**FCC CFR47 PART 15 SUBPART B**
**ICES-003 ISSUE 4, 2004-02**

# VERIFICATION TEST REPORT

**FOR**

**PCA, EVDO MINI-PCI EXPRESS CARD CDMA MODEM**

**MODEL NUMBERS: AC402**

**REPORT NUMBER: 08U12313-2, Revision B**

**ISSUE DATE: MARCH 24, 2009**

*Prepared for*
**SIERRA WIRELESS INC.**
**2290 COSMOS CT.**
**CARLSBAD, CA 92010, U.S.A.**

*Prepared by*
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NVLAP LAB CODE 200065-0

Revision History

| Rev. | Issue Date | Revisions | Revised By |
|---|---|---|---|
| -- | 01/07/08 | Initial issue | S. Shih |
| B | 03/24/09 | Revised section 5.1 and removed above 1GHz data | T. Chan |

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# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** SIERRA WIRELESS INC.
2290 COSMOS CT.
CARLSBAD, CA 92010, U.S.A.

**EUT DESCRIPTION:** PCA, EVDO MINI-PCI EXPRESS CARD CDMA MODEM

**MODELS:** AC402

**SERIAL NUMBER:** P7631080284D1

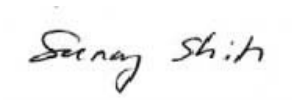
**DATE TESTED:** DECEMBER 17-18, 2008

| APPLICABLE STANDARDS | |
|---|---|
| **STANDARD** | **TEST RESULTS** |
| FCC PART 15 SUBPART B | PASS |
| ICES-003 ISSUE 4, 2004-02 | 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. 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:



SUNNY SHIH
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:

CHIN PANG
EMC ENGINEER
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# 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003 and ICES-003 ISSUE 4, 2004-02.

# 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://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. MEASUREMENT UNCERTAINTY

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

| PARAMETER | UNCERTAINTY |
|---|---|
| Power Line Conducted Emission | +/- 2.3 dB |
| Radiated Emission | +/- 3.4 dB |

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

# 5. EQUIPMENT UNDER TEST

## 5.1. DESCRIPTION OF EUT

The EUT is a Mini-PCI Express Card CDMA Wireless Modem intended for use in wireless networking applications, which manufactured by Sierra Wireless.

**GENERAL INFORMATION**

| | |
|---|---|
| CHASSIS MATERIAL | METAL |
| ENCLOSURE MATERIAL | METAL |
| POWER REQUIREMENTS | 100-240 VAC / 50-60 Hz |
| POWERLINE FILTER MANUFACTURER AND MODEL | None |
| LIST OF ALL OSCILLATOR FREQUENCIES GREATER THAN OR EQUAL TO 9 kHz | CPU: 2.0 GHz (Laptop); 48 MHz, 32.765 kHz |

## 5.2. PRELIMINARY TEST CONFIGURATIONS

The following configurations were investigated during preliminary testing:

| EUT Configuration | Description |
|---|---|
| Normal | EUT is interfaced to host Laptop via USB, and The Laptop connected with peripherals. |

## 5.3. MODE(S) OF OPERATION

| Mode | Description |
|---|---|
| Normal | The support Laptop that connected to the EUT transfers data (H-patterns) to 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** | **Manufacturer** | **Model** | **Serial Number** | **FCC ID** |
| Printer | Microline 186 | D22300A | AE5A048148A0 | DoC |
| USB Mouse | Logitech | 90.00026.7730 | HCA55002166 | DoC |
| USB Floppy Driver | Mitsumi | D353FUE | NA | DoC |
| Laptop | Toshiba | PSA8U-14N02K | 96275878Q | DoC |
| AC Adapter | Toshiba | PA3201U-ACA | 035D7299 | DoC |

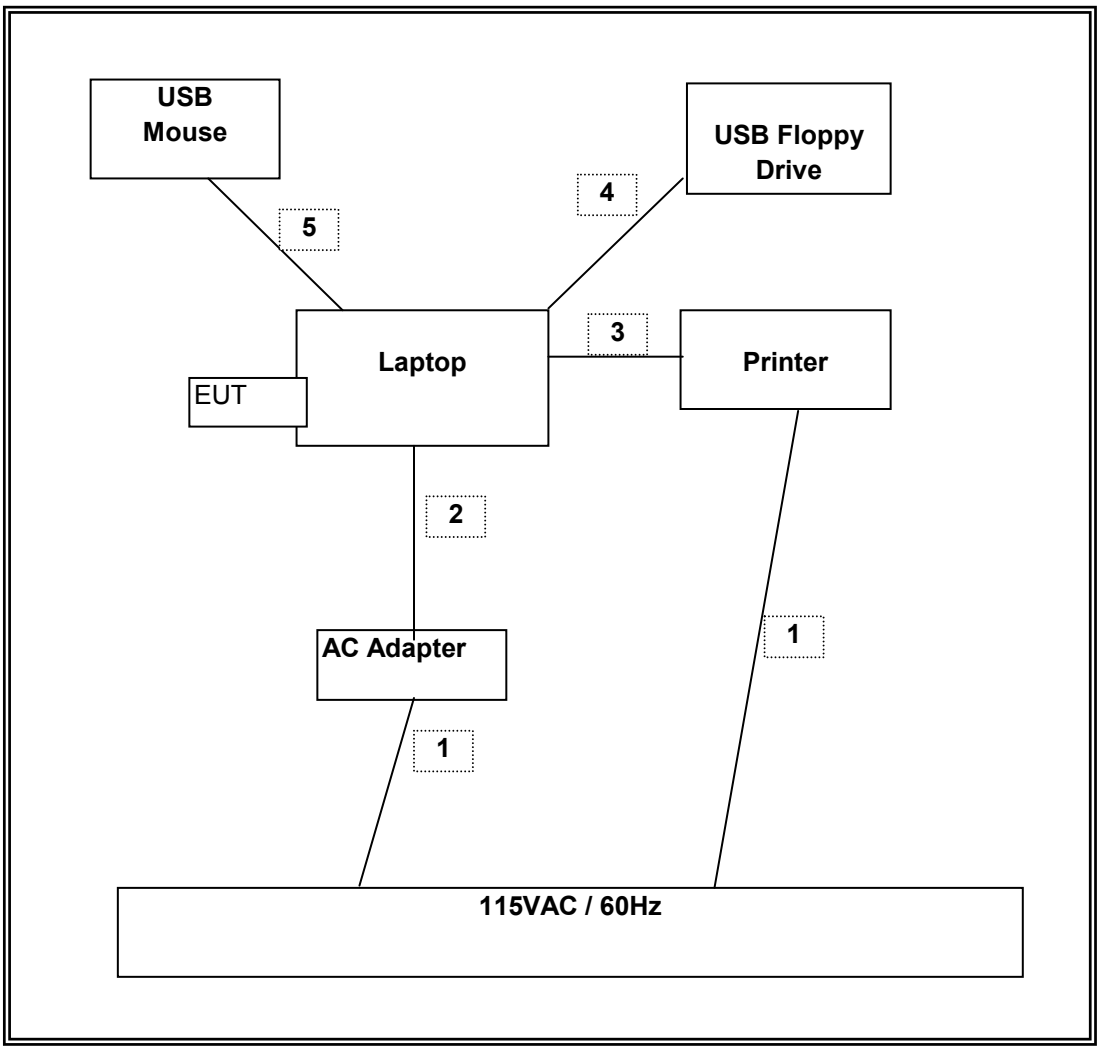
**I/O CABLES**

| I/O CABLE LIST | | | | | | |
|---|---|---|---|---|---|---|
| **Cable No.** | **Port** | **# of Identical Ports** | **Connector Type** | **Cable Type** | **Cable Length** | **Remarks** |
| 1 | AC | 1 | US 115V | Un-shielded | 2m | N/A |
| 2 | DC | 1 | DC | Un-shielded | 2m | N/A |
| 3 | USB | 1 | Printer | Un-shielded | 2m | N/A |
| 4 | USB | 1 | USB Floppy Drive | Un-shielded | 0.5m | N/A |
| 5 | USB | 1 | USB Mouse | Un-shielded | 2m | N/A |

**TEST SETUP**

The EUT Is connected to the support laptop via USB cable. The laptop also connected to other peripherals that data transfer takes place in between them.

**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** | **Cal Due** |
| LISN, 30 MHz | FCC | LISN-50/250-25-2 | N02625 | 10/22/09 |
| EMI Test Receiver, 30 MHz | R & S | ESHS 20 | N02396 | 08/06/09 |
| Antenna, Bilog, 2 GHz | Sunol Sciences | JB1 | C01011 | 02/11/09 |
| Antenna, Horn, 18 GHz | EMCO | 3115 | C00945 | 04/22/09 |
| Preamplifier, 26.5 GHz | Agilent / HP | 8449B | C01063 | 12/01/09 |
| Preamp, 1000MHz | Sonoma | 310N | N02891 | 03/31/09 |
| Spectrum Analyzer, 44 GHz | Agilent / HP | E4446A | C01012 | 03/03/09 |
| EMI Receiver, 2.9 GHz | Agilent / HP | 8542E | C00957 | 09/19/09 |
| RF Filter Section, 2.9 GHz | Agilent / HP | 85420E | C00958 | 09/19/09 |

# 7. APPLICABLE LIMITS AND TEST RESULTS

## 7.1. RADIATED EMISSIONS

**TEST PROCEDURE**

ANSI C63.4

The highest clock frequency generated or used in the EUT is 48MHz; therefore the frequency range was investigated from 30 MHz to 1000MHz.

**LIMIT**

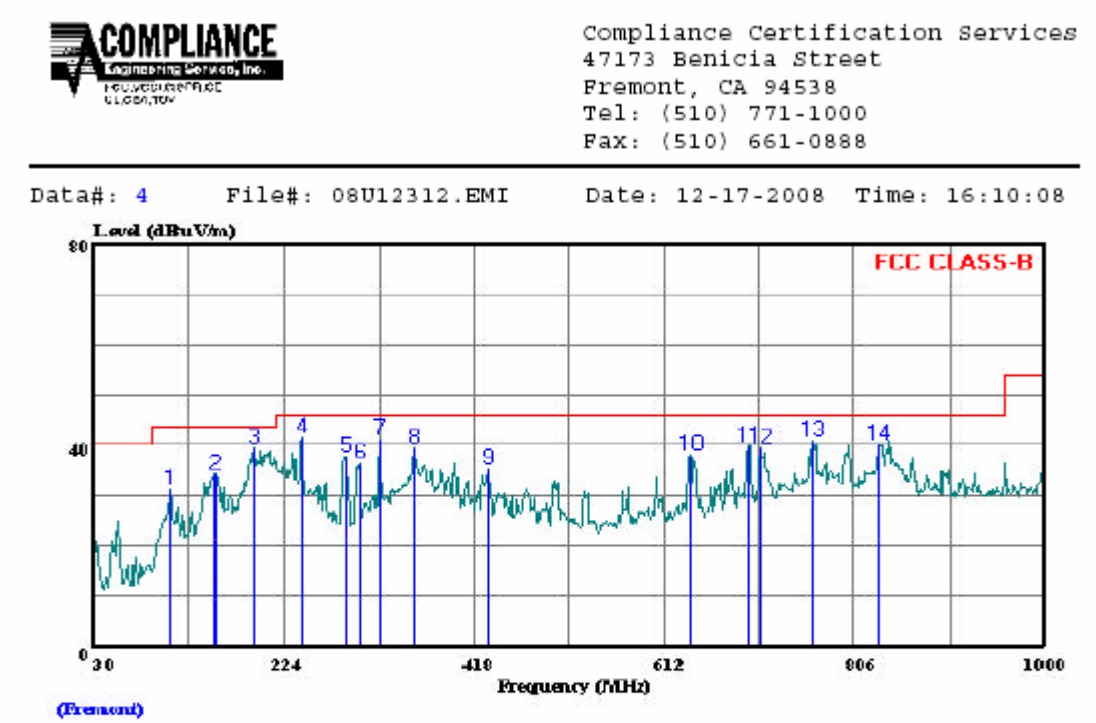
§15.109 (b) The field strength of radiated emissions from a Class A digital device, as determined at a distance of 10 meters, shall not exceed the following:

| Limits for radiated disturbance of Class A ITE at measuring distance of 10 m | |
|---|---|
| Frequency range (MHz) | Quasi-peak limits (dBµV/m) |
| 30 to 88 | 39 |
| 88 to 216 | 43.5 |
| 216 to 960 | 46.4 |
| Above 960 MHz | 49.5 |
| Note: The lower limit shall apply at the transition frequency. | |

**RESULTS**

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

HORIZONTAL PLOT AND DATA

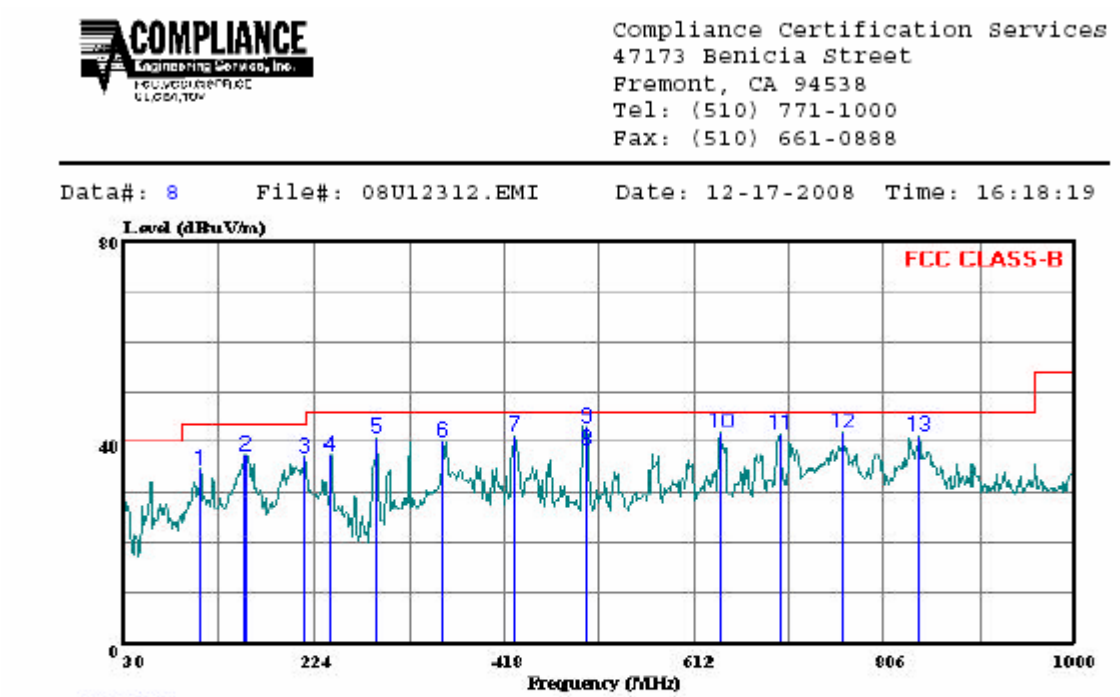


HORIZONTAL DATA

| | Freq | Read Level | Factor | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | |
| 1 | 107.600 | 50.50 | -19.32 | 31.18 | 43.50 | -12.32 | Peak |
| 2 | 154.160 | 52.67 | -18.46 | 34.21 | 43.50 | -9.29 | Peak |
| 3 | 192.960 | 56.50 | -17.18 | 39.32 | 43.50 | -4.18 | Peak |
| 4 | 241.460 | 59.17 | -17.72 | 41.45 | 46.00 | -4.55 | Peak |
| 5 | 287.050 | 54.00 | -16.11 | 37.89 | 46.00 | -8.11 | Peak |
| 6 | 301.600 | 51.83 | -15.49 | 36.34 | 46.00 | -9.66 | Peak |
| 7 | 321.000 | 56.17 | -14.93 | 41.24 | 46.00 | -4.76 | Peak |
| 8 | 355.920 | 53.50 | -13.94 | 39.56 | 46.00 | -6.44 | Peak |
| 9 | 432.550 | 47.00 | -11.74 | 35.26 | 46.00 | -10.74 | Peak |
| 10 | 639.160 | 45.83 | -7.67 | 38.17 | 46.00 | -7.83 | Peak |
| 11 | 697.360 | 46.33 | -6.40 | 39.93 | 46.00 | -6.07 | Peak |
| 12 | 709.970 | 45.50 | -6.13 | 39.37 | 46.00 | -6.63 | Peak |
| 13 | 763.320 | 46.00 | -5.15 | 40.85 | 46.00 | -5.15 | Peak |
| 14 | 830.250 | 44.17 | -3.93 | 40.23 | 46.00 | -5.77 | Peak |

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

VERTICAL PLOT



VERTICAL DATA

| | Freq | Read Level | Factor | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | |
| 1 | 107.600 | 53.83 | -19.32 | 34.52 | 43.50 | -8.98 | Peak |
| 2 | 154.160 | 56.00 | -18.46 | 37.54 | 43.50 | -5.96 | Peak |
| 3 | 215.270 | 54.67 | -17.47 | 37.20 | 43.50 | -6.30 | Peak |
| 4 | 239.520 | 55.17 | -17.70 | 37.47 | 46.00 | -8.53 | Peak |
| 5 | 288.020 | 57.00 | -16.05 | 40.95 | 46.00 | -5.05 | Peak |
| 6 | 354.950 | 54.00 | -13.97 | 40.03 | 46.00 | -5.97 | Peak |
| 7 | 428.670 | 53.17 | -11.85 | 41.31 | 46.00 | -4.69 | Peak |
| 8 | 501.420 | 48.26 | -9.81 | 38.45 | 46.00 | -7.55 | QP |
| 9 | 501.420 | 52.83 | -9.81 | 43.02 | 46.00 | -2.98 | Peak |
| 10 | 639.160 | 49.67 | -7.67 | 42.00 | 46.00 | -4.00 | Peak |
| 11 | 700.270 | 48.00 | -6.33 | 41.67 | 46.00 | -4.33 | Peak |
| 12 | 763.320 | 47.17 | -5.15 | 42.01 | 46.00 | -3.99 | Peak |
| 13 | 840.920 | 45.00 | -3.71 | 41.29 | 46.00 | -4.71 | Peak |

## 7.2. AC MAINS LINE CONDUCTED EMISSIONS

**TEST PROCEDURE**

ANSI C63.4

**LIMIT**

§15.107 (b) For a Class A digital device 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 μH/50 ohms 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 boundary between the frequency ranges.

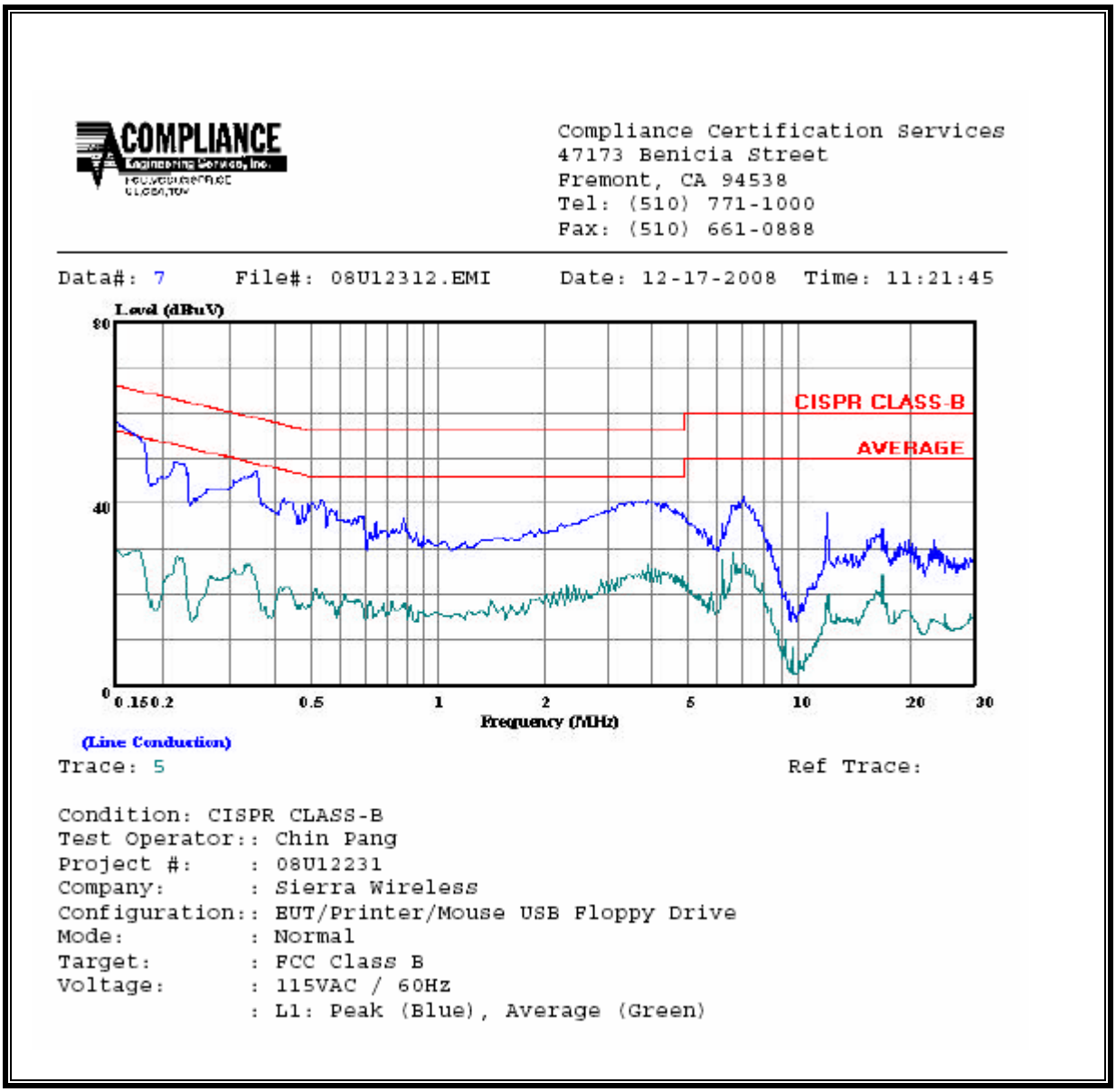
| Frequency range (MHz) | Limits (dBμV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15 to 0.50 | 79 | 66 |
| 0.50 to 30 | 73 | 60 |
| Note: The lower limit shall apply at the transition frequencies | | |

**RESULTS**

**6 WORST EMISSIONS**

| 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 |
| 0.16 | 56.93 | -- | 29.73 | 0.00 | 65.62 | 55.62 | -8.69 | -25.89 | L1 |
| 0.36 | 47.19 | -- | 26.75 | 0.00 | 58.77 | 48.77 | -11.58 | -22.02 | L1 |
| 7.14 | 41.47 | -- | 29.26 | 0.00 | 60.00 | 50.00 | -18.53 | -20.74 | L1 |
| 0.15 | 53.44 | -- | 25.20 | 0.00 | 66.00 | 56.00 | -12.56 | -30.80 | L2 |
| 0.36 | 38.39 | -- | 21.25 | 0.00 | 58.77 | 48.77 | -20.38 | -27.52 | L2 |
| 4.01 | 41.60 | -- | 26.86 | 0.00 | 56.00 | 46.00 | -14.40 | -19.14 | L2 |
| 6 Worst Data | | | | | | | | | |

**LINE 1 RESULTS**



**LINE 2 RESULTS**