ITS Intertek Testing Services
ETL SEMKO

Class II Permissive Change
FCC Part 22 Test Report

Test performed
on the

CDPD RF Modem
Model: AirPath 300
FCC ID: N7NACRD2

for
Sierra Wireless, Inc.

Date of Test: December 8, 2001

Job ##: J20037843, 3016012
Report #: 20378433a
Total No. of Pages contained in this report: 13

David Chernomordik	Xi-Ming Yang, EMC Test Engineer for David Chernomordik, EMC Technical Manager

All services undertaken are subject to the following general policy: Reports are submitted for exclusive use of the client to whom they are addressed. Their significance is subject to the adequacy and representative character of the samples and to the comprehensiveness of the tests, examinations or surveys made. This report shall not be reproduced except in full, without written consent of Intertek Testing Services, NA Inc.

FCC Part 22, Certification, Ver 2/01

TABLE OF CONTENTS

1.0 Introduction

This Permissive Change Report is designed to show compliance for a certified device that is now also being used in a PDA.

1.1 Product Description

The AirPath300 is a springboard interface for the AirCard300. This interface allows the use of the AirCard300 in the Handspring Visor line of PDAs as a CDPD modem for wireless connectivity. All the RF circuitry is contained in the AirCard300 and is handled by the AirCard300. There are no modifications to the AirCard300 while it is used in the AirPath 300. The AirCard300 is a CDPD RF modem. The specifications for the RF modem are:

Technical Specifications
Type II PC Card
CDPD, Release 1.1
Transmit: 824 to 849 Mhz
Receive: 869 to 894 Mhz
Channel Spacing: 30 kHz
Freq. Stability: 2.5 ppm
Power Output (conducted): 600 mW

Power Consumption: 5V
Sleep Typical: 2 mA
Transmit Typical: 500 mA, Max: 650mA
(900 mAH Lithium Ion)

Environmental
Operating Temperature: 0° to +55°C
Storage Temperature: -20° to +65°C
Humidity: 95%, non-condensing
Vibration: 15G peak 10-2000 Hz (not operating)

1.2 Justification

As the transmitter (RF module, modulator, etc) is not modified, only Radiated Emission Tests required by FCC Part 22 were performed.

The following conducted emission tests were not performed:

- output power
- emission mask (occupied bandwidth)
- spurious conducted emission
- frequency stability

The use of the device in a new application can not effect the test results of the tests listed above.

1.3 Test Summary

FCC RULE	DESCRIPTION OF TEST	RESULT	PAGE
22.913	Effective Radiated Power	Complies	5
2.1053	Radiated Spurious Emission Attenuation	Complies	6
2.1093	Specific Absorption Rate	Complies	See separate report

2.0 Measurement Results

2.1 Effective Radiated Power

The Effective Radiated Power (ERP) of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

2.1.1 Test Procedure

ERP in frequency band 824-849 MHz, was measured using a substitution method.
The EUT was positioned on a non-conductive turntable, 0.8 m above the ground plane in a semi-anechoic chamber. The Spectrum Analyzer Reading at the fundamental frequency was recorded at 3m distance from the EUT to the test antenna. Maximum emission level was recorded with the rotation of the turntable and the raising and lowering of the test antenna. Testing was performed with the EUT located on the table upright and lying down (display face up) and with EUT's antenna oriented horizontally and vertically. The maximum of Spectrum Analyzer Reading was recorded at 3 fundamental frequencies.

The EUT was replaced by half-wave dipole connected to a signal generator. The measurements was performed in the same manner as described above, the spectrum analyzer reading was recorded and ERP in dBm was calculated as follows:

$$ERP = U_1 - U_2 + P$$

Where U_1 & U_2 are spectrum analyzer readings in dBuV when measured emissions from EUT & generator accordingly; P is the generator output in dBm.
The tests were performed with dipole placed vertically and horizontally.

2.1.2 Test Equipment

Hewlett Packard 8546A Spectrum Analyzer
EMCO 3148 Log Periodic Antenna
CDI Robert's Antenna
HP 83732A Signal Generator

2.1.3 Test Results

Passed	Refer to the attached data sheets.

Radiated Power (Substitution Method)

EUT in upright position, EUT's antenna in vertical position

Frequency MHz	Antenna Polariz.	Spectrum Analyzer Reading (EUT) dBµV	Spectrum Analyzer Reading (Sig. Gen. +Tuned Dipole) dBµV	Signal Generator Output * dBm	ERP dBm
824.0	V	99.6	73.0	-0.3	26.3
836.5	V	100.0	74.0	-0.3	25.7
849.0	V	100.6	73.1	-0.3	27.2

EUT in upright position, EUT's antenna in horizontal position

Frequency MHz	Antenna Polariz.	Spectrum Analyzer Reading (EUT) dBµV	Spectrum Analyzer Reading (Sig. Gen. +Tuned Dipole) dBµV	Signal Generator Output * dBm	ERP dBm
824.0	H	100.3	74.6	-0.3	25.4
836.5	H	99.8	74.4	-0.3	25.1
849.0	H	99.5	74.1	-0.3	25.1

EUT lying on the table, EUT's antenna in vertical position

Frequency MHz	Antenna Polariz.	Spectrum Analyzer Reading (EUT) dBµV	Spectrum Analyzer Reading (Sig. Gen. +Tuned Dipole) dBµV	Signal Generator Output * dBm	ERP dBm
824.0	V	100.6	73.0	-0.3	27.3
836.5	V	100.2	74.0	-0.3	25.9
849.0	V	100.5	73.1	-0.3	27.1

EUT lying on the table, EUT's antenna in horizontal position

Frequency MHz	Antenna Polariz.	Spectrum Analyzer Reading (EUT) dBµV	Spectrum Analyzer Reading (Sig. Gen. +Tuned Dipole) dBµV	Signal Generator Output * dBm	ERP dBm
824.0	H	102.7	74.6	-0.3	27.8
836.5	H	102.5	74.4	-0.3	27.8
849.0	H	101.5	74.1	-0.3	27.1

* level on the half-wave dipole input.

2.2 Radiated Spurious Emission Attenuation
FCC 2.1053, 22.917

2.2.1 Test Procedure

The frequency range up to tenth harmonic of each of the three fundamental frequencies (low, middle, and high channels) was investigated.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT.

At each spurious emission frequency the ERP was measured by the substitution method using a generator and horn antenna. The spurious emissions attenuation was calculated as the difference between ERP in dBm at the fundamental frequency (See Section 2.1) and at the spurious emissions frequency.

2.2.2 Test Equipment

EMCO 3115 Horn Antenna
HP 83732A Signal Generator
HP 8546A Spectrum Analyzer
Low Pass Filter
Preamplifier

2.2.3 Test Results

On the following pages, the test results of the Field Strength of Spurious Radiation are presented. The measured Field Strength of spurious emission on some frequencies is low, more then 20 dB below the equivalent Field Strength limit of spurious radiated power (which is -13 dBm). Therefore, only for second and third harmonics the substitution method was used. As can be seen, the attenuation is well below the limit.

Spurious Emission Attenuation performed by the substitution method

Frequency MHz	Field Strength measured from EUT dBuV/m	Generator output power required to produce the same FS dBm	ERP of the generator and Tx antenna dBm	Spurious Emission Attenuation dB	Limit for Spurious Attenuation dB	Margin dB
1648.10	66.2	-37.9	-33.0	58.4	41.0	-17.4
2472.15	50.9	-51.9	-46.6	72.0	41.0	-31.0
1673.06	61.2	-40.9	-36.0	61.1	41.0	-20.1
2509.60	65.4	-37.5	-32.2	57.3	41.0	-16.3
1697.96	57.3	-46.0	-41.1	66.2	41.0	-25.2
2546.93	48.4	-54.6	-49.3	74.4	41.0	-33.4

Radiated Emissions Test Data

Company:	Sierra Wireless	**Model #:** **S/N:**	AirPath300 269771	Req.	FCC 2.993
EUT:	CDPD Modem	**FCC #:**	**N7NACRD2**	Test Dist.	3 m
Project #:	J20037843	**Test Date:**	December 8, 2001		
Test Mode:	Tx @ 824MHz	**Engineer:**	Xi Ming Y.		

	Antenna Used			Pre-Amp Used			Cable Used	
Number:	8	11	21	12	8	10	21	0
Model:	EMCO 3115	LPB-2520A	3160-9	ACO/ 180	CDI_ P1000	AFT 18855	Grn_M+L	None

Frequency	**Reading**	**Detector**	**Ant.**	**Amp.**	**Ant. Pol.**	**Antenna Factor**	**Pre-Amp.**	**Insertion Loss**	**Net**
MHz	dB(µV)	P/A/Q	#	#	H/V	dB(1/m)	dB	dB	dB(µV/m)
1648.10	66.9	Peak	8	8	V	26.7	29.5	2.1	66.2
2472.17	48.0	Peak	8	8	V	29.1	28.5	2.3	50.9
3296.20	46.0	Peak	8	8	V	31.3	27.9	2.5	51.9
4120.26	42.8	Peak	8	8	V	34.5	27.9	2.9	52.3
4944.28	50.2	Peak	8	8	V	34.0	28.1	3.2	59.3
5768.35	43.9	Peak	8	8	V	36.6	28.3	3.7	55.9
6592.40	43.2	Peak	8	8	H	36.6	28.0	4.2	56.0
7416.47	49.0	Peak	8	8	H	36.8	28.0	4.3	62.1
8240.50	34.0	Peak	8	8	H	37.2	27.2	4.8	48.8

a) Insert. Loss = Cable A + Cable B.
b) Net = Reading + Antenna Factor - Pre-Amp + Insertion Loss.

Radiated Emissions Test Data

Company:	Sierra Wireless	**Model #:** **S/N:**	AirPath300 269771	Req.	FCC 2.993
EUT:	CDPD Modem	**FCC #:**	**N7NACRD2**	Test Dist.	3 m
Project #:	J20037843	**Test Date:**	December 8, 2001		
Test Mode:	Tx @ 836.5MHz	**Engineer:**	Xi Ming Y.		

	Antenna Used			Pre-Amp Used			Cable Used	
Number:	8	11	21	12	8	10	21	0
Model:	EMCO 3115	LPB-2520A	3160-9	ACO/ 180	CDI_ P1000	AFT 18855	Grn_M+L	None

Frequency	**Reading**	**Detector**	**Ant.**	**Amp.**	**Ant. Pol.**	**Antenna Factor**	**Pre-Amp.**	**Insertion Loss**	**Net**
MHz	dB(µV)	P/A/Q	#	#	H/V	dB(1/m)	dB	dB	dB(µV/m)
1637.06	61.9	Peak	8	8	V	26.7	29.5	2.1	61.2
2509.64	61.0	Peak	8	8	V	30.6	28.5	2.3	65.4
3346.12	45.0	Peak	8	8	H	31.5	27.9	2.5	51.1
4182.65	50.8	Peak	8	8	V	34.5	27.9	2.9	60.3
5019.14	52.5	Peak	8	8	H	35.4	28.3	3.5	63.1
5855.67	45.0	Peak	8	8	V	36.6	28.3	3.7	57.0
6692.20	45.0	Peak	8	8	V	36.4	28.0	4.2	57.6
7528.20	42.0	Peak	8	8	H	38.3	28.0	4.6	56.9
8365.26	34.2	Peak	8	8	H	37.2	27.2	4.8	49.0

a) Insert. Loss = Cable A + Cable B.
b) Net = Reading + Antenna Factor - Pre-Amp + Insertion Loss.

Radiated Emissions Test Data

Company:	Sierra Wireless	**Model #:**	AirPath300	Req.	FCC 2.993
		S/N:	269771		
EUT:	CDPD Modem	**FCC #:**	**N7NACRD2**	Test Dist.	3 m
Project #:	J20037843	**Test Date:**	December 8, 2001		
Test Mode:	Tx @ 849MHz	**Engineer:**	Xi Ming Y.		

	Antenna Used			Pre-Amp Used			Cable Used	
Number:	8	11	21	12	8	10	21	0
Model:	EMCO 3115	LPB-2520A	3160-9	ACO/ 180	CDI_ P1000	AFT 18855	Grn_M+L	None

Frequency	**Reading**	**Detector**	**Ant.**	**Amp.**	**Ant. Pol.**	**Antenna Factor**	**Pre-Amp.**	**Insertion Loss**	**Net**
MHz	dB(µV)	P/A/Q	#	#	H/V	dB(1/m)	dB	dB	dB(µV/m)
1697.90	58.0	Peak	8	8	V	26.7	29.5	2.1	57.3
2546.93	44.0	Peak	8	8	H	30.6	28.5	2.3	48.4
3395.87	42.0	Peak	8	8	H	31.5	27.9	2.5	48.1
4244.89	42.5	Peak	8	8	V	34.5	27.9	2.9	52.0
5093.85	51.0	Peak	8	8	H	35.4	28.3	3.5	61.6
5942.85	44.0	Peak	8	8	V	36.6	28.3	3.7	56.0
6791.81	45.0	Peak	8	8	V	36.4	28.0	4.2	57.6
7640.75	41.0	Peak	8	8	V	37.8	27.8	4.6	55.6
8490.00	33.0	Peak	8	8	H	37.2	27.1	4.8	47.9

a) Insert. Loss = Cable A + Cable B.
b) Net = Reading + Antenna Factor - Pre-Amp + Insertion Loss.

3.0 Test Equipment

Equipment	Manufacturer	Model/Type	Serial #	Cal Int	Cal Due
Log-periodic Antenna	EMCO	3148	9904-1062	12	2/26/02
Half-wave dipole	CDI	Roberts Antenna	331	12	10/09/02
Horn Antenna	EMCO	3115	9170-3712	12	3/17/02
Horn Antenna	EMCO	3115	8812-3049	12	3/08/02
Pre-Amplifier	CDI	P1000	N/A	12	10/07/02
EMI Receiver	Hewlett Packard	8546A	3710A00373	12	7/20/02
Signal Generator	Hewlett Packard	83732A	3222A00119	12	08/02/02

4.0 Configuration Photograph

FCC Part 2 Radiated Power and Radiated Spurious Emission Attenuation Test