FCC CFR47 PART 22 SUBPART H
AND PART 24 SUBPART E
CLASS II PERMISSIVE CHANGE
CERTIFICATION TEST REPORT
FOR

EXPRESS MINI-PCI USB WIRELESS CDMA MODEM MODULE

MODEL NUMBER: MC5720

FCC ID: N7N-MC5720

REPORT NUMBER: 06U10157-1

ISSUE DATE: MARCH 28, 2006

Prepared for
SIERRA WIRELESS
2290 COSMOS CT.
CARLSBAD, CA 92009, USA

Prepared by
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LAB CODE:200065-0

Revision History

Rev.	Date	Revisions	Revised By
--	3/28/06	Initial Issue	Thu

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SIERRA WIRELESS
2290 COSMOS CT.
CARLSBAD CALIFORNIA 92009
U.S.A

EUT DESCRIPTION: EXPRESS MINI-PCI USB WIRELESS CDMA MODEM MODULE

MODEL: MC5720

SERIAL NUMBER: LV-A056

DATE TESTED: MARCH 17-20, 2006

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 22 SUBPART H	NO NON-COMPLIANCE NOTED
FCC PART 24 SUBPART E	NO NON-COMPLIANCE NOTED

Compliance Certification Services, Inc. tested the above equipment in accordance with the requirements set forth in the above standards. 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 Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services 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:

THU CHAN
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:

CHIN PANG
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with TIA/EIA 603C (2004), ANSI C63.4-2003, FCC CFR 47 Part 2, FCC CFR 47 Part 15 and FCC CFR 47 Part 22H and 24E.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

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. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Radiated Emission, 30 to 200 MHz	+/- 3.3 dB
Radiated Emission, 200 to 1000 MHz	+4.5 / -2.9 dB
Radiated Emission, 1000 to 2000 MHz	+4.5 / -2.9 dB
Power Line Conducted Emission	+/- 2.9 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a dual band 800 / 1900MHz Express Mini-PCI USB Wireless CDMA Modem Module, and manufactured by Sierra Wireless, Inc.

5.2. CLASS II PERMISSIVE CHANGE DESCRIPTION

Add one 14" Laptop of ThinkPad R60 series.

5.3. MAXIMUM OUTPUT POWER

The transmitter has maximum ERP and EIRP output powers as follows:

Part 22 (824 - 849MHz) & Part 24 (1850 - 1910MHz) Authorized Band:

Frequency Range (MHz)	Modulation	ERP Peak Power (dBm)	ERP Peak Power (mW)
824.7 - 848.31	CDMA	26.10	407.38

Frequency Range (MHz)	Modulation	ERP Peak Power (dBm)	ERP Peak Power (mW)
1851.25 - 1908.75	CDMA	26.60	457.09

NOTE: RBW=VBW=3MHz

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an inverted F antenna, with a maximum gain of –0.50 dBi for Cellular band and -0.62 dBi for PCS band.

5.5. SOFTWARE AND FIRMWARE

The test utility software used during testing was Hyperterminal.

5.6. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power. Please refer to the previous project 05U3389.

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
AC Adapter	IBM	92P1160	570001030B	NA
Laptop	IBM	Thinkpad X60	AAGH349	DoC

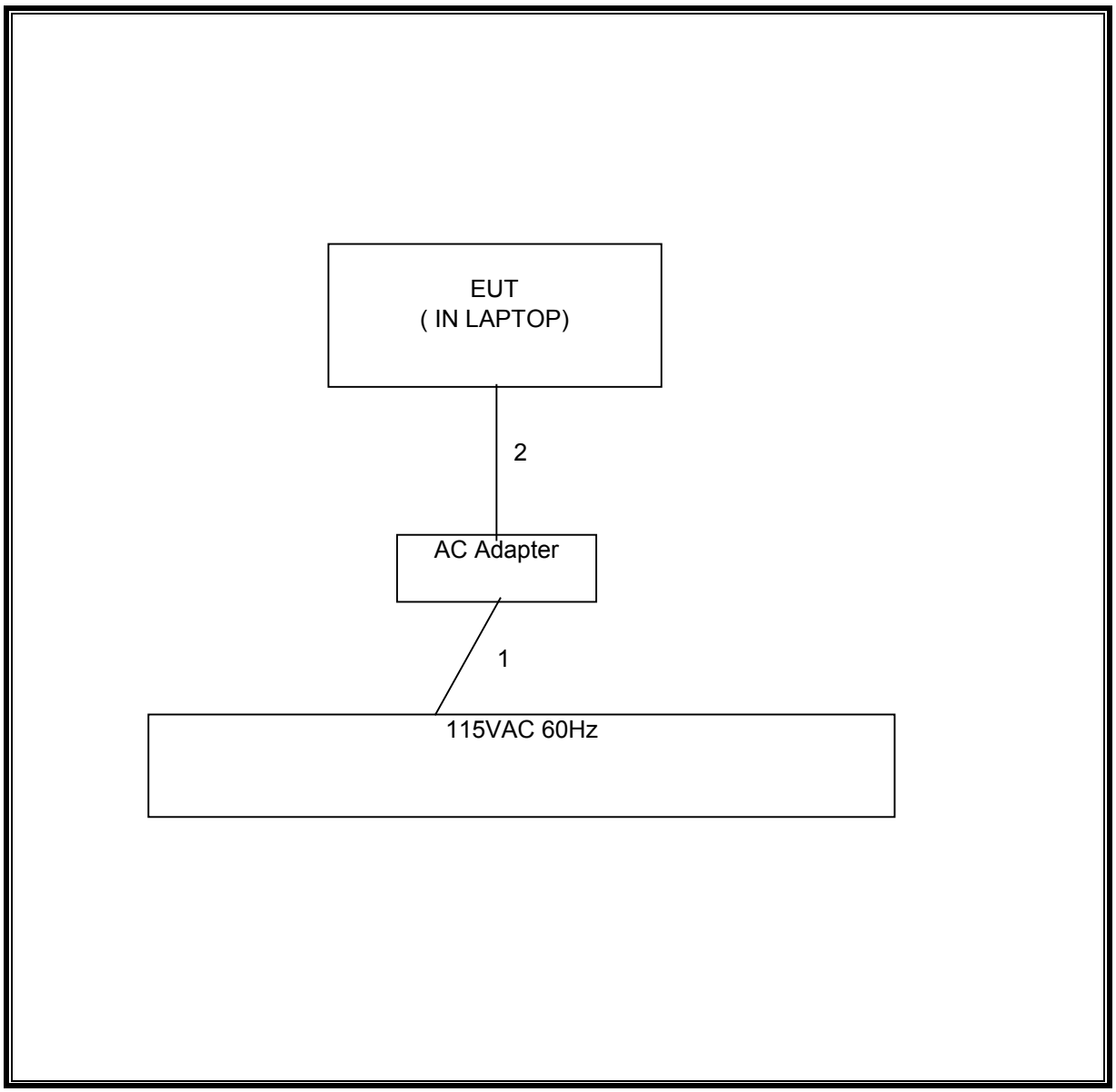
I/O CABLES

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	NA
2	DC	1	DC	Un-shielded	0.5m	NA

TEST SETUP

The EUT is installed inside the ThinkPad R60 during the tests. The HyperTerminal exercised the EUT.

RADIATED 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**
Antenna, Bilog 30 MHz ~ 2 Ghz	Sunol Sciences	JB1	A121003	9/3/06
Preamplifier, 1300 MHz	HP	8447D	1937A02062	1/7/07
Spectrum Analyzer, 26.5 GHz	HP	8593EM	3710A00205	7/26/06
EMI Test Receiver	R & S	ESHS 20	827129/006	6/3/06
LISN, 10 kHz ~ 30 MHz	FCC	LISN-50/250-25-2	2023	8/30/06
Preamplifier, 1 ~ 26.5 GHz	HP	8449B	3008A00369	8/17/06
Spectrum Analyzer, 26.5 GHz	HP	8593EM	3710A00205	7/6/06
Signal Generator, 1024 MHz	R & S	SMY01	DE 12311	04/11/06
Spectrum Analyzer 3 Hz ~ 44 GHz	Agilent	E4446A	US42510266	10/19/06
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	6717	04/22/06
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	2238	04/22/06

7. LIMITS AND RESULTS

7.1. RADIATED RF POWER OUTPUT

LIMIT

22.913(a) The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.
24.232(b) Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

TEST PROCEDURE

ANSI / TIA / EIA 603C Clause 2.2.17
The transmitter output is connected to the spectrum analyzer.

RESULTS

No non-compliance noted.

800 MHz CELL CDMA Modulation

Channel	Frequency (MHz)	ERP Peak Power (dBm)	ERP Peak Power (mW)
Low	824.7	22.80	190.55
Middle	836.5	24.90	309.03
High	848.3	26.10	407.38

1900 MHz PCS CDMA Modulation

Channel	Frequency (MHz)	EIRP Peak Power (dBm)	EIRP Peak Power (mW)
Low	1851.25	24.90	309.03
Middle	1880.00	26.60	457.09
High	1908.75	25.50	354.81

NOTE: RBW=VBW=3MHz.

CDMA Cellular Band Output Power (ERP)

03/17/06 High Frequency Substitution Measurement
Compliance Certification Services, Morgan Hill 5m Chamber Site

Test Engr: Chin Pang
Project #: 06U10157-1
Company: Sierra Wireless
EUT Descrip.: Express Mini-PCI USB Wireless CDMA Modem Module
EUT M/N: MC5720
Test Target: FCC 22
Mode Oper: TX, Fundamental

Test Equipment:
Receiving: Sunol T122, and 5m Chamber N-type Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 00022117, and 4ft SMA Cable Warehouse S/N: 177081002

f MHz	SA reading (dBuV/m)	Ant. Pol. (H/V)	SG reading (dBm)	CL (dB)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
824.20	100.3	V	23.3	0.5	0.0	22.8	38.5	-15.6	
824.20	99.9	H	21.6	0.5	0.0	21.1	38.5	-17.4	
836.50	101.5	V	25.5	0.6	0.0	24.9	38.5	-13.6	
836.50	100.6	H	22.4	0.6	0.0	21.8	38.5	-16.7	
848.80	102.2	V	26.8	0.7	0.0	26.1	38.5	-12.4	
848.80	100.3	H	22.2	0.7	0.0	21.5	38.5	-17.0	

NOTE: RBW=VBW=3MHz

PCS Output Power (EIRP)

3/17/2006 High Frequency Fundamental Measurement
Compliance Certification Services, Morgan Hill 5m Chamber Site

Test Engr: Chin Pang
Project #: 06U10157-1
Company: Sierra Wireless
EUT Descrip.: Express Mini-PCI USB Wireless CDMA Modem Module
EUT M/N: MC5720
Test Target: FCC 24
Mode Oper: TX, Fundamental

Test Equipment:
Receiving: Horn T73, and 12ft S/N: 197209005 (Setup this one for testing EUT)
Substitution: Horn T60 Substitution, 4ft SMA Cable Warehouse S/N: 177081002

f GHz	SA reading (dBuV/m)	Ant. Pol. (H/V)	SG reading (dBm)	CL (dB)	Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
1.850	94.5	H	17.3	0.9	8.3	24.7	33.0	-8.3	
1.850	94.8	V	17.5	0.9	8.3	24.9	33.0	-8.2	
1.880	94.0	H	17.1	0.9	8.3	24.5	33.0	-8.5	
1.880	96.8	V	19.2	0.9	8.3	26.6	33.0	-6.4	
1.910	90.7	H	14.1	0.9	8.4	21.6	33.0	-11.4	
1.910	95.0	V	18.0	0.9	8.4	25.5	33.0	-7.5	

NOTE: RBW=VBW=3MHz

7.2. FIELD STRENGTH OF SPURIOUS EMISSION

LIMIT

§22.917 (e) and §24.238 (a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

TEST PROCEDURE

ANSI / TIA / EIA 603C Clause 2.2.12, FCC 22.917 (h), & FCC 24.238 (b)

RESULTS

No non-compliance noted.

Note: No emissions were found within 30-1000MHz of 20dB below the system noise.

800MHz Band CDMA Spurious & Harmonic (ERP)

03/17/06 **High Frequency Substitution Measurement**
Compliance Certification Services, Morgan Hill 5m Chamber Site

Test Engr: Chin Pang
Project #: 06U10157-1
Company:Sierra Wireless
EUT Descrip.: Express Mini-PCI USB Wireless CDMA Modem Module (ThinkPad R60, ThinkPad R60p)
EUT M/N: MC5720-CDMA Module Class II, Add R1-Note 14 inch Screen Laptop
Test Target:FCC 22 / RSS-129
Mode Oper:Tx, 800MHz Band

Test Equipment:

EMCO Horn 1-18GHz: T73; S/N: 6717 @3m
Horn > 18GHz:
Limit: FCC 22
☑ High Pass Filter
Hi Frequency Cables: ☐ (2 ft) ☐ (2 ~ 3 ft) ☑ (4 ~ 6 ft) ☑ (12 ft)
Pre-amplifer 1-26GHz: T87 Miteq 924342
Pre-amplifer 26-40GHz:

f GHz	SA reading (dBuV/m)	Ant. Pol. (H/V)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch										
1.649	62.0	V	-46.0	2.1	8.3	6.2	-42.0	-13.0	-29.0	
2.474	56.0	V	-48.1	2.6	9.7	7.6	-43.2	-13.0	-30.2	
3.299	55.4	V	-45.4	3.0	9.8	7.7	-40.7	-13.0	-27.7	
4.125	55.0	V	-43.8	3.5	10.4	8.3	-39.0	-13.0	-26.0	
1.649	61.4	H	-45.9	2.1	8.3	6.2	-41.9	-13.0	-28.9	
2.474	53.8	H	-50.1	2.6	9.7	7.6	-45.2	-13.0	-32.2	
3.299	54.0	H	-46.7	3.0	9.8	7.7	-42.0	-13.0	-29.0	
4.125	53.2	H	-45.2	3.5	10.4	8.3	-40.4	-13.0	-27.4	
Mid Ch										
1.637	59.5	V	-48.6	2.1	8.3	6.1	-44.6	-13.0	-31.6	
2.510	54.7	V	-49.3	2.6	9.7	7.5	-44.3	-13.0	-31.3	
3.346	55.0	V	-45.7	3.1	9.9	7.7	-41.0	-13.0	-28.0	
4.182	53.4	V	-45.4	3.5	10.5	8.3	-40.6	-13.0	-27.6	
1.637	59.0	H	-48.4	2.1	8.3	6.1	-44.4	-13.0	-31.4	
2.510	53.0	H	-50.8	2.6	9.7	7.5	-45.8	-13.0	-32.8	
3.346	53.4	H	-47.2	3.1	9.9	7.7	-42.5	-13.0	-29.5	
4.182	52.3	H	-46.1	3.5	10.5	8.3	-41.3	-13.0	-28.3	
High Ch										
1.697	61.2	V	-46.6	2.1	8.4	6.3	-42.4	-13.0	-29.4	
2.545	55.5	V	-48.3	2.6	9.7	7.5	-43.4	-13.0	-30.4	
3.394	54.7	V	-45.8	3.1	9.9	7.7	-41.2	-13.0	-28.2	
4.242	53.2	V	-45.6	3.6	10.5	8.4	-40.7	-13.0	-27.7	
1.697	62.8	H	-44.3	2.1	8.4	6.3	-40.1	-13.0	-27.1	
2.545	55.0	H	-48.6	2.6	9.7	7.5	-43.7	-13.0	-30.7	
3.394	52.2	H	-48.2	3.1	9.9	7.7	-43.6	-13.0	-30.6	
4.242	52.3	H	-46.2	3.6	10.5	8.4	-41.3	-13.0	-28.3	

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

PCS Spurious & Harmonic (EIRP):

3/177/2006 **High Frequency Substitution Measurement**
Compliance Certification Services, Morgan Hill 5m Chamber Site

Test Engr: Chin Pang
Project #:06U10157-1
Company:Sierra Wireless
EUT Descrip.: Express Mini-PCI USB Wireless CDMA Modem Module (ThinkPad R60, ThinkPad R60p)
EUT M/N: MC5720-CDMA Module Class II, Add R1-Note 14 inch Screen Laptop
Test Target:FCC 24 / RSS-133
Mode Oper:Tx, 1900MHz Band

Test Equipment:

EMCO Horn 1-18GHz: T73; S/N: 6717 @3m
Horn > 18GHz:
Limit: FCC 24
☑ High Pass Filter
Hi Frequency Cables: ☐ (2 ft) ☐ (2 ~ 3 ft) ☑ (4 ~ 6 ft) ☑ (12 ft)
Pre-amplifer 1-26GHz: T87 Miteq 924342
Pre-amplifer 26-40GHz:

f GHz	SA reading (dBuV/m)	Ant. Pol. (H/V)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch										
3.703	63.3	V	-36.4	3.3	10.1	8.0	-29.5	-13.0	-16.5	
5.554	67.0	V	-29.6	4.3	11.0	8.8	-22.9	-13.0	-9.9	
7.405	57.5	V	-36.6	4.8	11.7	9.5	-29.8	-13.0	-16.8	
9.256	52.0	V	-39.5	5.4	12.2	10.0	-32.7	-13.0	-19.7	
3.703	65.6	H	-34.0	3.3	10.1	8.0	-27.1	-13.0	-14.1	
5.554	63.9	H	-31.7	4.3	11.0	8.8	-25.0	-13.0	-12.0	
7.405	62.3	H	-31.1	4.8	11.7	9.5	-24.2	-13.0	-11.2	
9.256	50.0	H	-41.5	5.4	12.2	10.0	-34.7	-13.0	-21.7	
Mid Ch										
3.760	63.1	V	-36.4	3.3	10.2	8.0	-29.5	-13.0	-16.5	
5.640	64.3	V	-32.3	4.3	11.1	8.9	-25.5	-13.0	-12.5	
7.520	62.9	V	-30.9	4.9	11.6	9.5	-24.2	-13.0	-11.2	
9.400	51.3	V	-39.9	5.4	12.3	10.1	-33.0	-13.0	-20.0	
3.760	64.0	H	-35.4	3.3	10.2	8.0	-28.5	-13.0	-15.5	
5.640	59.7	H	-35.9	4.3	11.1	8.9	-29.1	-13.0	-16.1	
7.520	63.6	H	-29.4	4.9	11.6	9.5	-22.7	-13.0	-9.7	
9.400	51.5	H	-39.7	5.4	12.3	10.1	-32.8	-13.0	-19.8	
High Ch										
3.818	68.5	V	-30.8	3.3	10.2	8.0	-23.9	-13.0	-10.9	
5.763	65.0	V	-31.6	4.4	11.2	9.1	-24.7	-13.0	-11.7	
7.635	58.0	V	-35.6	4.9	11.5	9.4	-28.9	-13.0	-15.9	
9.544	51.3	V	-39.6	5.5	12.4	10.2	-32.7	-13.0	-19.7	
3.818	66.8	H	-32.4	3.3	10.2	8.0	-25.6	-13.0	-12.6	
5.763	59.1	H	-36.5	4.4	11.2	9.1	-29.6	-13.0	-16.6	
7.635	56.2	H	-36.6	4.9	11.5	9.4	-29.9	-13.0	-16.9	
9.544	50.8	H	-40.1	5.5	12.4	10.2	-33.2	-13.0	-20.2	
Note: No other emissions were detected above the system noise floor.										