

FCC CFR47 PART 15 SUBPART B CERTIFICATION TEST REPORT

FOR

USB MODEM

MODEL NUMBER: AC250U

REPORT NUMBER: 09U12929-2

ISSUE DATE: DECEMBER 15, 2009

Prepared for

SIERRA WIRELESS INC. 2200 FARADAY AVENUE, SUITE 150 CARLSBAD, CA 92008, U.S.A.

Prepared by

COMPLIANCE CERTIFICATION SERVICES 47173 BENICIA STREET FREMONT, CA 94538, U.S.A.

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Revision History

Rev.	Issue Date	Revisions	Revised By
	12/1509	Initial Issue	T. Chan

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SIERRA WIRELESS, INC.

2200 FARADAY AVENUE, SUITE 150

CARLSBAD, CA 92008, U.S.A.

EUT DESCRIPTION: USB MODEM

MODEL: AC250U

SERIAL NUMBER: 3

DATE TESTED: NOVEMBER 15-19, 2009

APPLICABLE STANDARDS

STANDARD TEST RESULTS

FCC PART 15 SUBPART B PASS

Compliance Certification Services, Inc. (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 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 CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by CCS will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By: Tested By:

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THU CHEN
EMC MANAGER
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CHIN PANG EMC ENGINEER COMPLIANCE CERTIFICATION SERVICES

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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.

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:

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, 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 multi-band wireless modem that operates on the CDMA2000 1xRTT, 1xEVDO and Wimax network. The EUT manufactured by Sierra Wireless, Inc.

GENERAL INFORMATION

CHASSIS MATERIAL	PLASTIC
ENCLOSURE MATERIAL	PLASTIC
POWER REQUIREMENTS	5VDC from USB port
LIST OF ALL OSCILLATOR FREQUENCIES	32KHz, 2GHz
GREATER THAN OR EQUAL TO 9 kHz	

5.2. WORST CASE CONFIGURATIONS

Two configurations have been investigated on:

- 1. EUT directly plugged into the Laptop without USB cable.
- 2. EUT directly plugged into the Laptop with USB cable.

5.3. MODE(S) OF OPERATION

Mode	Description
Normal	The EUT was in normal mode, while all the I/O ports active to transfer
	data between the laptop and other peripherals.

5.4. SOFTWARE AND FIRMWARE

The test software used during the test was EMCTest software.

5.5. MODIFICATIONS

No modifications were made during testing.

5.6. DETAILS OF TESTED SYSTEM

SUPPORT EQUIPMENT & PERIPHERALS

PERIPHERAL SUPPORT EQUIPMENT LIST										
Description	Description Manufacturer Model Serial Number FCC ID									
Printer	Microline 186	D22300A	AC5C018494A0	DoC						
Mouse	Logitech	M-UA34	LTC70500299	DoC						
Laptop	Sony	VGN-SZ340	3000325	DoC						
AC Adapter	Sony	VGP-AC19V13	1479681110488130	DoC						

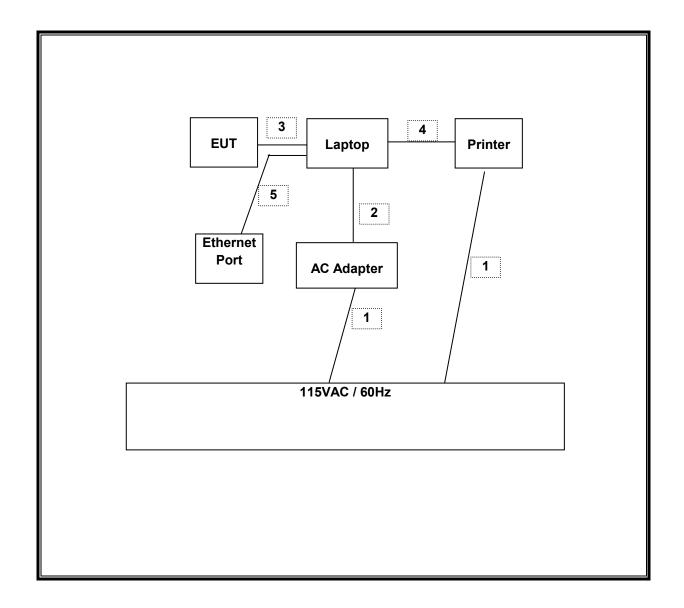
I/O CABLES

	I/O CABLE LIST											
Cable	Port	# of	Connector	Cable	Cable	Remarks						
No.		Identica Ports	Туре	Туре	Length							
1	AC	2	US 115V	Un-shielded	2m							
2	DC	1	DC	Un-shielded	2m							
3	USB	1	EUT	Un-shielded	2m							
4	USB	1	Printer	Un-shielded	2m							
5	Ethernet Port	1	RJ45	Un-shielded	5m							

TEST SETUP

The EUT is installed into a laptop with and without USB cable, and test software exercised the EUT.

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	Asset	Cal Due						
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01063	02/04/10						
Antenna, Horn, 18 GHz	EMCO	3115	C00783	01/29/10						
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00778	12/16/09						
Antenna, Bilog, 2 GHz	Sund Sciences	JB1	CO1011	01/14/10						
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01178	08/31/10						
EMI Test Receiver, 30 MHz	R&S	ESHS 20	N02396	05/06/11						
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	10/29/10						

7. APPLICABLE LIMITS AND TEST RESULTS

7.1. RADIATED EMISSIONS

TEST PROCEDURE

ANSI C63.4

The highest clock frequency generated is 2 GHz in the EUT. Therefore the frequency range was investigated from 30 MHz to 10 GHz.

LIMIT

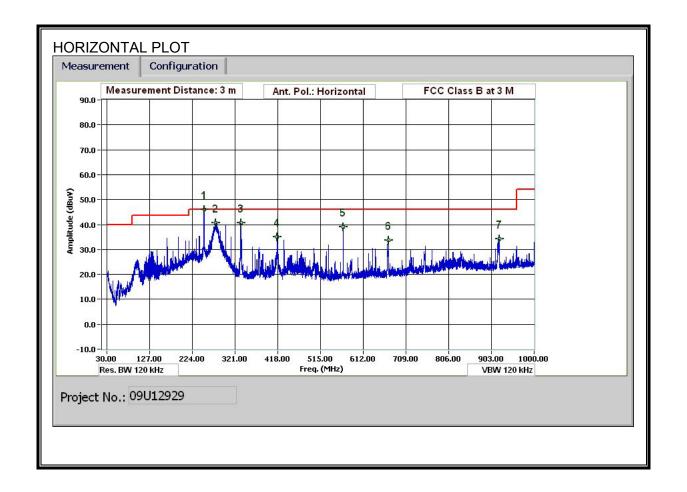
§15.109 (a) Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Limits for radiated disturbance of Class B ITE at measuring distance of 3 m							
Frequency range	Quasi-peak limits						
(MHz)	(dBµV/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.							

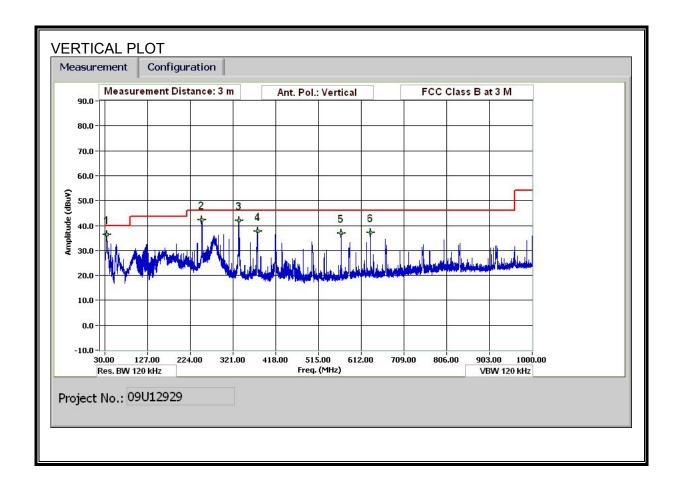
RESULTS

EUT WITH USB CABLE

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



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



EMISSIONS DATA

30-1000MHz Frequency Measurement

Compliance Certification Services, Fremont 5m Chamber

Test Engr: Chin Pang
Date: 11/18/09
Project #: 09U12929
Company: Sierra Wireless
EUT Description: USB Modem

EUT Configuration: EUT with USB cable and Basic peripheral

EUT M/N: AC250U
Test Target: FCC Class B
Mode Oper: Normal

f Measurement Frequency Amp Preamp Gain Margin Margin vs. Limit

 Dist
 Distance to Antenna
 D Corr
 Distance Correct to 3 meters

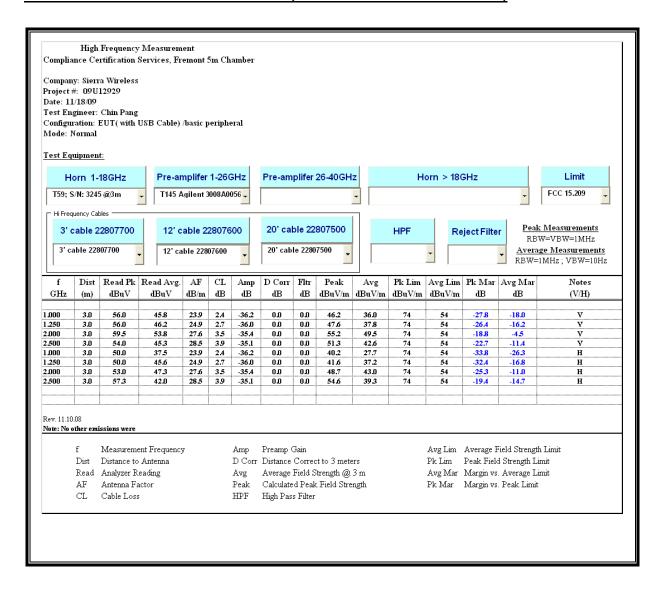
 Read
 Analyzer Reading
 Filter
 Filter Insert Loss

 AF
 Antenna Factor
 Corr.
 Calculated Field Strength

 CL
 Cable Loss
 Limit
 Field Strength Limit

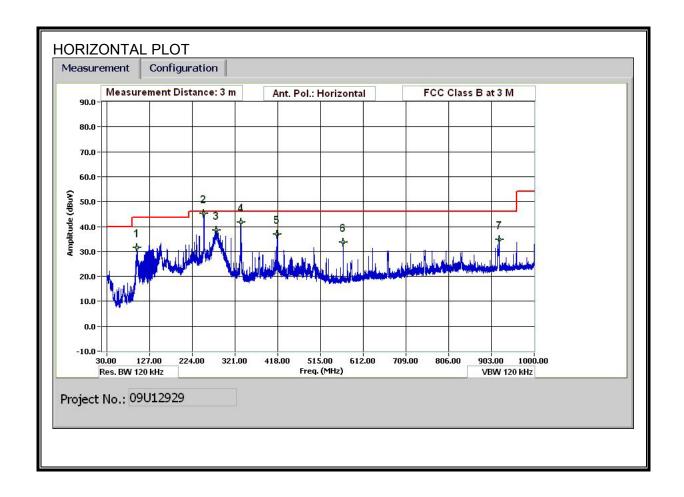
f	Dist	Read	AF	CL	Amp	D Corr	Filter	Corr.	Limit	Margin	Ant Pol	Det	Notes
MHz	(m)	dBuV	dB/m	dB	dB	dB	dВ	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
34.440	3.0	47.1	18.3	0.5	29.7	0.0	0.0	36.3	40.0	-3.7	v	P	
250.089	3.0	57.8	11.8	1.4	28.8	0.0	0.0	42.3	46.0	-3.7	v	P	
334.693	3.0	55.4	13.9	1.7	29.0	0.0	0.0	42.0	46.0	-4.0	v	P	
376.454	3.0	50.4	14.6	1.8	29.2	0.0	0.0	37.7	46.0	-8.3	V	P	
566.662	3.0	46.4	17.8	2.3	29.7	0.0	0.0	36.8	46.0	-9.2	V	P	
633.385	3.0	45.6	18.6	2.5	29.6	0.0	0.0	37.1	46.0	-8.9	v	P	
250.929	3.0	61.5	11.8	1.4	28.8	0.0	0.0	45.9	46.0	-0.1	H	P	
250.929	3.0	57.0	11.8	1.4	28.8	0.0	0.0	41.4	46.0	-4.6	H	QP	
277.690	3.0	55.2	12.6	1.5	28.8	0.0	0.0	40.6	46.0	-5.4	H	P	
334.453	3.0	54.0	13.9	1.7	29.0	0.0	0.0	40.6	46.0	-5.4	н	P	
416.656	3.0	47.1	15.3	1.9	29.4	0.0	0.0	35.0	46.0	-11.0	H	P	<u></u>
566.662	3.0	48.8	17.8	2.3	29.7	0.0	0.0	39.2	46.0	-6.8	н	P	
669.386	3.0	41.8	18.9	2.5	29.6	0.0	0.0	33.6	46.0	-12.4	H	P	<u></u>
920.437	3.0	38.0	21.7	3.0	28.5	0.0	0.0	34.3	46.0	-11.7	Н	P	
					i						1		

SPURIOUS EMISSIONS ABOVE 1000 MHz (WORST-CASE CONFIGURATION)

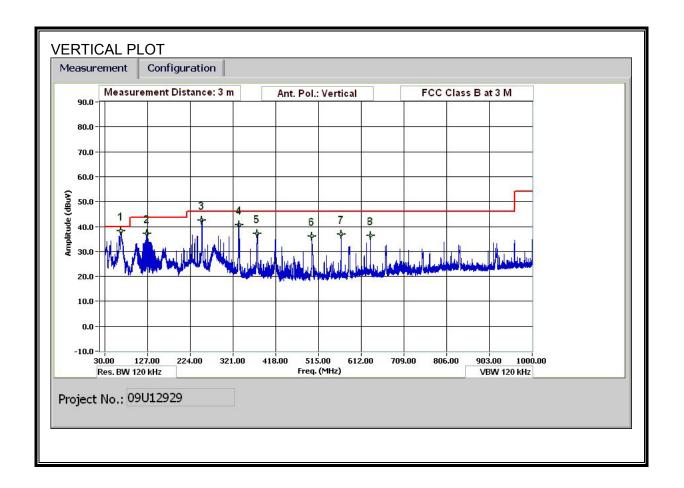


EUT WITHOUT USB CABLE

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



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



EMISSIONS DATA

30-1000MHz Frequency Measurement

Compliance Certification Services, Fremont 5m Chamber

Chin Pang Test Engr: Date: 11/20/09 Project #: 09U12929 Sierra Wireless Company: EUT Description: USB Modem

Configuration: EUT (No USB Cable) with basic peripheral

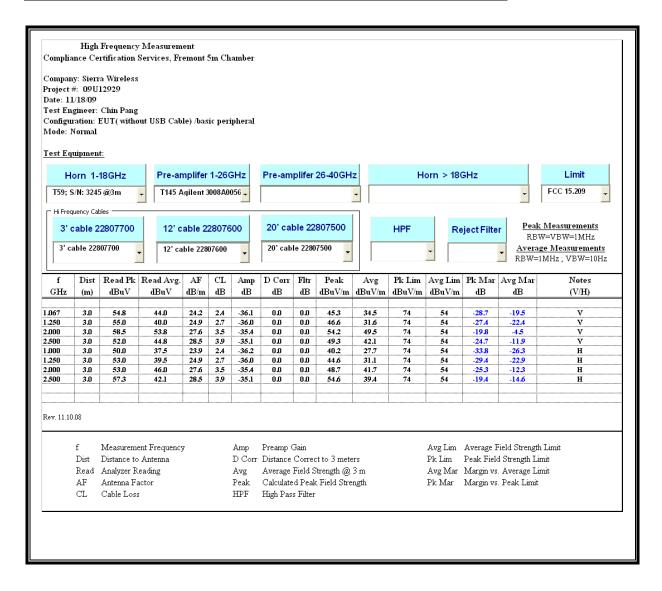
EUT M/N: AC250U Test Target: FCC Class B Mode Oper: Normal

Margin Margin vs. Limit

Measurement Frequency Amp Preamp Gain
Dist Distance to Antenna D Corr Distance Correct to 3 meters
Read Analyzer Reading Filter Filter Insert Loss
AF Antenna Factor Corr. Calculated Field Strength
CL Cable Loss Limit Field Strength Limit

f	Dist	Read	AF	\mathbf{CL}	Amp	D Corr	Filter	Corr.	Limit	Margin	Ant Pol	Det.	Notes
MHz	(m)	dBuV	dB/m	dВ	dВ	dВ	dВ	dBuV/m	dBuV/m	αв	V/H	P/A/QP	
66.241	3.0	59.2	8.1	0.7	29.6	0.0	0.0	38.4	40.0	-1.6	v	P	
66.241	3.0	55.4	8.1	0.7	29.6	0.0	0.0	34.6	40.0	-5.4	V	QP	
125.284	3.0	51.7	13.8	1.0	29.4	0.0	0.0	37.1	43.5	-6.4	V	P	
250.929	3.0	57.9	11.8	1.4	28.8	0.0	0.0	42.4	46.0	-3.6	V	P	
333.373	3.0	54.3	13.9	1.7	29.0	0.0	0.0	40.9	46.0	-5.1	V	P	
375.014	3.0	49.9	14.6	1.8	29.2	0.0	0.0	37.2	46.0	-8.8	V	P	
499.939	3.0	46.9	16.8	2.1	29.7	0.0	0.0	36.1	46.0	-9.9	V	P	
566.662	3.0	46.5	17.8	2.3	29.7	0.0	0.0	36.9	46.0	-9.1	V	P	
633.385	3.0	45.0	18.6	2.5	29.6	0.0	0.0	36.4	46.0	-9.6	V	P	
98.403	3.0	50.5	9.7	0.9	29.5	0.0	0.0	31.5	43.5	-12.0	H	P	
250.089	3.0	60.7	11.8	1.4	28.8	0.0	0.0	45.2	46.0	-0.8	H	P	
250.089	3.0	56.9	11.8	1.4	28.8	0.0	0.0	41.4	46.0		H		
279.250	3.0	53.1	12.7	1.5	28.8	0.0	0.0	38.5	46.0	-7.5	H	P	
334.573	3.0	55.1	13.9	1.7	29.0	0.0	0.0	41.7	46.0	-4.3	H	P	
416.656	3.0	49.1	15.3	1.9	29.4	0.0	0.0	37.0	46.0	-9.0	н	P	
566.662	3.0	43.2	17.8	2.3	29.7	0.0	0.0	33.6	46.0	-12.4	H	P	
920.437	3.0	38.5	21.7	3.0	28.5	0.0	0.0	34.7	46.0	-11.3	H	P	

SPURIOUS EMISSIONS ABOVE 1000 MHz (WORST-CASE CONFIGURATION)



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.

Frequency range	Limits (dBμV)					
(MHz)	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

EUT WITH USB CABLE

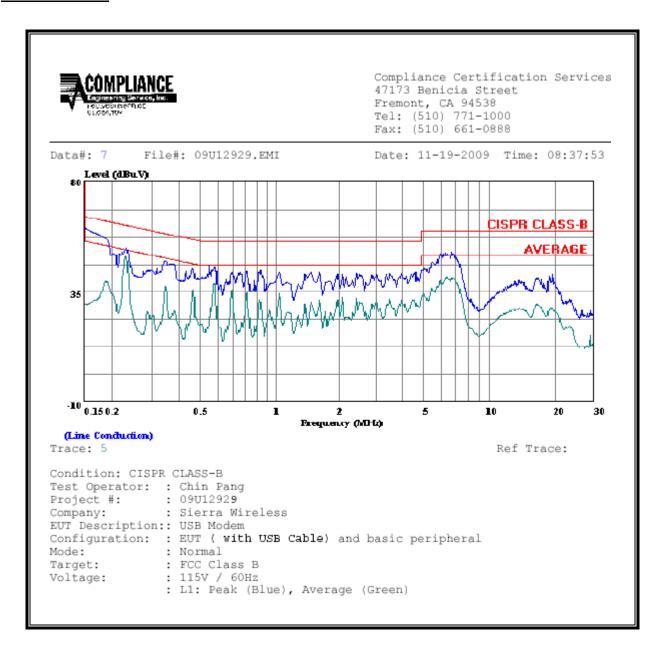
CONDUCTED EMISSIONS DATA (115VAC 60Hz)											
Freq.	Reading			Closs	Limit	EN_B	Margin		Remark		
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2		
0.23	52.27		49.61	0.00	62.49	52.49	-10.22	-2.88	L1		
0.58	45.16		38.78	0.00	56.00	46.00	-10.84	-7.22	L1		
6.84	50.66		41.10	0.00	60.00	50.00	-9.34	-8.90	L1		
0.23	52.57		50.67	0.00	62.31	52.31	-9.74	-1.64	L2		
0.57	45.74		40.32	0.00	56.00	46.00	-10.26	-5.68	L2		
6.49	50.65		40.72	0.00	60.00	50.00	-9.35	-9.28	L2		
6 Worst Data											

EUT WITHOUT USB CABLE

CONDUCTED EMISSIONS DATA (115VAC 60Hz)											
Freq.	Reading			Closs	Limit	EN_B	Margin		Remark		
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2		
0.21	53.88		44.62	0.00	63.05	53.05	-9.17	-8.43	L1		
0.48	45.40		36.02	0.00	56.32	46.32	-10.92	-10.30	L1		
6.95	50.78		40.57	0.00	60.00	50.00	-9.22	-9.43	L1		
0.22	50.19		44.54	0.00	62.97	52.97	-12.78	-8.43	L2		
0.60	43.77		38.47	0.00	56.00	46.00	-12.23	-7.53	L2		
7.10	51.11		41.02	0.00	60.00	50.00	-8.89	-8.98	L2		
6 Worst Data											

EUT WITH USB CABLE

LINE 1 RESULTS

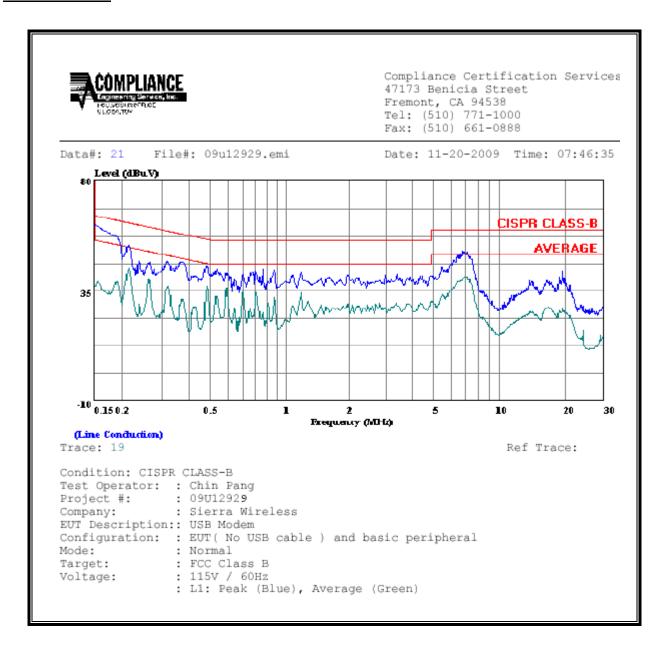


LINE 2 RESULTS

Compliance Certification Services 47173 Benicia Street Fremont, CA 94538 Tel: (510) 771-1000 Fax: (510) 661-0888 Data#: 14 File#: 09U12929.EMI Date: 11-19-2009 Time: 08:43:28 Level (dBuV) CISPR CLASS-B <u>AVERAGE</u> 35 ·10 0.15 0.2 10 30 Frequency (MIHz) (Line Conduction) Trace: 12 Ref Trace: Condition: CISPR CLASS-B Test Operator: : Chin Pang Project #: : 09U12929 Company: : Sierra Wireless Company: EUT Description:: USB Modem Configuration: : EUT (with USB cable) and basic peripheral : Normal Mode: Target: : FCC Class B : 115V / 60Hz Voltage: : L2: Peak (Blue), Average (Green)

EUT WITHOUT USB CABLE

LINE 1 RESULTS



LINE 2 RESULTS

