



Assessment of Compliance

for

Measurement of Effective Radiated Power (ERP) in
accordance with the FCC Rules & Regulations Part 2.1046

Wireless CDPD Modem Minstrel S

Novatel Wireless Technologies Ltd.



August 2000

NVWB-MINSTREL S -3509

51 Spectrum Way Nepean ON K2R 1E6
Tel: (613) 820-2730 Fax: (613) 820-4161
email: info@aprel.com

Engineering Report

Subject: Measurement of Effective Radiated Power (ERP) in accordance with the FCC Rules & Regulations Part 2.1046

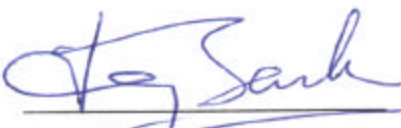
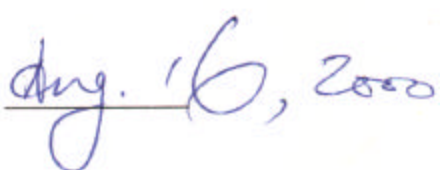
Equipment: Wireless CDPD Modem

Model: Minstrel S

Client: Novatel Wireless Technologies Ltd.
Suite 200
6715-8th Street, N.E.
Calgary, Alberta
Canada, T2E 7H7

Project #: NVWB-MINSTREL S-3509

Prepared By: APREL Laboratories,
Regulatory Compliance Division

Approved by:  **Date:** 
Jay Sarkar
Director, Standards & Certification

Released by:  **Date:** 
Dr. Jack J. Wojcik, P.Eng.



"SOLUTIONS FOR THE WIRELESS FUTURE"

FCC ID: NBZNRM6834
Applicant: Novatel Wireless Technologies Ltd.
Equipment: Wireless CDPD Modem
Model: Minstrel S
Standard: FCC Rules and Regulations Part 2.1046

ENGINEERING SUMMARY

This report contains the results of the effective radiated power (ERP) measurement performed on a NOVATEL WIRELESS Minstrel S wireless CDPD modem. The measurements were carried out in accordance with the FCC Rules and Regulations Part 2.1046. The product was evaluated for ERP when it was set at the maximum power level.

The Minstrel S wireless CDPD modem is an attachment for the Handspring Visor PDA.

Minstrel S was tested for ERP at high, middle, and low frequencies with the maximum ERP obtained at channel No.: 991 with the frequency being 824.04 MHz. The test data is presented in this report under the section: Test Results. The measured ERP is 0.191 W.

(The results presented in this report relate only to the sample tested)

Summary of the Results

| Test Description | Page No. | Test Set-up Figure No. | Results Summary |
|--|----------|------------------------|-----------------|
| RF Power Output as Radiated Ref. Paragraph 2.1046 | 8 | 1 | Passed |

INTRODUCTION

General

This report describes the results of the effective radiated power (ERP) measurement conducted on a Novatel Wireless Minstrel S wireless CDPD modem herein referred to as DUI (Device under Investigation)

Test Facility

The tests were performed for Novatel by APREL Laboratories at APREL's EMI facility located in Nepean, Ontario, Canada. The laboratory operates an (3m and 10m) Open Area Test Site (OATS). The measurement facility is calibrated in accordance with ANSI C63.4-1992.

A description of the measurement facility in accordance with the radiated and AC line conducted test site criteria per ANSI C63.4-1992 is on file with the Federal Communications Commission and is in compliance with the requirements of Section 2.948 of the Commissions rules and regulations.

APREL's registration number is: 90416

APREL is accredited by Standard Council of Canada, under PALCAN program (ISO Guide 25). APREL is also accredited by Industry Canada (formerly DOC) and recognised by the Federal Communications Commissions (FCC).

Standard

The evaluation and analysis were conducted in accordance with FCC Rules and Regulations Parts 2.1046 and the appropriate limits.

Test Equipment

The test equipment used during the evaluation is listed in Appendix A with calibration due dates.

Environmental Conditions

Measurements were conducted in open area test site.

- Temperature: 15 °C ± 2
- Relative Humidity: 30 - 50 %

- Air Pressure: 101 kPa \pm 3

FCC SUBMISSION INFORMATION

FCC ID: NBZNRM6834

Equipment: Wireless CDPD Modem

Model: Minstrel S

For: Certification

Applicant: Novatel Wireless Technologies Ltd.
Suite 200
6715-8th Street, N.E.
Calgary, Alberta
Canada, T2E 7H7

Manufacturer: Novatel Wireless Technologies Ltd.
Suite 200
6715-8th Street, N.E.
Calgary, Alberta
Canada, T2E 7H7

Evaluated by: APREL Laboratories
51 Spectrum Way
Nepean, Ontario
Canada K2R 1E6

MANUFACTURER'S DATA

| | |
|-----------------------------------|---|
| FCC ID No: | NBZNRM6834 |
| Equipment Type: | Wireless CDPD Modem |
| Model: | Minstrel S |
| Reference: | FCC Rules and Regulations Parts 2 and Part 22 |
| Manufacturer: | Novatel Wireless Technologies Ltd. |
| Power Source: | DC Battery |
| Development Stage of Unit: | Production |

GENERAL SPECIFICATIONS

1. Frequency Range: 824 to 849 MHz (Transmitter)
2. Output Power: 0.191 W ERP
3. Frequency Tolerance: 2.5 ppm
4. Type of Modulation: GMSK
5. Emission Designators(See 47 CFR § 2.201 and §2.202) 28K8FXW
6. Antenna Impedance: 50 Ohms

TEST RESULTS

FOR

Effective Radiated Power (ERP)
Of
Novatel Wireless Minstrel S CDPD
modem

Novatel Wireless

Test: RF Power Output as Radiated (ERP)

Ref.: FCC Part 2 paragraph 2.1046

Criteria: N/A

Set-up: See Figure No. 1.

Equipment: See Appendix A.

Methodology: RF Power Measurement by Radiated Method (ERP):

Test site: The radiated RF power measurement was taken at APREL Laboratory's open area test site (OATS). This open area test site is calibrated to ANSI C63.4 document and a description of the measurement facility is on file with the Federal Communications Commission and is in compliance with the requirement of Section 2.948 of the Commissions rules and regulations. (FCC File No.: 90416)

The test was set-up as illustrated in Fig.1. The Minstrel S was configured to operate at maximum power with carrier **unmodulated**. The equipment under test was placed on a turntable positioned 3 m away from the calibrated receiving antenna, which in turn was connected to the spectrum analyzer.

For each transmitter frequency, the received signal was **maximised** by rotating the turntable and adjusting the height of the receiving antenna. To obtain the actual ERP, the Minstrel S was replaced by a vertically polarised half-wave dipole antenna resonant to that frequency and fed by a RF power amplifier and signal generator. The center of the dipole antenna was placed precisely in the same location as the Minstrel S. It was ensured that the orientation of the rotating table and the height of the receiving antenna were unmoved. The signal generator level was adjusted until the peak reading on the spectrum analyzer was identical to that obtained when the Minstrel S was on the turntable. The two signals were matched by superimposing one signal to the other on the spectrum analyzer screen. The output of power amplifier was disconnected from the substitute dipole antenna and connected to a RF power meter. **The effective radiated power was read directly form the power meter.**

The process was repeated for two more channels.

Results: See Table 1

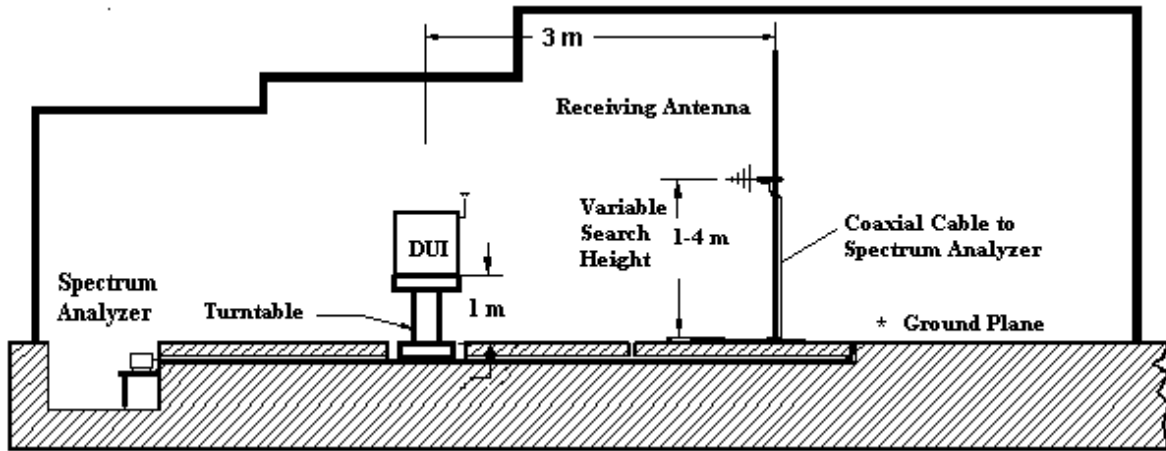


Figure 1.a Test set up for the Radiated Power (ERP) Measurement in OATS (not to scale)



Fig. 1.b APREL's OATS (Open Area Test Site)

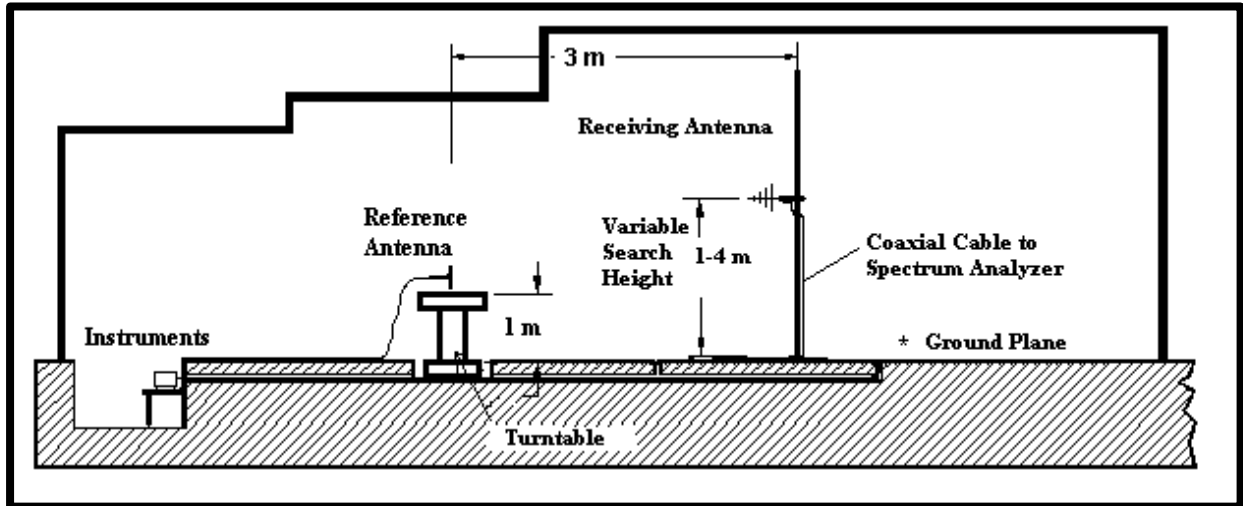


Figure 1.c Test set up for the Radiated Power (ERP) Measurement in OATS (not to scale)
The DUI is replaced by Reference Dipole Antenna.

Table 1.
RF Output Power Measurement
ERP
Power Level: 0
Minstrel S

| Channel No. | Nominal Transmit Frequency | Measured Output Power ERP (Power Level: 0) | ERP (Power Level: 0) |
|-------------|----------------------------|--|----------------------|
| | (MHz) | (dBm) | (W) |
| 991 | 824.04 | 22.8 | 0.191 |
| 367 | 836.01 | 21.9 | 0.155 |
| 799 | 848.97 | 22.4 | 0.174 |

Test Engineer *Lucretia Polera*

Date *August 16, 2000*

APPENDIX A

List of Test Equipment

List of Equipment used

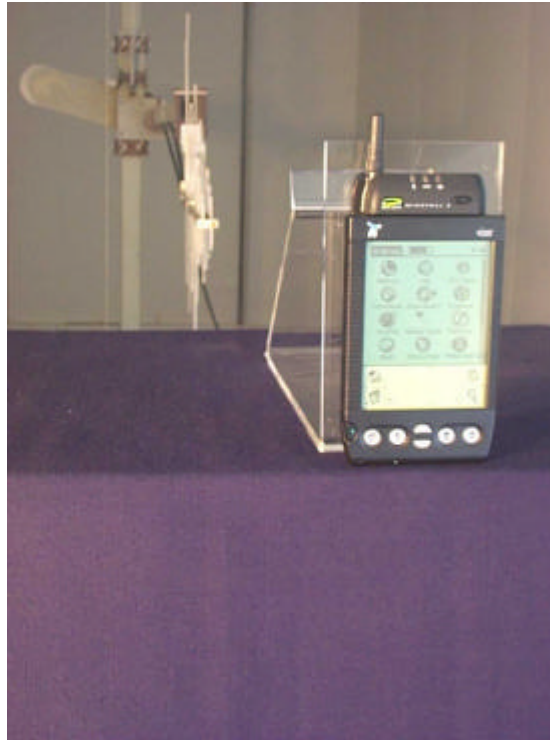
| Description | Manufacturer | Model # | Asset # | Calibration Due Data |
|---|---------------------|----------------|----------------|-----------------------------|
| Spectrum Analyzer | Anritsu | MS2661C | 301330 | Dec 10, 2000 |
| Power Meter | Rhode & Schwarz | NRVS | 00851 | July 21, 2001 |
| 20 dB Attenuator | Narda | 4779-20 | 301370 | May 18, 2001 |
| Signal Generator | Hewlett-Packard | HP 8662A | 100456 | Nov 1, 2000 |
| RF Power Amplifier | Amplifier Research | 25W100M | 100735 | Sep 16, 2000 |
| Reference Half wave Dipole | APREL Inc. | D-8355 | N/A | June 16, 2001 |
| Log Periodic Antenna | Eaton | ALP-1 | 100553 | July 21, 2001 |
| Turntable with Controller | EMCO | 1060-1.241 | 100506 | CNR |
| Computer Controlled Antenna Position Mast | EMCO | 1051-12 | 100507 | CNR |
| OATS | APREL Inc. | 3m & 10m | N/A | N/A |

APPENDIX B

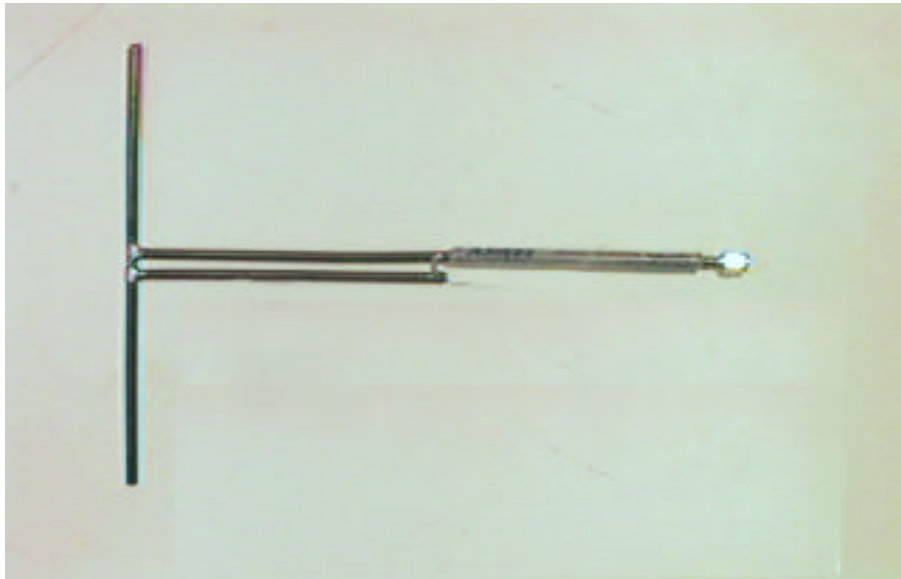
PHOTOGRAPHS



**Novatel Wireless
Minstrel S CDPD**



ERP Measurements in OATS



Reference Dipole Antenna Used for ERP Measurement