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: February 18, 2001
Job #: J20037843

NVLAP Laboratory Code: 200201-0

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

Review Date: _____

FCC Part 22, Certification, Ver 2/01

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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: 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 and Part 15 (for unintentional radiation) 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	Passed	5
2.1053	Radiated Spurious Emission Attenuation	Passed	14
15.109	Radiation from digital parts	Passed	17
15.107	AC Line conducted emissions	Passed	17
2.1093	Specific Absorption Rate	Passed	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

The EUT was positioned on a non-conductive turntable, 0.8m above the ground plane on an open test site. The radiated emission at the fundamental frequency was measured at 3m distance with a test antenna and spectrum analyzer. During the measurement, the resolution and video bandwidths of the spectrum analyzer were set to 100 kHz (for frequencies below 1 GHz) and 1 MHz (for frequencies above 1 GHz).

Worst case emission was recorded with the rotation of the turntable and the raising and lowering of the test antenna. The spectrum analyzer reading was recorded and the field strength (E in dBuV/m) was calculated.

ERP in frequency band 824-849 MHz, was measured using a substitution method. The EUT was replaced by half-wave dipole connected to a signal generator. The spectrum analyzer reading was recorded and ERP was calculated as follows:

$$ERP = E_1 - E_2 + P$$

Where E_1 & E_2 are spectrum analyzer readings in dBuV/m when measured field strength from EUT & generator accordingly; P is the generator output in dBm.

2.1.2 Test Equipment

Hewlett Packard HP8566B Spectrum Analyzer
EMCO LPA-25 Log Periodic Antenna
CDI Robert's Antenna
HP 8663A Signal Generator

2.1.3 Test Results

Passed	Refer to the attached data sheets.

Field Strength of fundamental

Frequency MHz	**Antenna Polarity**	**Detector**	**SA Reading dB(µV)**	**Antenna Factor dB(1/m)**	**Cable Loss dB**	**Field Strength dB(µV/m)**
824.0	V	Peak	104.8	23.0	2.0	129.8
836.5	V	Peak	102.7	23.3	2.0	128.0
849.0	V	Peak	103.8	23.3	2.0	129.1

Radiated Power (Substitution Method)

Frequency MHz	Antenna Polariz.	Field Strength (EUT) dBµV/m	Field Strength (Sig. Gen. +Tuned Dipole) dBµV/m	Signal Generator Output dBm	ERP dBm
824.0	V	129.8	112.4	9.0	26.4
836.5	V	128.0	111.9	9.0	25.1
849.0	V	129.1	111.6	8.7	26.2

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 8663A Signal Generator
HP 8566B Spectrum Analyzer
Tektronix 2782 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	EIRP of the generator and Tx antenna dBm	Spurious Emission Attenuation dB	Limit for Spurious Attenuation dB	Margin dB
1648.10	67.1	-37.0	-32.1	58.5	41.0	-17.5
2473.15	46.9	-55.9	-50.6	77.0	41.0	-36.0
1673.06	59.8	-40.2	-35.3	60.4	41.0	-19.4
2509.60	74.6	-31.7	-26.4	51.5	41.0	-10.5
1697.96	64.3	-42.4	-37.5	63.7	41.0	-22.7
2546.93	60.2	-43.8	-38.5	64.7	41.0	-23.7

Radiated Emissions Test Data

Company:	Sierra wireless	**Model #:**	AirPath300	Req.	FCC 2.993		
EUT:	CDPD Modem	**FCC ID:**	**N7NACRD2**	Test Dist.	3	meters	
Project #:	J20037843	**Test Date:**	February 18. 2001	TP	0.44	Watt	
Test Mode:	Tx @ 824 MHz	**Engineer:**	Xi Ming Y.	Min. Attn.	39.43	dBc	

	Antenna Used			Pre-Amp Used			Cable Used			Transducer Used
Number	8	18	12	0	8	13	21	0	0	0
Model:	EMCO 3115	0	EMCO 3104	None	CDI_P1000	ACO/400	Grn_M+L	None	None	None

Frequency	**Reading**	**Detector**	**Ant.**	**Amp.**	**Ant. Pol.**	**Ant. Factor**	**Pre-Amp**	**Insert. Loss**	**Net**	**ERP**	**Attn.**	**Margin**
MHz	dB(µV)	P/A/Q	#	#	H/V	dB(1/m)	dB	dB	dB(µV/m)	mW	dBc	dB
824.00	104.8	Peak	18	0	V	23.0	0.0	2.0	129.8	1.75E+03	-	-
824.00	104.8	Ave.	18	0	V	23.0	0.0	2.0	129.8	1.75E+03	-	-
1648.10	67.8	Peak	8	8	V	26.7	29.5	2.1	67.1	9.38E-04	62.7	-23.3
2473.15	44.0	Peak	8	8	V	29.1	28.5	2.3	46.9	8.96E-06	82.9	-43.5
3296.20	54.8	Peak	8	8	H	31.5	27.9	2.5	60.9	2.25E-04	68.9	-29.5
4120.25	44.4	Peak	8	8	V	34.5	27.9	2.9	53.9	4.49E-05	75.9	-36.5
4944.26	54.8	Peak	8	8	V	34.0	28.1	3.2	63.9	8.96E-04	65.9	-26.5
5768.30	47.0	Peak	8	8	H	36.6	28.3	3.7	59.0	1.45E-04	70.8	-31.4
6592.35	41.2	Peak	8	8	H	36.6	28.0	4.2	54.0	4.59E-05	75.8	-36.4
7416.40	50.2	Peak	8	8	H	36.8	28.0	4.3	63.3	3.91E-04	66.5	-27.1
8240.42	32.0	Peak	8	8	H	37.2	27.2	4.8	46.8	8.76E-06	83.0	-43.6

Notes:

a) O.C.F.:Other Correction Factor
b) Insert. Loss = Cable A + Cable B + Cable C + Transducer.
c) Net = Reading + Antenna Factor - Pre-Amp + Insert. Loss.
d) Attn. = Field Strength (Fundamental) - Field Strength (Harmonics).
e) Negative signs (-) in Margin column signify levels below the limits.

Radiated Emissions Test Data

Company:	Sierra wireless	**Model #:**	AirPath300	Req.	FCC 2.993		
EUT:	CDPD Modem	**FCC #:**	**N7NACRD2**	Test Dist.	3	meters	
Project #:	J20037843	**Test Date:**	February 18. 2001	TP	0.32	Watt	
Test Mode:	Tx @ 836 MHz	**Engineer:**	Xi Ming Y.	Min. Attn.	38.05	dBc	

	Antenna Used			Pre-Amp Used			Cable Used			Transducer Used
Number:	8	18	12	0	8	13	21	0	0	0
Model:	EMCO 3115	0	EMCO 3104	None	CDI_P1000	ACO/400	Grn_M+L	None	None	None

Frequency	**Reading**	**Detector**	**Ant.**	**Amp.**	**Ant. Pol.**	**Ant. Factor**	**Pre-Amp**	**Insert. Loss**	**Net**	**ERP**	**Attn.**	**Margin**
MHz	dB(µV)	P/A/Q	#	#	H/V	dB(1/m)	dB	dB	dB(µV/m)	mW	dBc	dB
836.53	102.7	Peak	18	0	V	23.3	0.0	2.0	128.0	1.15E+03	-	-
836.53	102.7	Ave.	18	0	V	23.3	0.0	2.0	128.0	1.15E+03	-	-
1673.06	60.5	Peak	8	8	V	26.7	29.5	2.1	59.8	1.75E-04	68.2	-30.1
2509.60	70.2	Peak	8	8	H	30.6	28.5	2.3	74.6	5.28E-03	53.4	-15.3
3346.12	56.9	Peak	8	8	H	31.5	27.9	2.5	63.0	3.65E-04	65.0	-26.9
4182.65	44.0	Peak	8	8	V	34.5	27.9	2.9	53.5	4.10E-05	74.5	-36.4
5019.14	54.8	Peak	8	8	V	35.4	28.3	3.5	64.4	1.27E-03	62.6	-24.5
5855.67	48.0	Peak	8	8	H	36.6	28.3	3.7	60.0	1.83E-04	68.0	-29.9
6692.20	52.0	Peak	8	8	H	36.6	28.0	4.2	64.8	8.76E-04	63.2	-25.1
7528.73	42.5	Peak	8	8	H	38.3	28.0	4.6	57.4	1.01E-04	70.6	-32.5
8365.26	34.0	Peak	8	8	H	37.2	27.2	4.8	48.8	1.39E-05	79.2	-41.1

Notes:

a) O.C.F.:Other Correction Factor
b) Insert. Loss = Cable A + Cable B + Cable C + Transducer.
c) Net = Reading + Antenna Factor - Pre-Amp + Insert. Loss.
d) Attn. = Field Strength (Fundamental) - Field Strength (Harmonics).
e) Negative signs (-) in Margin column signify levels below the limits.

Radiated Emissions Test Data

Company	Sierra wireless	**Model #:**	AirPath300	Req.	FCC 2.993		
EUT:	CDPD Modem	**FCC ID**	N7NACRD2	Test Dist.	3	meters	
Project #:	J20037843	**Test Date:**	February 18. 2001	TP	0.42	Watt	
Test Mode:	Tx @ 849 MHz	**Engineer:**	Xi Ming Y.	Min. Attn.	39.23	dBc	

	Antenna Used			Pre-Amp Used			Cable Used			Transducer Used
Number:	8	18	12	0	8	13	21	0	0	0
Model:	EMCO 3115	0	EMCO 3104	None	CDI_P1000	ACO/400	Grn_M+L	None	None	None

Frequency	**Reading**	**Detector**	**Ant**	**Amp.**	**Ant. Pol.**	**Ant. Factor**	**Pre-Amp**	**Insert. Loss**	**Net**	**ERP**	**Attn.**	**Margin**
MHz	dB(µV)	P/A/Q	#	#	H/V	dB(1/m)	dB	dB	dB(µV/m)	mW	dBc	dB
849.00	103.8	Peak	18	0	V	23.3	0.0	2.0	129.1	1.49E+03	-	-
849.00	103.8	Ave.	18	0	V	23.3	0.0	2.0	129.1	1.49E+03	-	-
1697.96	65.0	Peak	8	8	V	26.7	29.5	2.1	64.3	2.47E-04	64.8	-25.6
2546.93	55.8	Peak	8	8	H	30.6	28.5	2.3	60.2	1.92E-04	68.9	-29.7
3395.87	52.0	Peak	8	8	H	31.5	27.9	2.5	58.1	1.18E-04	71.0	-31.8
4244.89	36.0	Peak	8	8	V	34.5	27.9	2.9	45.5	6.49E-06	83.6	-44.4
5093.85	43.9	Peak	8	8	V	35.4	28.3	3.5	54.5	5.16E-05	74.6	-35.4
5942.85	44.5	Peak	8	8	H	36.6	28.3	3.7	56.5	8.17E-05	72.6	-33.4
6791.81	50.2	Peak	8	8	H	36.6	28.0	4.2	63.0	3.65E-04	66.1	-26.9
7640.75	47.4	Peak	8	8	H	38.3	27.8	4.6	62.5	3.25E-04	66.6	-27.4
8365.26	32.0	Peak	8	8	H	37.2	27.2	4.8	46.8	8.76E-06	82.3	-43.1

Notes:

a) O.C.F.:Other Correction Factor
b) Insert. Loss = Cable A + Cable B + Cable C + Transducer.
c) Net = Reading + Antenna Factor - Pre-Amp + Insert. Loss.
d) Attn. = Field Strength (Fundamental) - Field Strength (Harmonics).
e) Negative signs (-) in Margin column signify levels below the limits.

2.3 Radiated emission from digital part of transceiver.
FCC 15.109

The following radiated emission limits apply to Class B unintentional radiators:

Radiated Emissions Limits, Section 15.109(a)

Frequency MHz	Class B at 3m µV/m	Class B at 3m dB(µV/m)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Note: Three sets of units are commonly used for EMI measurement, decibels below one milliwatt (-dBm), decibels above a microvolt, dB(mV), and microvolts (mV). To convert between them, use the following formulas: 20 LOG_{10} (mV) = dB(mV), dB(m) = dB(mV)-107.

2.3.1 Test Procedures

The test procedures, as described in American National Standards Institute C63.4-1992, were employed 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.

2.3.2 Test Results

Test Result:	Passed, refer to the test data on the next page.

Radiated Emissions Test Data

Company:	Sierra wireless			**Model #:**	AirPath300	**Standard**	**FCC § 15B**	
EUT:	CDPD Modem			**FCC ID:**	N7NACRD2	**Limits**	2	
Project #:	J20037843			**Test Date:**	February 18. 2001	**Test Distance_**	3	meters
Test Mode:	Rx			**Engineer:**	Xi-Ming Y.	**Duty Relaxation**	0	dB

	Antenna Used			Pre-Amp Used			Cable Used			Transducer Used
Number:	1	8	22	2	8	0	22	0	0	0
Model:	EMCO 3143	EMCO 3115	3160-10	HP 8447D	CDI_P1000	None	Grn_M+L	None	None	None

Frequency	**Reading**	**Detector**	**Ant**	**Amp.**	**Ant. Pol.**	**Ant. Factor**	**Pre-Amp**	**Insert. Loss**	**D. C. F.**	**Net**	**Limit @3m**	**Margin**
MHz	dB(µV)	P/A/Q	#	#	H/V	dB(1/m)	dB	dB	dB	dB(µV/m)	dB(µV/m)	dB
79.20E+0	58.0	QP	1	2	V	6.6	32.4	1.0	0.0	33.2	40.0	-6.8
175.00E+0	58.3	QP	1	2	V	9.1	32.0	1.6	0.0	37.0	43.5	-6.5
405.00E+0	55.0	QP	1	2	V	15.6	33.2	2.6	0.0	40.0	46.0	-6.0
646.00E+0	40.0	QP	1	2	V	18.9	33.3	3.4	0.0	29.0	46.0	-17.0
914.07E+0	49.0	QP	1	2	V	22.3	33.1	4.2	0.0	42.4	46.0	-3.6
926.81E+0	48.0	QP	1	2	V	22.6	33.1	4.2	0.0	41.7	46.0	-4.3
938.97E+0	47.5	QP	1	2	V	22.6	33.1	4.2	0.0	41.2	46.0	-4.8
1828.14E+0	32.0	Ave.	8	8	H	26.9	29.3	0.0	0.0	29.6	54.0	-24.4
1853.62E+0	31.0	Ave.	8	8	V	26.7	29.3	0.0	0.0	28.4	54.0	-25.6
1877.94E+0	33.0	Ave.	8	8	H	26.9	29.3	0.0	0.0	30.6	54.0	-23.4

Notes:

a) D.C.F.:Distance Correction Factor
b) Insert. Loss (dB) = Cable A + Cable B + Cable C .
c) Net (dB) = Reading + Antenna Factor - Pre-amp + Insert. Loss. - Transducer Loss - Duty Relaxation (transmitter only).
d) Negative signs (-) in Margin column signify levels below the limits.
e) All other emissions not reported are below the equipment noise floor which is at least 20 dB below the limits.

2.4 AC Mains Line-Conducted Emissions

2.4.1 Line Conducted Emission Limits

The following AC line conducted emission limits apply to Class B unintentional radiators:

Conducted Emissions Limits, Section 15.107(a)

Frequency MHz	Class B µV	Class B dB(µV)
0.45 - 1.705	250	48
1.705 to 30.000	250	48

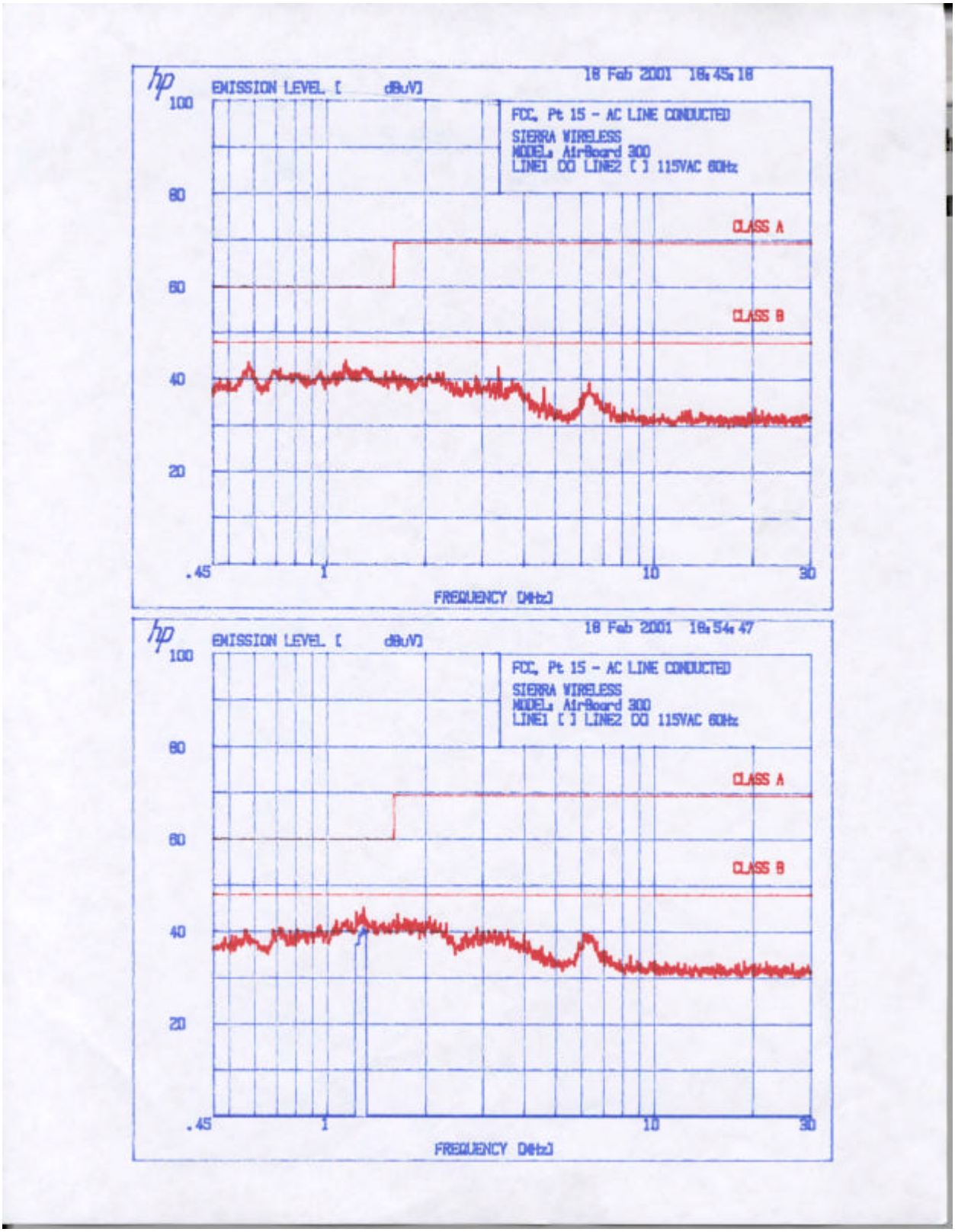
Note: Three sets of units are commonly used for EMI measurement, decibels below one milliwatt (-dBm), decibels above a microvolt,dB(mV), and microvolts (mV). To convert between them, use the following formulas: 20 LOG$_{10}$ (mV) = dB(mV), dB(m) = dB(mV)-107.

2.4.2 Test Procedures

The test procedures, as described in American National Standards Institute C63.4-1992, were employed.

2.4.3 Test Results

Test Result:	Passed, refer to the attached plot.


hp
EMISSION LEVEL [dBuV]
18 Feb 2001 16:45:18
100
80
60
40
20
FCC, Pt 15 - AC LINE CONDUCTED
SIERRA WIRELESS
MODEL: AirBoard 300
LINE1 [ ] LINE2 [ ] 115VAC 60Hz
CLASS A
CLASS B
.45
1
10
30
FREQUENCY [MHz]
hp
EMISSION LEVEL [dBuV]
18 Feb 2001 16:54:47
100
80
60
40
20
FCC, Pt 15 - AC LINE CONDUCTED
SIERRA WIRELESS
MODEL: AirBoard 300
LINE1 [ ] LINE2 [ ] 115VAC 60Hz
CLASS A
CLASS B
.45
1
10
30
FREQUENCY [MHz]

3.0 Test Equipment

Equipment	Manufacturer	Model/Type	Serial #	Cal Int	Cal Due
Bi-Log Antenna	EMCO	3143	9509-1160	12	6/8/01
Log-periodic Antenna	EMCO	LPA-25	1079	12	4/10/01
Half-wave dipole	CDI	Roberts Antenna	331	12	8/16/01
Horn Antenna	EMCO	3115	8812-3049	12	5/1/01
Pre-Amplifier	Hewlett Packard	8447D	185634	12	4/25/01
Pre-Amplifier	CDI	P1000	N/A	12	10/06/01
Spectrum Analyzer w/85650 QP Adapter	Hewlett Packard	8566B	2416A00317 2043A00251	6	3/03/01
Spectrum Analyzer w/8650 QP Adapter	Hewlett Packard	8568B	1912A0053 2521A01021	12	3/16/01
Spectrum Analyzer	Tektronix	2784	B3020108	12	8/4/01
LISN	Solar Electronics	8028-50-TS-24-BNC	980235	12	3/9/01
LISN	Solar Electronics	8025-50-TS-24-BNC	912434	12	3/31/01
Pulse Limiter	Hewlett Packard	11947A	2820A00184	12	8/25/01
Signal Generator	Hewlett Packard	8663A	2537A00214	12	06/13/01
Signal Generator	Hewlett Packard	8672A	2352A03583	12	08/14/01

4.0 Configuration Photograph