



**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: 05U3650-1

ISSUE DATE: SEPTEMBER 30, 2005

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

Prepared by
COMPLIANCE ENGINEERING SERVICES, INC.
d.b.a.
COMPLIANCE CERTIFICATION SERVICES
561F MONTEREY ROAD,
MORGAN HILL, CA 95037, USA
TEL: (408) 463-0885
FAX: (408) 463-0888

NVLAP[®]
LAB CODE:200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
A	9/30/05	Initial Issue	Thu

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>	<i>5</i>
4.2. <i>MEASUREMENT UNCERTAINTY.....</i>	<i>5</i>
5. EQUIPMENT UNDER TEST.....	6
5.1. <i>DESCRIPTION OF EUT</i>	<i>6</i>
5.2. <i>DESCRIPTION OF CLASS II PERMISSIVE CHANGE.....</i>	<i>6</i>
5.3. <i>DESCRIPTION OF AVAILABLE ANTENNAS.....</i>	<i>6</i>
5.4. <i>SOFTWARE AND FIRMWARE</i>	<i>6</i>
5.5. <i>WORST-CASE CONFIGURATION AND MODE.....</i>	<i>6</i>
5.6. <i>DESCRIPTION OF TEST SETUP</i>	<i>7</i>
6. TEST AND MEASUREMENT EQUIPMENT	9
7. LIMITS AND RESULTS	10
7.1. <i>RF POWER OUTPUT.....</i>	<i>10</i>
7.2. <i>SPURIOUS EMISSION AT ANTENNA TERMINAL.....</i>	<i>12</i>
8. SETUP PHOTOS	15

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SIERRA WIRELESS
2290 COSMOS CT.
CARLSBAD, CA 92009, USA

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

MODEL: MC5720

SERIAL NUMBER: 10505

DATE TESTED: SEPTEMBER 24, 2005

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 603A (2001), 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.

The module is manufactured by Flextronics Mfg. (HK) Ltd.

5.2. DESCRIPTION OF CLASS II PERMISSIVE CHANGE

The purpose of this class II permissive change is to add an alternative antenna.

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a Planner Inverted F type antenna with a maximum gain of 0.00 dBi for cellular band and 3.11 dBi for PCS band.

5.4. SOFTWARE AND FIRMWARE

The test utility software used during testing was Hyperterminal / ProcommPlus.

5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power. Low, mid and high channels were all investigated under this project.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

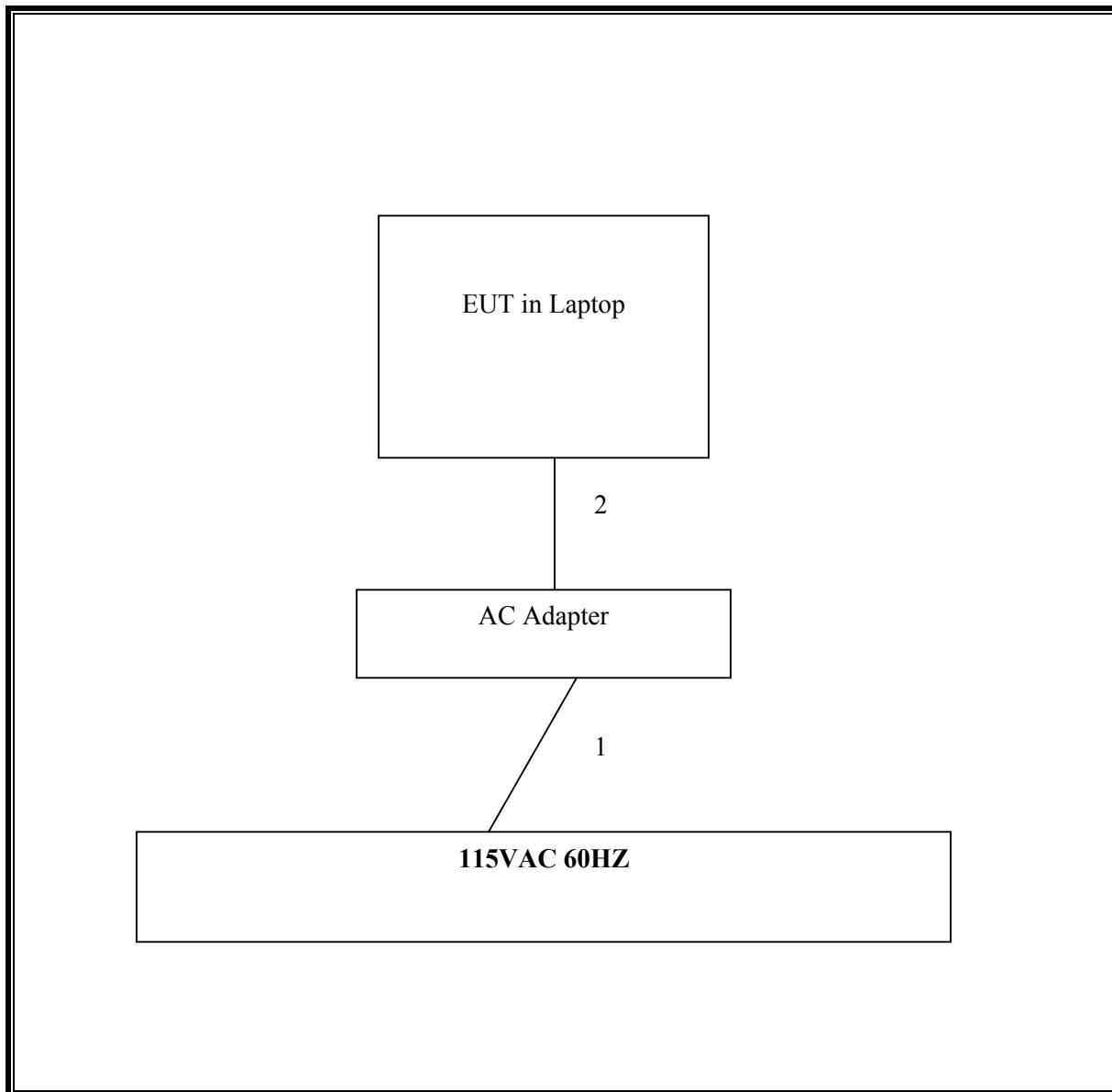
PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
DC Power Supply	IBM	PA-1900-171	530002520D	DoC
Laptop	IBM	Thinkpad BW1	S1VBW1B300000001	DoC

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 laptop during the tests.

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
30MHz— 2Ghz	Sunol Sciences	JB1 Antenna	A121003	9/22/06
Antenna, Horn 1 ~ 18 GHz	EMCO	3117	29301	9/12/06
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	6717	9/12/06
Amplifier 1-26GHz	MITEQ	NSP2600-SP	924341	8/17/06
Spectrum Analyzer, 26.5 GHz	HP	8593EM	3710A00205	1/6/06
Dipole	EMCO	3121C-DB2	22435	3/25/06
Signal Generator 2 -40 GHz	R & S	SMP04	DE 34210	5/2/06
Spectrum Analyzer	HP	E4446A	US42510266	08/25/06
Antenna, Bilog 30MHz ~ 2Ghz	Sunol Sciences	JB1	A121003	03/03/06
RF Filter Section	HP	85420E	3705A00256	03/29/06
EMI Receiver, 9 kHz ~ 2.9 GHz	HP	8542E	3942A00286	3/29/06

7. LIMITS AND RESULTS

7.1. 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 603 Clause 2.2.17

RESULTS

No non-compliance noted.

800 MHz CELL CDMA Modulation

Channel	Frequency (MHz)	ERP Peak Power (dBm)	ERP Peak Power (mW)
Low	824.7	20.60	114.82
Middle	836.5	20.10	102.33
High	848.3	22.30	169.82

1900 MHz PCS CDMA Modulation

Channel	Frequency (MHz)	EIRP Peak Power (dBm)	EIRP Peak Power (mW)
Low	1851.25	23.00	199.53
Middle	1880.00	22.20	165.96
High	1908.75	22.20	165.96

NOTE: RBW=VBW=3MHz.

In W-Note Host Laptop, CDMA 850 MHz Band, Output Power (ERP)

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	98.0	V	21.1	0.5	0.0	20.6	38.5	-17.9	
824.20	98.1	H	19.8	0.5	0.0	19.3	38.5	-19.2	
836.50	96.7	V	20.7	0.6	0.0	20.1	38.5	-18.4	
836.50	97.8	H	19.6	0.6	0.0	19.0	38.5	-19.5	
848.80	98.4	V	23.0	0.7	0.0	22.3	38.5	-16.2	
848.80	99.9	H	21.8	0.7	0.0	21.1	38.5	-17.3	

NOTE: RBW=VBW=3MHzIn W-Note Host Laptop, CDMA 1900 MHz Band, Output Power (EIRP)

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	92.8	H	15.6	0.9	8.3	23.0	33.0	-10.0	
1.850	92.8	V	15.4	0.9	8.3	22.8	33.0	-10.2	
1.880	90.0	H	13.1	0.9	8.3	20.6	33.0	-12.5	
1.880	92.4	V	14.7	0.9	8.3	22.2	33.0	-10.8	
1.910	87.4	H	10.8	0.9	8.4	18.3	33.0	-14.7	
1.910	91.7	V	14.7	0.9	8.4	22.2	33.0	-10.8	

NOTE: RBW=VBW=3MHz

7.2. SPURIOUS EMISSION AT ANTENNA TERMINAL

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 603 Clause 3.2.12, FCC 22.917 (h), & FCC 24.238 (b)

RESULTS

No non-compliance noted.

In W-Note Host Laptop, CDMA 850 MHz Band, Spurious & Harmonic (ERP)

09/24/05 High Frequency Substitution Measurement
Compliance Certification Services, Morgan Hill 5m Chamber Site

Test Engr:Chin Pang
Project #:05U3650
Company:Sierra Wireless
EUT Descrip.:CDMA, 850MHz
EUT M/N: MC5720, W-node, Plastic, EMC#1
Test Target:CDMA 850MHz
Mode Oper:TX

Test Equipment:

EMCO Horn 1-18GHz	Horn > 18GHz	Limit			
T73; S/N: 6717 @3m		FCC 22			
Hi Frequency Cables		<input checked="" type="checkbox"/> High Pass Filter			
<input type="checkbox"/> (2 ft)	<input checked="" type="checkbox"/> (2 ~ 3 ft)	<input type="checkbox"/> (4 ~ 6 ft)	<input checked="" type="checkbox"/> (12 ft)	Pre-amplifier 1-26GHz	Pre-amplifier 26-40GHz
				T34 HP 8449B	

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, 824.7MHz										
1.649	65.1	V	-40.5	1.6	8.3	6.2	-35.9	-13.0	-22.9	
2.474	53.7	V	-47.4	1.9	9.7	7.6	-41.8	-13.0	-28.8	
3.298	49.6	V	-47.9	2.3	9.8	7.7	-42.5	-13.0	-29.5	
4.123	42.6	V	-52.5	2.6	10.4	8.3	-46.8	-13.0	-33.8	
1.649	59.6	H	-45.3	1.6	8.3	6.2	-40.7	-13.0	-27.7	
2.474	51.0	H	-49.9	1.9	9.7	7.6	-44.3	-13.0	-31.3	
3.298	49.1	H	-48.3	2.3	9.8	7.7	-42.9	-13.0	-29.9	
4.123	44.1	H	-50.7	2.6	10.4	8.3	-45.0	-13.0	-32.0	
Mid Ch, 836.52MHz										
1.673	62.0	V	-43.5	1.6	8.4	6.2	-38.8	-13.0	-25.8	
2.510	54.5	V	-46.5	1.9	9.7	7.5	-40.8	-13.0	-27.8	
3.346	61.1	V	-36.3	2.3	9.9	7.7	-30.9	-13.0	-17.9	
4.182	44.2	V	-50.8	2.6	10.5	8.3	-45.1	-13.0	-32.1	
1.673	58.6	H	-46.2	1.6	8.4	6.2	-41.5	-13.0	-28.5	
2.510	52.0	H	-48.8	1.9	9.7	7.5	-43.1	-13.0	-30.1	
3.346	51.9	H	-45.4	2.3	9.9	7.7	-40.0	-13.0	-27.0	
4.182	42.2	H	-52.4	2.6	10.5	8.3	-46.8	-13.0	-33.8	
High Ch, 848.31MHz										
1.697	63.6	V	-41.7	1.6	8.4	6.3	-37.1	-13.0	-24.1	
2.545	55.1	V	-45.7	2.0	9.7	7.5	-40.1	-13.0	-27.1	
3.393	56.0	V	-41.2	2.3	9.9	7.7	-35.8	-13.0	-22.8	
4.242	43.0	V	-51.9	2.7	10.5	8.4	-46.2	-13.0	-33.2	
1.697	55.0	H	-49.6	1.6	8.4	6.3	-44.9	-13.0	-31.9	
2.545	52.3	H	-48.3	2.0	9.7	7.5	-42.7	-13.0	-29.7	
3.393	53.0	H	-44.1	2.3	9.9	7.7	-38.7	-13.0	-25.7	
4.242	43.4	H	-51.1	2.7	10.5	8.4	-45.4	-13.0	-32.4	
Note: No other emissions were detected above the system noise floor, from 30MHz-10th harmonic										

NOTE: RBW=VBW=1MHz

In W-Note Host Laptop, CDMA 1900 MHz Band, Spurious & Harmonic (EIRP)

09/24/05 High Frequency Substitution Measurement
 Compliance Certification Services, Morgan Hill 5m Chamber Site

Test Engr:Chin Pang
 Project #:05U3674
 Company:Sierra Wireless
 EUT Descrip.:CDMA, 1900MHz
 EUT M/N:MC5720, W-node, Plastic, EMC#1
 Test Target:CDMA 1900MHz
 Mode Oper:TX

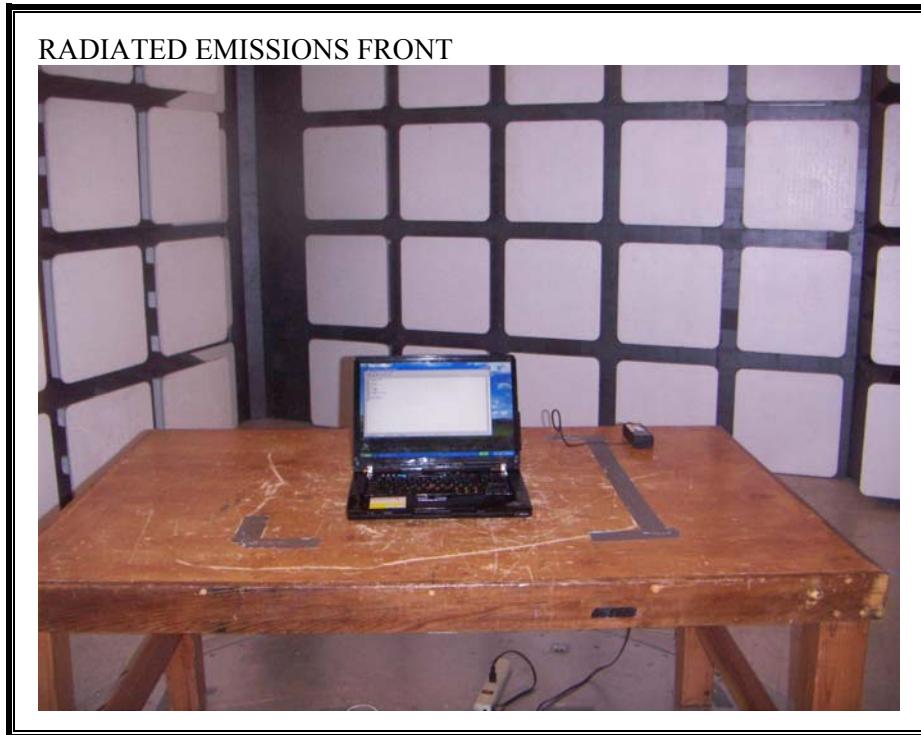
Test Equipment:

EMCO Horn 1-18GHz	Horn > 18GHz	Limit	<input checked="" type="checkbox"/> High Pass Filter
T73; S/N: 6717 @3m		FCC 24	
Hi Frequency Cables			
<input type="checkbox"/> (2 ft)	<input checked="" type="checkbox"/> (2 ~ 3 ft)	<input type="checkbox"/> (4 ~ 6 ft)	<input checked="" type="checkbox"/> (12 ft)
Pre-amplifier 1-26GHz		Pre-amplifier 26-40GHz	
T34 HP 8449B			

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
<u>Low Ch, 1851.25MHz</u>										
3.702	52.2	V	-44.1	2.4	10.1	8.0	-36.4	-13.0	-23.4	
5.554	63.1	V	-27.8	3.2	11.0	8.8	-20.0	-13.0	-7.0	
7.405	50.5	V	-37.7	3.7	11.7	9.5	-29.8	-13.0	-16.8	
9.256	42.0	V	-45.9	4.2	12.2	10.0	-37.9	-13.0	-24.9	
3.702	52.0	H	-44.2	2.4	10.1	8.0	-36.5	-13.0	-23.5	
5.554	60.0	H	-29.9	3.2	11.0	8.8	-22.1	-13.0	-9.1	
7.405	48.8	H	-38.6	3.7	11.7	9.5	-30.7	-13.0	-17.7	
9.256	42.0	H	-45.9	4.2	12.2	10.0	-37.9	-13.0	-24.9	
<u>Mid Ch, 1880MHz</u>										
3.760	55.4	V	-40.7	2.5	10.2	8.0	-33.0	-13.0	-20.0	
5.640	63.5	V	-27.3	3.3	11.1	8.9	-19.5	-13.0	-6.5	
7.520	54.3	V	-33.7	3.7	11.6	9.5	-25.8	-13.0	-12.8	
9.400	42.3	V	-45.6	4.2	12.3	10.1	-37.5	-13.0	-24.5	
3.760	53.3	H	-42.7	2.5	10.2	8.0	-35.0	-13.0	-22.0	
5.640	60.0	H	-29.8	3.3	11.1	8.9	-22.0	-13.0	-9.0	
7.520	51.7	H	-35.5	3.7	11.6	9.5	-27.6	-13.0	-14.6	
9.400	41.5	H	-46.4	4.2	12.3	10.1	-38.3	-13.0	-25.3	
<u>High Ch, 1908.75MHz</u>										
3.818	63.4	V	-32.5	2.5	10.2	8.0	-24.8	-13.0	-11.8	
5.726	65.2	V	-25.5	3.3	11.2	9.0	-17.7	-13.0	-4.7	
7.635	55.0	V	-32.7	3.8	11.5	9.4	-25.0	-13.0	-12.0	
9.544	43.0	V	-44.8	4.3	12.4	10.2	-36.7	-13.0	-23.7	
3.818	59.9	H	-35.9	2.5	10.2	8.0	-28.2	-13.0	-15.2	
5.726	60.1	H	-29.6	3.3	11.2	9.0	-21.7	-13.0	-8.7	
7.635	56.3	H	-30.6	3.8	11.5	9.4	-22.9	-13.0	-9.9	
9.544	42.7	H	-45.1	4.3	12.4	10.2	-37.0	-13.0	-24.0	
Note: No other emissions were detected above the system noise floor, from 30MHz-10th harmonic.										

NOTE: RBW=VBW=1MHz

8. SETUP PHOTOS



RADIATED EMISSIONS BACK

**END OF REPORT**