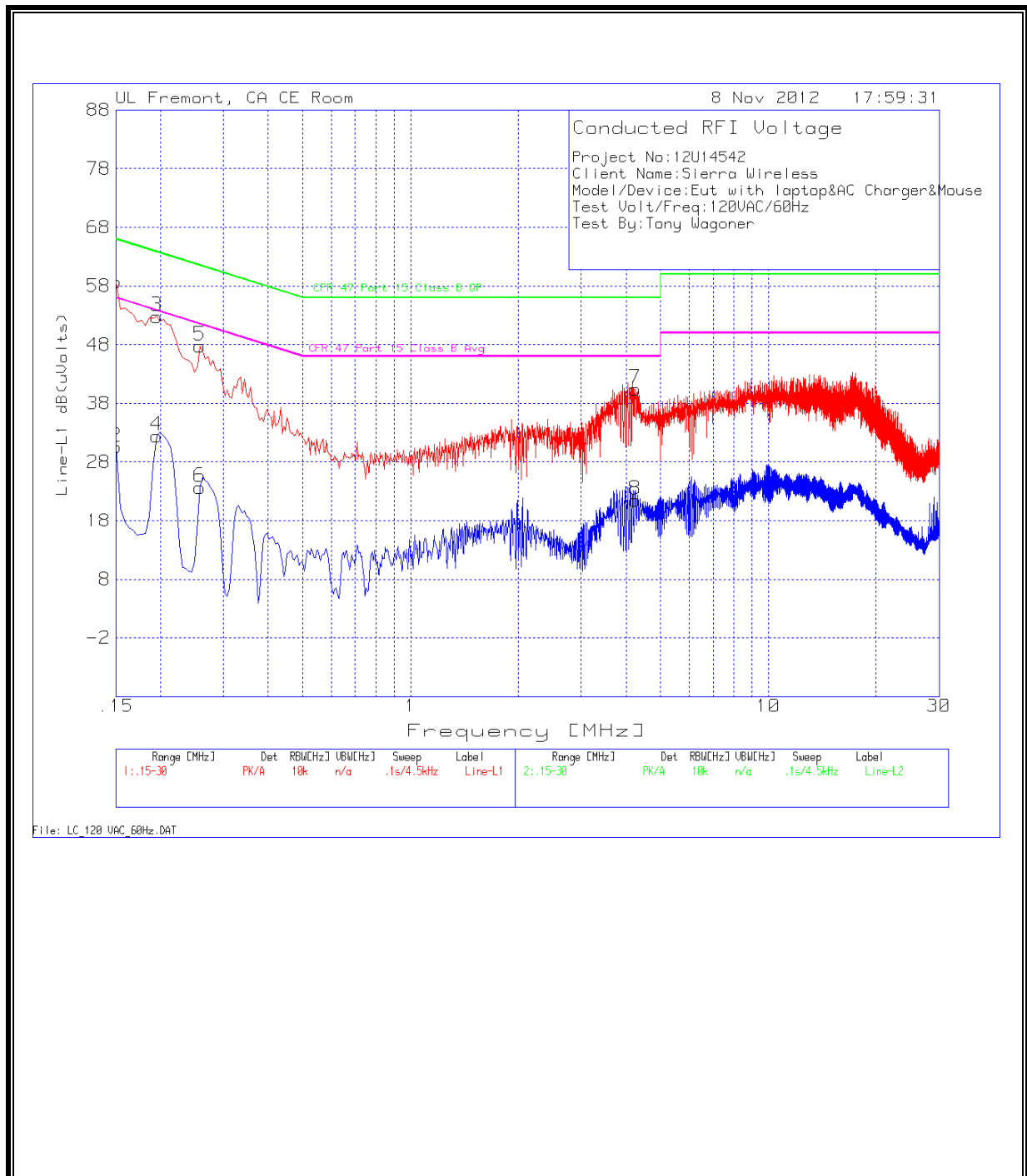
Notes:
1. The lower limit shall apply at the transition frequencies
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

RESULTS

6 WORST EMISSIONS

Project No:12U14542									
Client Name:Sierra Wireless									
Model/Device:EUT, laptop,AC Charger,Mouse, Ethernet									
Test Volt/Freq:120VAC/60Hz									
Test By:Tony Wagoner									
Frequency MHz	Reading dB(μV)	Detector	T24 LISN dB	Cable Loss dB	Corrected dB(μV)	CFR 47 Part 15 Class B QP	QP Margin dB	CFR 47 Part 15 Class B Avg	Av Margin dB
Line-L1 .15 - 30MHz									
0.15	58.61	PK	0.1	0	58.71	66	-7.29	-	-
0.15	30.46	Av	0.1	0	30.56	-	-	56	-25.44
0.195	52.74	PK	0.1	0	52.84	63.8	-10.96	-	-
0.195	32.29	Av	0.1	0	32.39	-	-	53.8	-21.41
0.258	47.64	PK	0.1	0	47.74	61.5	-13.76	-	-
0.258	23.52	Av	0.1	0	23.62	-	-	51.5	-27.88
4.2495	40.25	PK	0.1	0.1	40.45	56	-15.55	-	-
4.2495	21.23	Av	0.1	0.1	21.43	-	-	46	-24.57
Line-L2 .15 - 30MHz									
0.15	58.83	PK	0.1	0	58.93	66	-7.07	-	-
0.15	27.32	Av	0.1	0	27.42	-	-	56	-28.58
0.1905	53.73	PK	0.1	0	53.83	64	-10.17	-	-
0.1905	25.98	Av	0.1	0	26.08	-	-	54	-27.92
0.258	48.14	PK	0.1	0	48.24	61.5	-13.26	-	-
0.258	25.76	Av	0.1	0	25.86	-	-	51.5	-25.64
0.384	41.07	PK	0.1	0	41.17	58.2	-17.03	-	-
0.384	18.25	Av	0.1	0	18.35	-	-	48.2	-29.85
4.0875	41.63	PK	0.1	0.1	41.83	56	-14.17	-	-
4.0875	21.73	Av	0.1	0.1	21.93	-	-	46	-24.07
PK - Peak detector									
Av - Average detector									

LINE 1 RESULTS



LINE 2 RESULTS

