MEASUREMENT/TECHNICAL REPORT

Intermec
Technologies Corporation
EMC Test Laboratory
Cedar Rapids, IA

Intermec Technologies Corporation
700 With Novatel CDPD
Cellular Radio Module

REPORT NO: 20010830-1

DATE: August 30, 2001

APPENDIX I

EFFECTIVE ISOTROPIC RADIATED POWER DATA

Assessment of Compliance

for

Measurement of Effective Isotropically Radiated Power (EIRP): FCC Rules & Regulation 2.1046

Handheld PC

Intermec 700 with Novatel CDPD Modem

Intermec Technologies Corporation

August 2001

ITCC-Intermec 700 w. Novatel CDPD-3781

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APREL Laboratories

Engineering Report

Subject: **Measurement of Effective Isotropically Radiated Power (EIRP): FCC Rules & Regulations 2.1046**

FCC ID: **EHANOVCDPD**

Equipment: **Handheld PC**

Model: **Intermec 700 with Novatel CDPD Modem**

Client: **Intermec Technologies Corporation**
550 Second Street S. E.
Cedar Rapids, IA
52401, U. S. A.

Project #: ITCC-Intermec 700 w. Novatel CDPD-3781

Prepared by: **APREL Laboratories,**
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51 Spectrum Way
K2R 1E6

Approved by: _____ Date: Sept. 19, 2001
Jay Sarkar
Technical Director, Standards & Certification

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FCC ID: EHANOVCDPD
Applicant: Intermec Technologies Corporation
Equipment: Handheld PC
Model: Intermec 700
Standard: FCC Rules and Regulations Part 2.1046 & 22

ENGINEERING SUMMARY

This report contains the results of the Effective Isotropically Radiated Power (EIRP) measurement performed on an Intermec 700 Handheld PC operating with a built-in Novatel CDPD radio transmitter. The measurements were carried out in accordance with the FCC Rules and Regulations Part 2.1046 and 22.

Tests were conducted to determine the peak EIRP of the above sample.

Intermec 700 CDPD was tested for EIRP at high, middle, and low frequency channels with the maximum EIRP obtained at channel No. 799 with the frequency being 848.97 MHz. The test data is presented in page 9 of this report. The measured EIRP is 109.4 mW.

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

INTRODUCTION

General

This report describes the results of the Effective Isotropically Radiated Power (EIRP) measurement conducted on an Intermec 700 Handheld PC operating with a built-in Novatel CDPD radio transmitter. Tests were performed to determine the peak EIRP for the above sample.

Test Facility

The tests were performed for Intermec Technologies Corporation 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 2.

Test Equipment

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

Environmental Conditions

Final measurements were conducted in open area test site.

- Temperature: 23 °C ± 2, - Relative Humidity: 30 - 50 %, - Air Pressure: 101 kPa ± 3

FCC SUBMISSION INFORMATION

FCC ID:	**EHANOVCDPD**
Equipment:	Handheld PC
Model:	Intermec 700 with CDPD Modem
For:	Certification
Applicant:	Intermec Technologies Corporation 550 Second Street S. E. Cedar Rapid, IA 52401, U. S. A.
Manufacturer:	Intermec Technologies Corporation 550 Second Street S. E. Cedar Rapids, IA 52401, U. S. A.
Evaluated by:	APREL Laboratories 51 Spectrum Way Nepean, Ontario Canada K2R 1E6

MANUFACTURER'S DATA

FCC ID:	**EHANOVCDPD**
Equipment Type:	Handheld PC
Model:	Intermec 700 with CDPD Modem
Reference:	FCC Rules and Regulations Parts 2 and Part 22.901(d)
Manufacturer:	Intermec Technologies Corporation
Power Source:	DC Battery
Development Stage of Unit:	Production

GENERAL SPECIFICATIONS

1. Frequency Range: 824 to 849 MHz (Transmitter)
2. Output Power: 109.4 mW EIRP
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: **RF Power Output as Radiated (EIRP)**

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 Substitution Method (EIRP):

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 Intermec 700 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 Radiated Power, the Intermec 700 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 Intermec 700. 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 of obtained when the Intermec 700 was on the turntable. The two signals were matched by superimposing one signal to the other on the spectrum analyser screen. The output of power amplifier was disconnected from the substitute dipole antenna and connected to a RF power meter. The radiated power was read directly form the power meter. The measured power is ERP (Effective Radiated Power) as it was referenced to a half-wave dipole radiator instead of an isotropic radiator. This is then converted to EIRP by multiplying ERP by the factor of 1.64, which is the gain of a half-wave dipole relative to an isotropic radiator. The process was repeated for two more channels.

Results: See Table 1

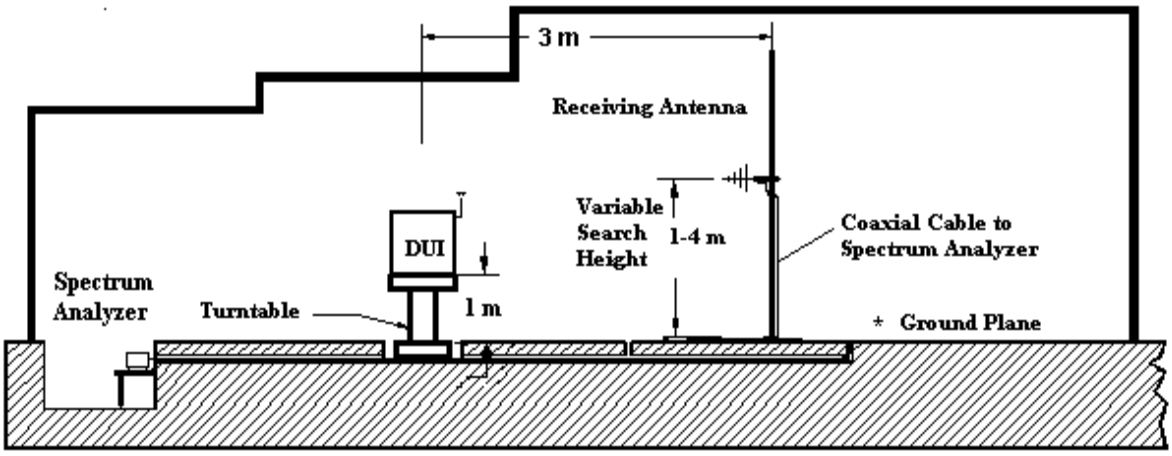


Figure 1.a Test set up for the Radiated Power Measurement in OATS (not to scale)

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

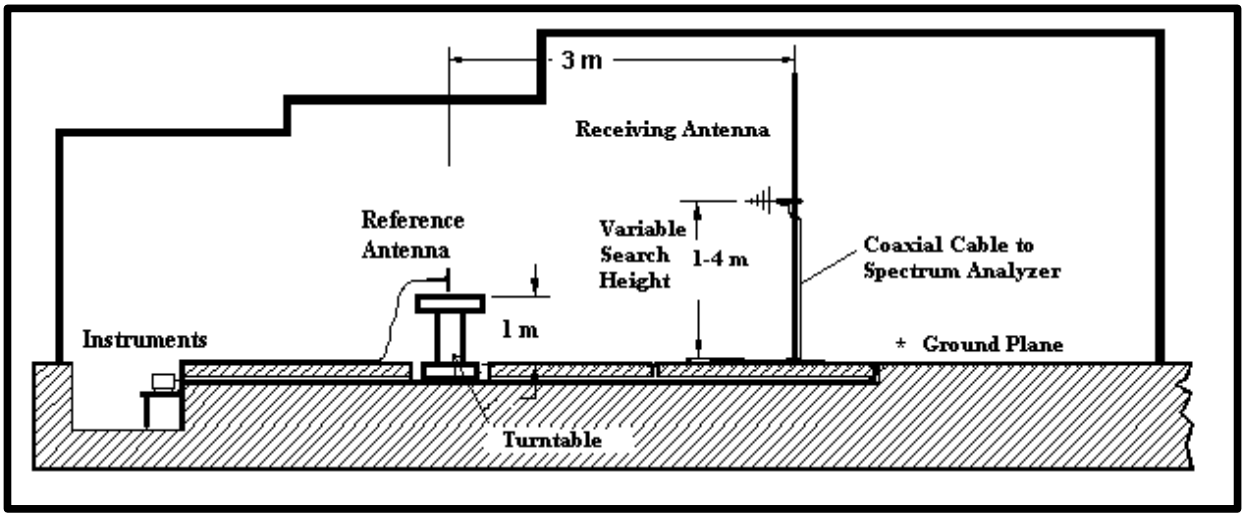


Figure 1.c Test set up for the Radiated Power Measurement in OATS (not to scale)
The DUI is replaced by Reference Dipole Antenna.

Table 1.
RF Output Power Measurement
EIRP
Power Level: 2

Channel No.	Nominal Transmit Frequency	Measured Output Power EIRP (Power Level: 2)	EIRP (Power Level: 2)
	(MHz)	(dBm)	(mW)
991	824.04	19.65	92.2
400	837.00	19.74	94.2
799	848.97	20.39	109.4

APPENDIX A

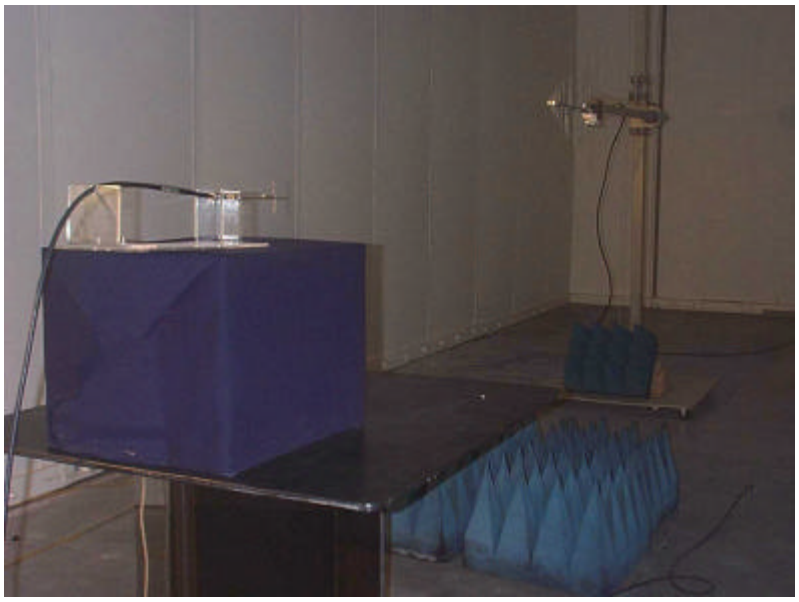
List of Test Equipment

List of Equipment used

Description	Manufacturer	Model #	Asset #	Calibration Due Data
Spectrum Analyzer	Anritsu	MS2661C	301330	Dec 10, 2001
Power Meter	Rhode & Schwarz	NRVS	100851	Oct 09, 2002
Signal Generator	Hewlett-Packard	HP 83640B	N/A	Sep 01, 2001
Reference Half wave Dipole	APREL Inc.	D-8355	N/A	Sep 16, 2001
Log Periodic Antenna	Eaton	ALP-1	100063	Aug 23, 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

Intermec 700 Handheld PC
with Novatel CDPD Modem



EIRP Measurements in OATS

Reference Dipole Antenna Used for the Measurement