

CERTIFICATE OF COMPLIANCE **MPE EVALUATION**

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Applicant Information:

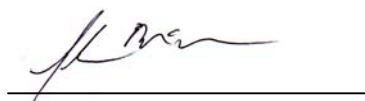
WIRELESS MATRIX CORPORATION
Suite 102, 1530-27 Avenue NE
Calgary, Alberta
Canada T2E 7S6

FCC Rule Part(s):	90, 2.1091; 1.1310; ET Docket 93-62
IC Rule Part(s):	RSS-119 Issue 6, RSS-102 Issue 1
FCC Classification:	Licensed Non-Broadcast Station Transmitter (TNB)
IC Classification:	Land Mobile Radio Transmitter
FCC ID:	P5I-907-FNN-A
Model:	907-FNN-A
Equipment Type:	Wireless Telemetry Unit with RIM 802 DataTAC Radio Modem Terrestrial Processor Assisted Connector (TPAC) with Aluminum & Plastic Enclosures
Tx Frequency Range:	806 - 821 MHz
Rx Frequency Range:	851 - 870 MHz
Max. RF Output Power:	2.65 Watts (ERP)
Antenna Type:	Permanent Stud-Mount ¼-Wave Whip (Antenna Factor P/N: ANT-868-PW-QW)

This wireless mobile device has been shown to be compliant for localized Maximum Permissible Exposure (MPE) for uncontrolled environment/general population exposure limits specified in ANSI/IEEE Std. C95.1-1992 and has been tested in accordance with the measurement procedures specified in ANSI/IEEE Std. C95.3-1999.

I attest to the accuracy of data. All measurements were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

This test report shall not be reproduced partially, or in full, without the prior written approval of Celltech Research Inc. The results and statements contained in this report pertain only to the device(s) evaluated.



Shawn McMillen
General Manager
Celltech Research Inc.



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1.0 SCOPE

Environmental evaluation measurements of Maximum Permissible Exposure (MPE) to radio frequency (RF) radiation from transmitting devices for compliance with the technical rules and regulations of the U.S. Federal Communications Commission (1)* and Industry Canada (5).

1.1 INTRODUCTION

This measurement report describes the Maximum Permissible Exposure (MPE) tests of the Wireless Matrix Corporation Model: 907-FNN-A Wireless Telemetry Unit FCC ID: P5I-907-FNN-A with RIM 802D-2-O DataTAC Radio Modem. The test procedures described in FCC CFR47 2.1091, 1.1310, American National Standards Institute C95.1-1992 (2), C95.3-1992 (3), and OET Bulletin 65, Supplement C (4) were employed. A description of the product and operating configuration, detailed summary of the test results, methodology and procedures used in the evaluation, equipment used, and the various provisions of the rules are included within this test report.

2.0 DESCRIPTION of Equipment Under Test (EUT)

EUT Type	Wireless Telemetry Unit with RIM 802 DataTAC Radio Modem	Radio Type	RIM 802D-2-O (DataTAC Network)
FCC Equipment Class	Licensed Non-Broadcast Station Transmitter (TNB)	FCC Rule Part(s)	90, 2.1091; 1.1310 ET Docket 93-62
IC Equipment Class	Land Mobile Radio Transmitter	IC Rule Part(s)	RSS-119 Issue 6 RSS-102 Issue 1
Max. RF Output Power	2.65 Watts (ERP)	FCC ID	P5I-907-FNN-A
Tx Frequency Range (MHz)	806 - 821	Model(s)	907-FNN-A
Rx Frequency Range (MHz)	851 - 870	Antenna Type	Permanent Stud-Mount ¼ Wave Whip
Signal Modulation(s)	FSK	Antenna P/N	Antenna Factor ANT-868-PW-QW

* Note: See page 12 for list of References.

3.0 MPE MEASUREMENT GUIDELINES

The safety limits used for the RF exposure environmental evaluation measurements are based on the criteria published by the American National Standards Institute (ANSI) for localized MPE in IEEE/ANSI C95.1-1992 Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz - 300 GHz (2). The measurement procedure described in IEEE/ANSI C95.3-1992 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave (3) is used for guidance in measuring MPE due to RF exposure from the particular transmitting device. The new guidelines incorporate limits for MPE in terms of electric and magnetic field strength, and power density for transmitters operating at frequencies between 300 kHz and 100 GHz. The criteria for MPE evaluation is also described in OET Bulletin 65, Supplement C, Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields (4).

4.0 DEFINITION

MPE is the RMS and peak electric and magnetic field strength, their squares, or the plane-wave equivalent power densities associated with these fields to which a person may be exposed without harmful effect, and with an acceptable safety factor.

The MPE prescribed by the standard are set in terms of different parameters of effects, depending on the frequency generated by the device. The MPE levels are set in terms of power density, whose definition and relationship to electric and magnetic field strengths are described by the following equation:

$$S(mW/cm^2) = \frac{E^2}{3770} = 37.7H^2$$

where:

S = Power density (mW/cm²)

Power per unit area normal to the direction of propagation usually expressed in units of watts per square meter (W/m²), or units of milliwatts per square centimeter (mW/cm²). For plane waves, power density, electric field strength (E), and magnetic field strength (H) are related by the impedance of free space (377 Ω).

E = Electric field strength (V/m)

H = Magnetic field strength (A/m)

5.0 MPE LIMITS

(A) Limits for Occupational/Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f ²)*	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6

(B) Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f ²)*	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

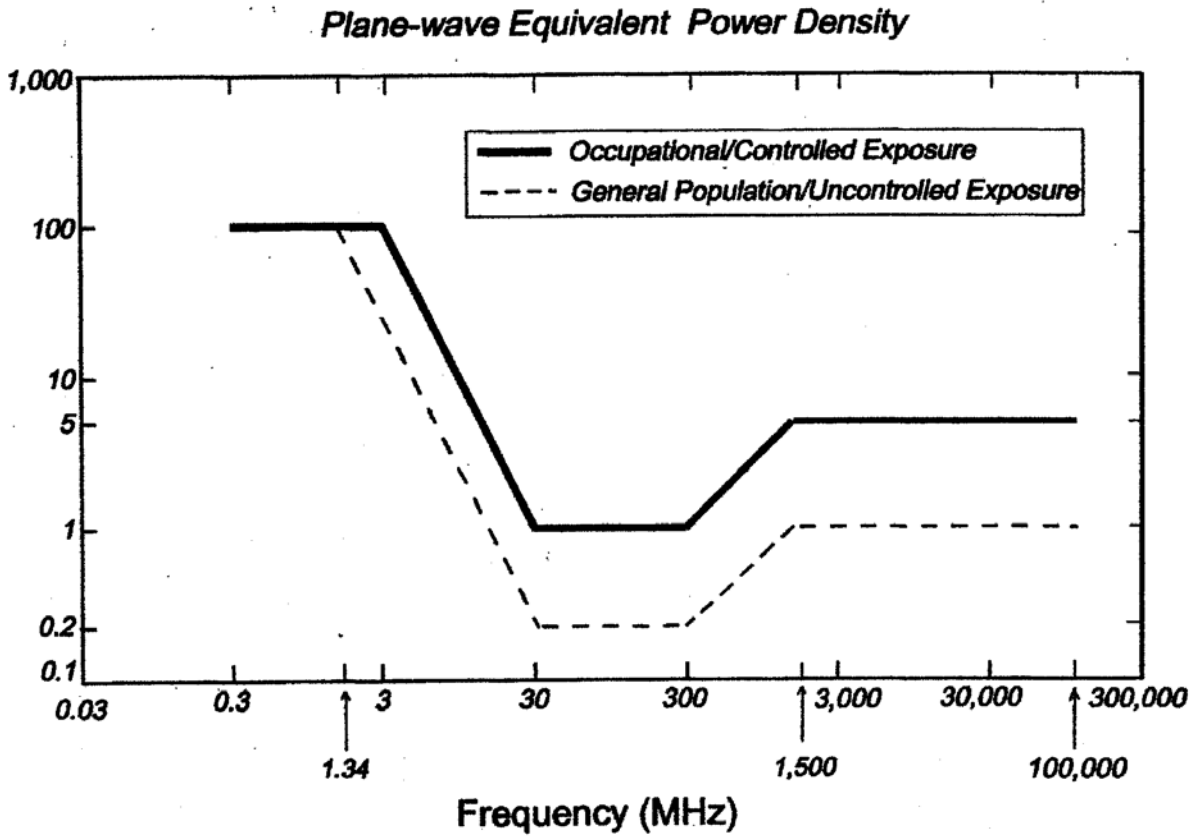
f = frequency in MHz

*Plane-wave equivalent power density

NOTE 1: **Occupational/controlled** limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2: **General population/uncontrolled** exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

MPE LIMITS (Cont.)



6.0 DETAILS OF MPE EVALUATION

The Wireless Matrix Corporation Model: 907-FNN-A Wireless Telemetry Unit FCC ID: P5I-907-FNN-A with RIM 802D-2-O DataTAC Radio Modem and Antenna Factor Permanent Stud-Mount 1/4-Wave Whip Antenna (P/N: ANT-868-PW-QW) was found to be compliant for MPE based on the following test provisions and conditions:

- 1) The probe was positioned on the turntable at a separation distance of 20.0cm from the radiating antenna and at a starting height of 5.0cm to the center of the probe.
- 2) The turntable was positioned so that the initial start angle was 0 degrees.
- 3) The EUT was powered on and allowed sufficient time to stabilize. The EUT was operated at full power on a desired frequency.
- 4) The Survey Meter was set for maximum hold, and set on the appropriate power range.
- 5) The turntable was rotated 360 degrees and the maximum reading was obtained for that elevation.
- 6) The EUT was then turned off and the probe raised by 5.0cm. This process was repeated to a sufficient distance past the tip of the antenna or where the maximum radiation was reduced by a significant factor to warrant no further measurement. The data was then tabulated and graphed in the charts and tables shown on the next pages.



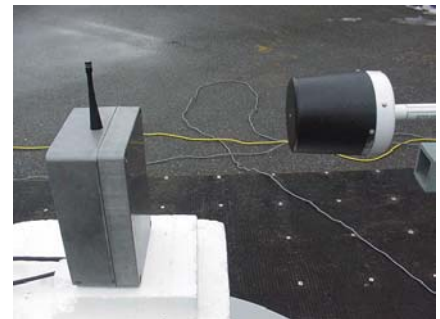
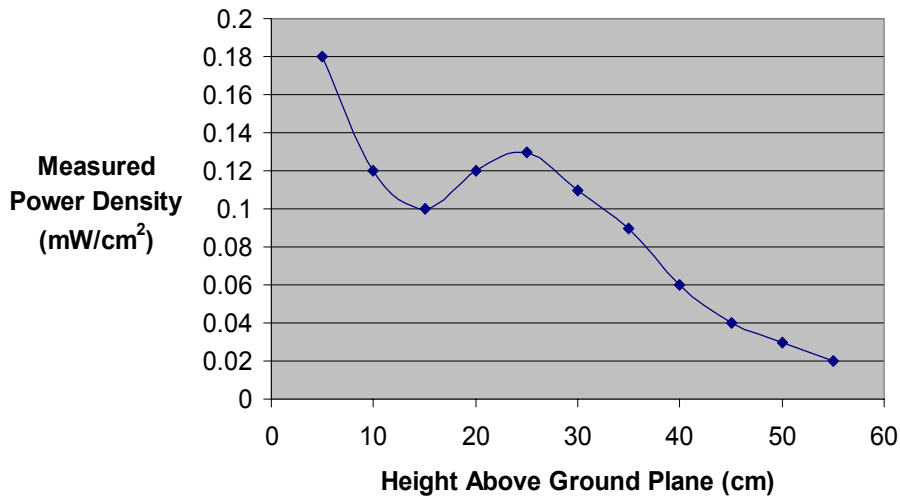
MPE Test Setup Photograph

7.0 MPE MEASUREMENT SUMMARY

The measurement results were obtained with the EUT tested in the conditions described in this report.

806MHz (Aluminum Enclosure Unit)

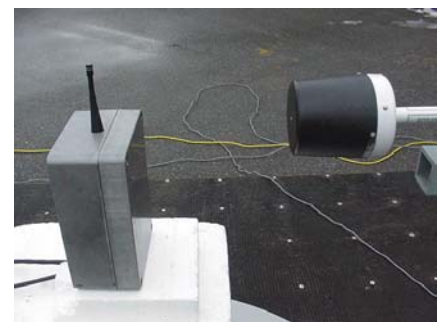
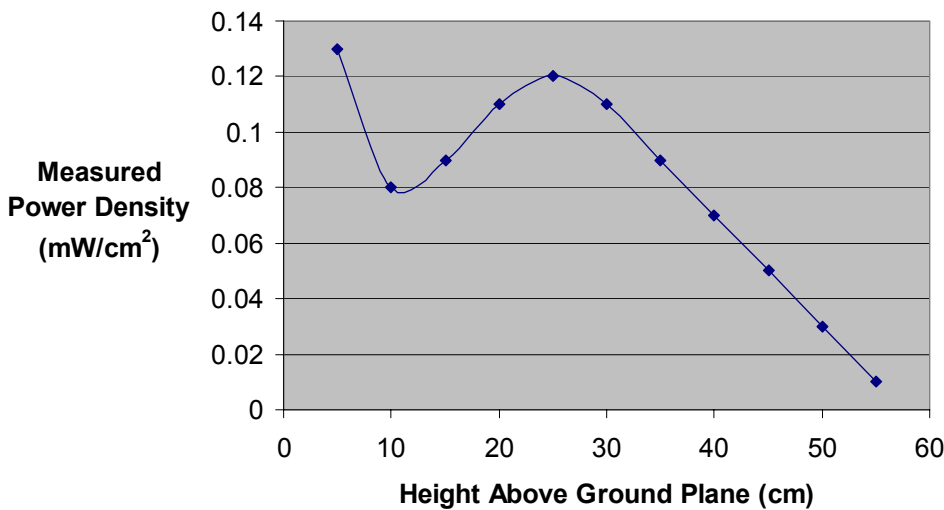
Height Above Ground Plane (cm)	Measured Power Density at 20cm (mW/cm ²)	Correction Factor to Obtain Actual mW/cm ²	Total E-Field Equivalent Power Density	MPE Limit (mW/cm ²)
5	0.18	1.02	0.1836	f/1500
10	0.12	1.02	0.1224	f/1500
15	0.10	1.02	0.1020	f/1500
20	0.12	1.02	0.1224	f/1500
25	0.13	1.02	0.1326	f/1500
30	0.11	1.02	0.1122	f/1500
35	0.09	1.02	0.0918	f/1500
40	0.06	1.02	0.0612	f/1500
45	0.04	1.02	0.0408	f/1500
50	0.03	1.02	0.0306	f/1500
55	0.02	1.02	0.0204	f/1500



**Aluminum Enclosure Unit
 with 1/4-Wave Whip Antenna
 (Antenna Factor P/N: ANT-868-PW-QW)**

813.5MHz (Aluminum Enclosure Unit)

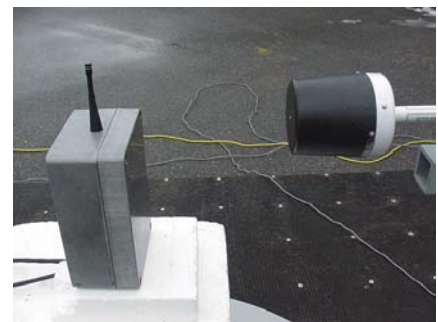
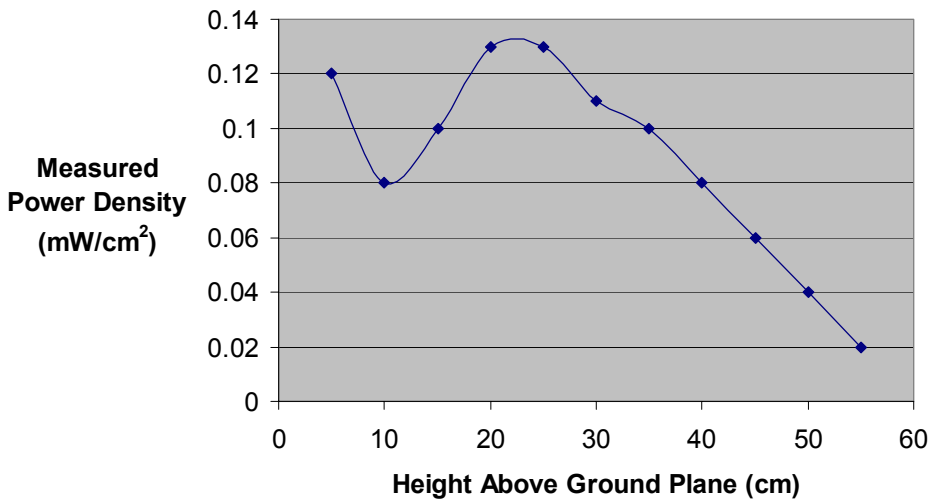
Height Above Ground Plane (cm)	Measured Power Density at 20cm (mW/cm ²)	Correction Factor to Obtain Actual mW/cm ²	Total E-Field Equivalent Power Density	MPE Limit (mW/cm ²)
5	0.13	1.02	0.1326	f/1500
10	0.08	1.02	0.0816	f/1500
15	0.09	1.02	0.0918	f/1500
20	0.11	1.02	0.1122	f/1500
25	0.12	1.02	0.1224	f/1500
30	0.11	1.02	0.1122	f/1500
35	0.09	1.02	0.0918	f/1500
40	0.07	1.02	0.0714	f/1500
45	0.05	1.02	0.0510	f/1500
50	0.03	1.02	0.0306	f/1500
55	0.01	1.02	0.0102	f/1500



Aluminum Enclosure Unit with 1/4-Wave Whip Antenna (Antenna Factor P/N: ANT-868-PW-QW)

821MHz (Aluminum Enclosure Unit)

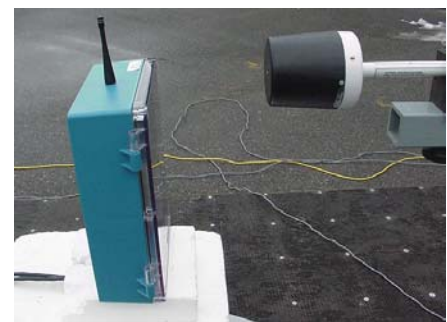
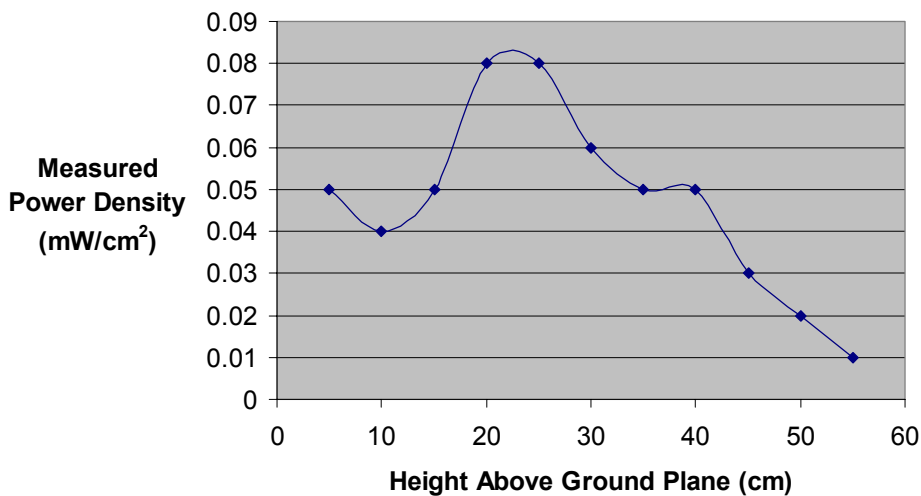
Height Above Ground Plane (cm)	Measured Power Density at 20cm (mW/cm ²)	Correction Factor to Obtain Actual mW/cm ²	Total E-Field Equivalent Power Density	MPE Limit (mW/cm ²)
5	0.12	1.01	0.1212	f/1500
10	0.08	1.01	0.0808	f/1500
15	0.10	1.01	0.1010	f/1500
20	0.13	1.01	0.1313	f/1500
25	0.13	1.01	0.1313	f/1500
30	0.11	1.01	0.1111	f/1500
35	0.10	1.01	0.1010	f/1500
40	0.08	1.01	0.0808	f/1500
45	0.06	1.01	0.0606	f/1500
50	0.04	1.01	0.0404	f/1500
55	0.02	1.01	0.0202	f/1500



**Aluminum Enclosure Unit
 with 1/4-Wave Whip Antenna
 (Antenna Factor P/N: ANT-868-PW-QW)**

806MHz (Plastic Enclosure Unit)

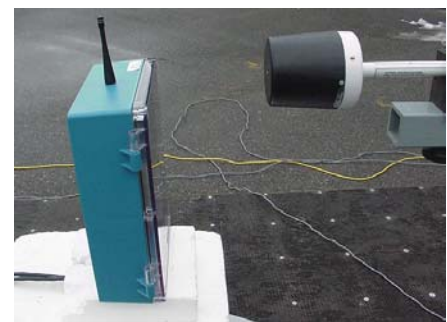
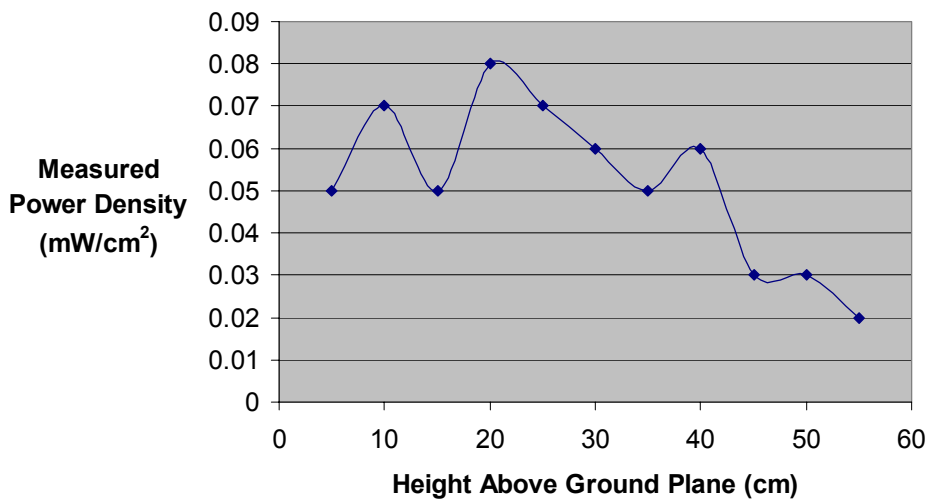
Height Above Ground Plane (cm)	Measured Power Density at 20cm (mW/cm ²)	Correction Factor to Obtain Actual mW/cm ²	Total E-Field Equivalent Power Density	MPE Limit (mW/cm ²)
5	0.05	1.02	0.0510	f/1500
10	0.04	1.02	0.0408	f/1500
15	0.05	1.02	0.0510	f/1500
20	0.08	1.02	0.0816	f/1500
25	0.08	1.02	0.0816	f/1500
30	0.06	1.02	0.0612	f/1500
35	0.05	1.02	0.0510	f/1500
40	0.05	1.02	0.0510	f/1500
45	0.03	1.02	0.0306	f/1500
50	0.02	1.02	0.0204	f/1500
55	0.01	1.02	0.0102	f/1500



**Plastic Enclosure Unit
 with 1/4-Wave Whip Antenna
 (Antenna Factor P/N: ANT-868-PW-QW)**

813.5MHz (Plastic Enclosure Unit)

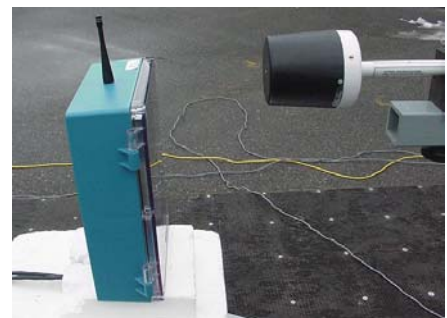
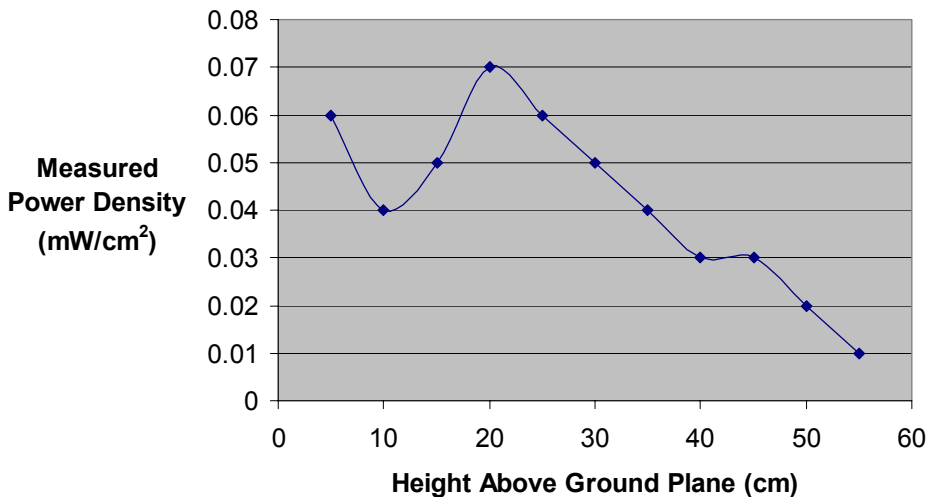
Height Above Ground Plane (cm)	Measured Power Density at 20cm (mW/cm ²)	Correction Factor to Obtain Actual mW/cm ²	Total E-Field Equivalent Power Density	MPE Limit (mW/cm ²)
5	0.05	1.02	0.0510	f/1500
10	0.07	1.02	0.0714	f/1500
15	0.05	1.02	0.0510	f/1500
20	0.08	1.02	0.0816	f/1500
25	0.07	1.02	0.0714	f/1500
30	0.06	1.02	0.0612	f/1500
35	0.05	1.02	0.0510	f/1500
40	0.06	1.02	0.0612	f/1500
45	0.03	1.02	0.0306	f/1500
50	0.03	1.02	0.0306	f/1500
55	0.02	1.02	0.0204	f/1500



Plastic Enclosure Unit with 1/4-Wave Whip Antenna (Antenna Factor P/N: ANT-868-PW-QW)

821MHz (Plastic Enclosure Unit)

Height Above Ground Plane (cm)	Measured Power Density at 20cm (mW/cm ²)	Correction Factor to Obtain Actual mW/cm ²	Total E-Field Equivalent Power Density	MPE Limit (mW/cm ²)
5	0.06	1.01	0.0606	f/1500
10	0.04	1.01	0.0404	f/1500
15	0.05	1.01	0.0505	f/1500
20	0.07	1.01	0.0707	f/1500
25	0.06	1.01	0.0606	f/1500
30	0.05	1.01	0.0505	f/1500
35	0.04	1.01	0.0404	f/1500
40	0.03	1.01	0.0303	f/1500
45	0.03	1.01	0.0303	f/1500
50	0.02	1.01	0.0202	f/1500
55	0.01	1.01	0.0101	f/1500



Plastic Enclosure Unit with 1/4-Wave Whip Antenna (Antenna Factor P/N: ANT-868-PW-QW)

8.0 SYSTEM CALIBRATION

Prior to the assessment for MPE, the Electromagnetic Radiation Survey Meter and probe was calibrated as per the operating instructions in the operations manual. The unit was placed into the units electrically sealed storage case and allowed sufficient time for both units to acquire the same temperature. The system was then calibrated by a built in software routine and zeroed in an electromagnetic free environment.

9.0 MPE SYSTEM SPECIFICATIONS

Radiation Detection Specifications

Electromagnetic Radiation Survey Meter:	Narda Model 8712
Isotropic Electric Field Probe:	Narda Model: 8761D
Frequency Range:	300 kHz - 3 GHz
Calibration Date:	June 2001

Positioning System

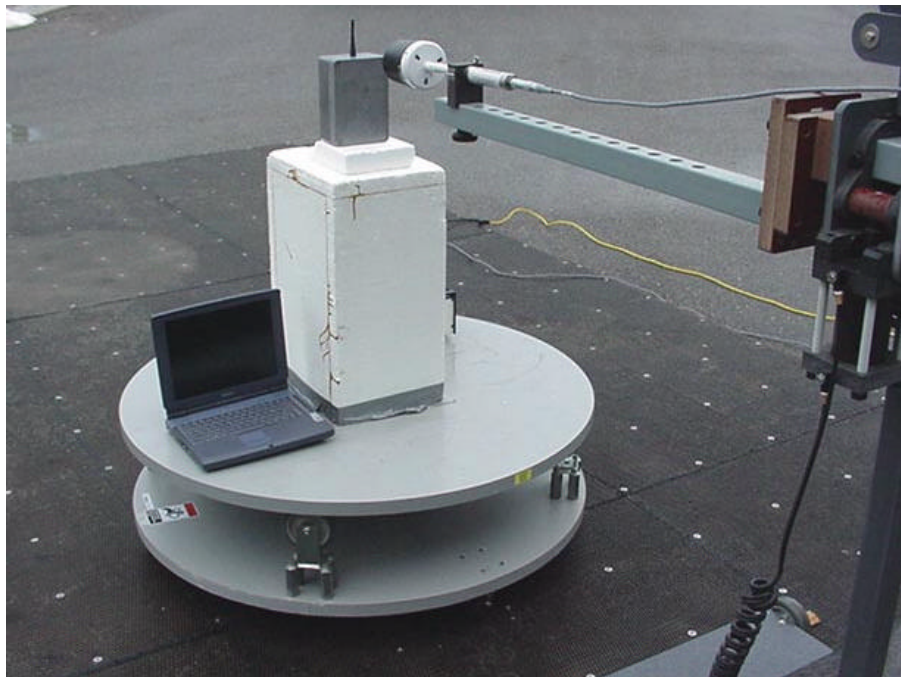
Multi-Device Controller	EMCO Model: 2090	S/N: 9912-1484
Mini-Mast	EMCO Model: 2075	S/N: 0001-2277
Turntable	EMCO Model: 2080-1.2/1.5	S/N: 0002-1002

10.0 REFERENCES

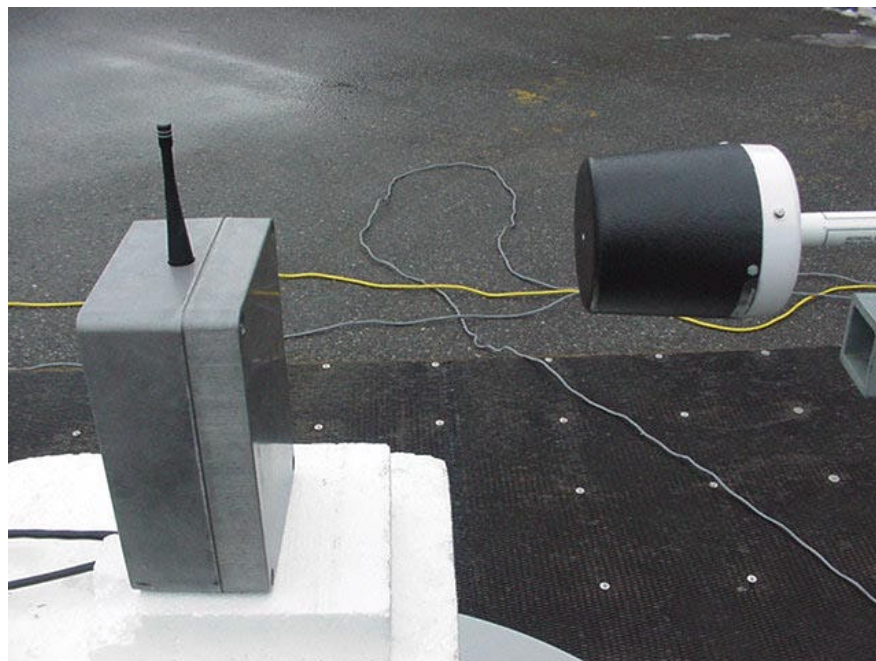
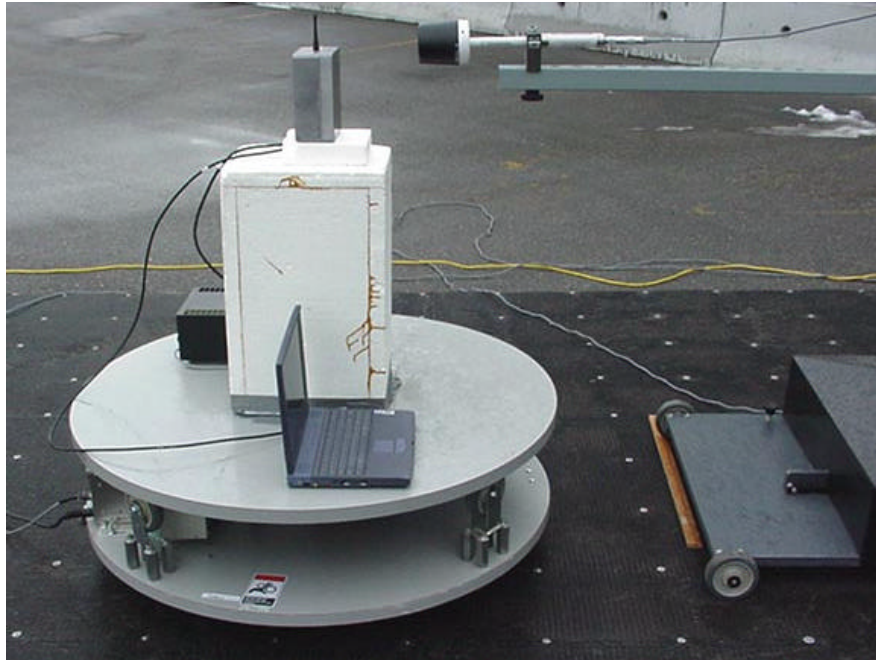
- (1) Federal Communications Commission, ET Docket 93-62, Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation, Aug. 1996.
- (2) ANSI/IEEE C95.1-1992, IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3kHz to 300GHz.
- (3) ANSI/IEEE C95.3-1992, IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields – RF and Microwave.
- (4) OET Bulletin 65, Supplement C (Edition 01-01), Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields.
- (5) Industry Canada, Radio Standards Specification RSS-102 Issue 1 (Provisional), Evaluation Procedure for Mobile and Portable Radio Transmitters with respect to Health Canada's Safety Code 6 for Exposure of Humans to Radio Frequency Fields.

APPENDIX A - MPE TEST SETUP PHOTOGRAPHS

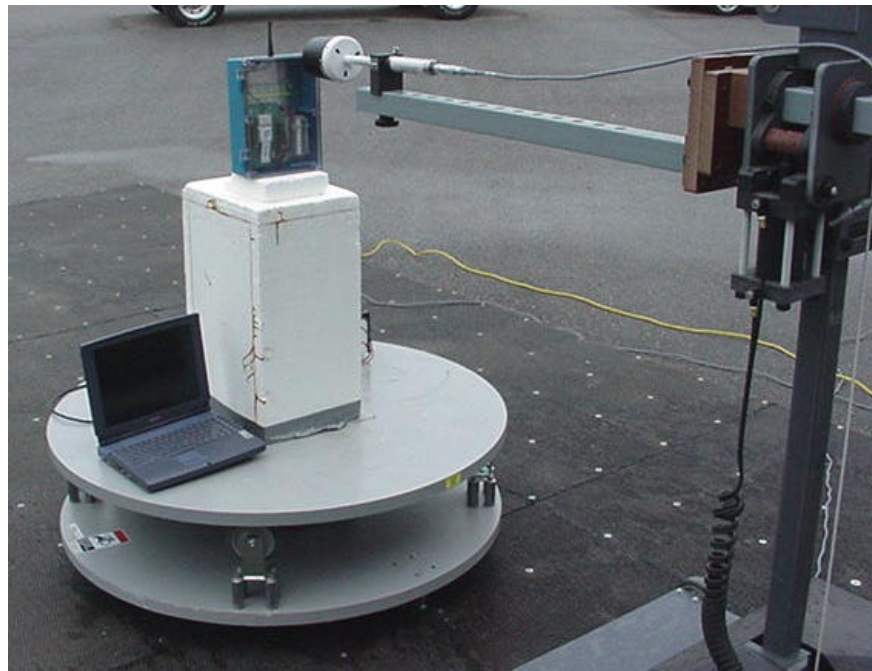
MPE TEST SETUP PHOTOGRAPHS
Permanent Stud-Mount $\frac{1}{4}$ -Wave Whip Antenna
(Antenna Factor P/N: ANT-868-PW-QW)
Aluminum Enclosure



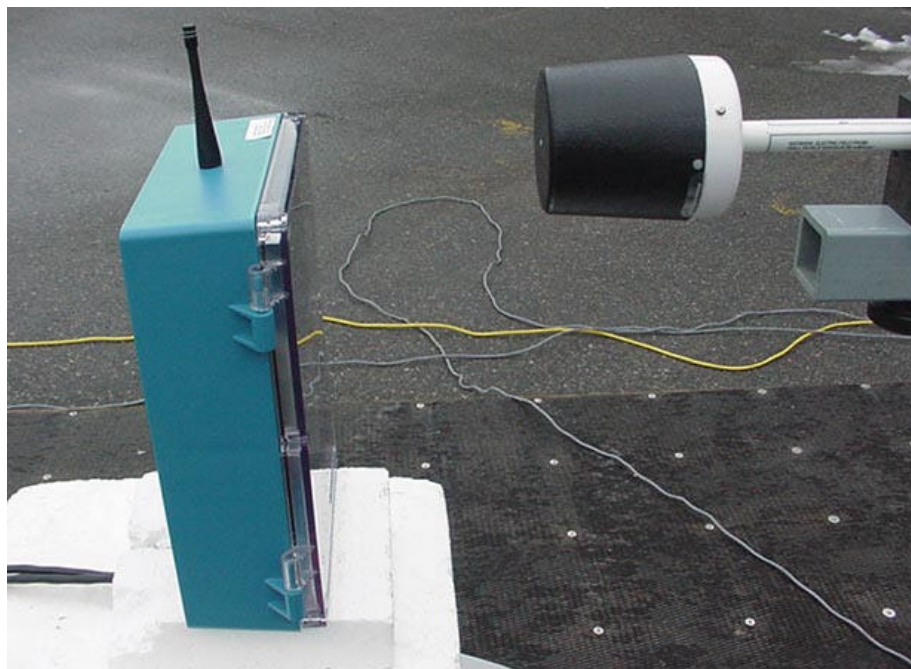
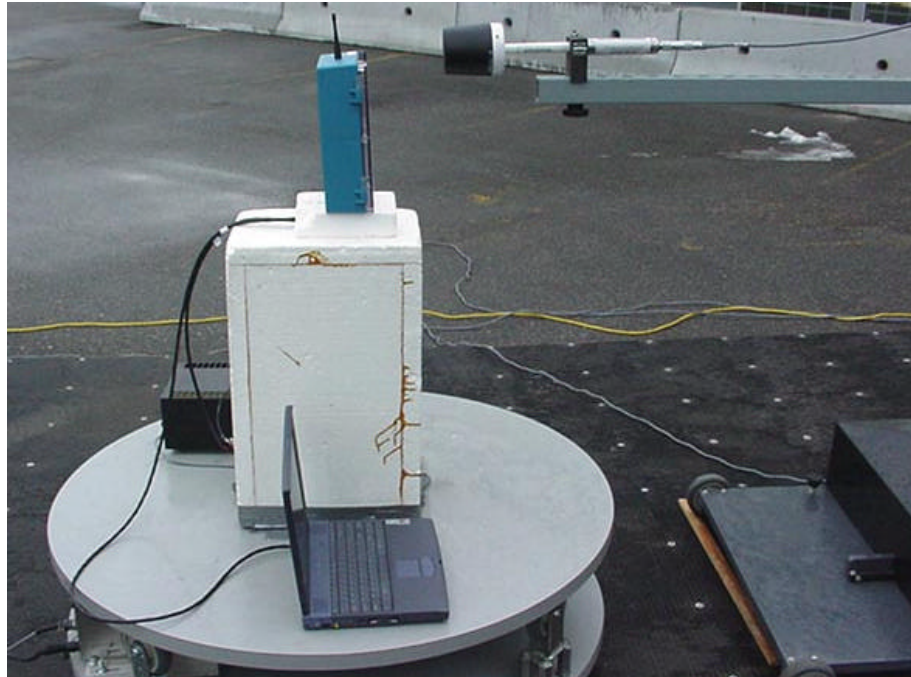
MPE TEST SETUP PHOTOGRAPHS
Permanent Stud-Mount 1/4-Wave Whip Antenna
(Antenna Factor P/N: ANT-868-PW-QW)
Aluminum Enclosure



MPE TEST SETUP PHOTOGRAPHS
Permanent Stud-Mount 1/4-Wave Whip Antenna
(Antenna Factor P/N: ANT-868-PW-QW)
Plastic Enclosure



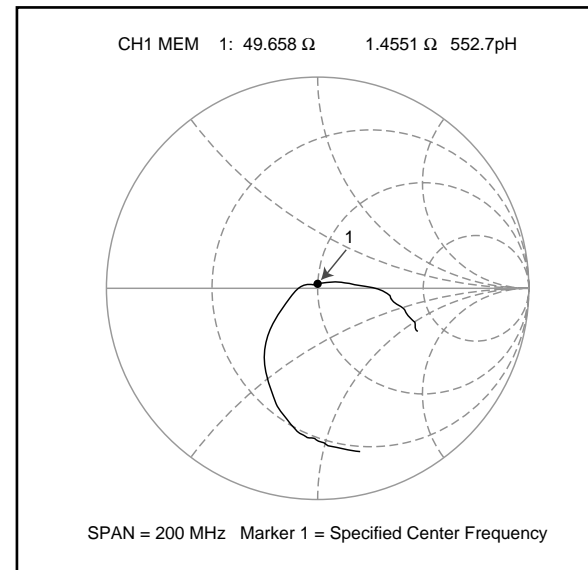
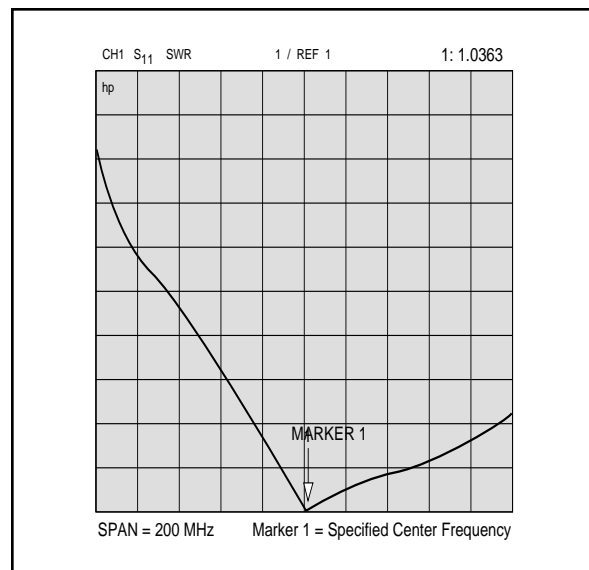
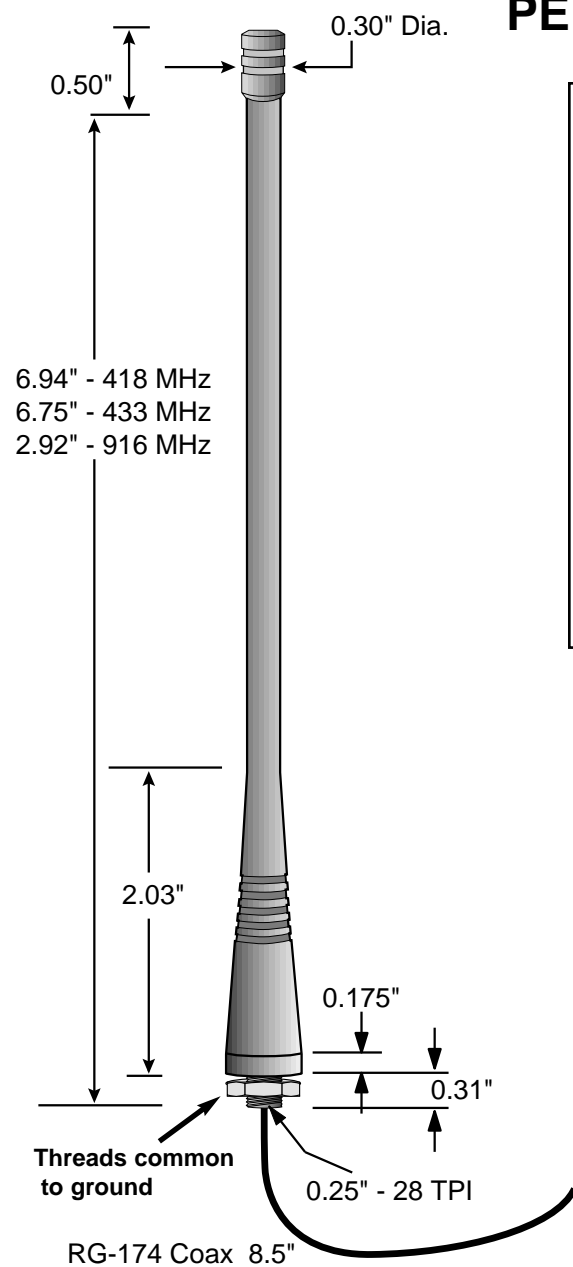
MPE TEST SETUP PHOTOGRAPHS
Permanent Stud-Mount 1/4-Wave Whip Antenna
(Antenna Factor P/N: ANT-868-PW-QW)
Plastic Enclosure



APPENDIX B - ANTENNA SPECIFICATIONS

The antenna is a permanent stud-mount 1/4-wave whip antenna with a center frequency of 868 MHz. It is attached by placing its base through a 1/4" hole in the host product, secured with a nut and fed through the base with RG-174 coax cable. Standard cable length is 8.5". A 50-ohm MMCX plug connector (Johnson Components, 135-3403-001) is attached to the end of the coax by Wireless Matrix.

PERMANENT STUD-MOUNT 1/4-WAVE WHIP ANTENNAS



DESIGN: _____	LINX TECHNOLOGIES PHONE: 541-471-6256		
DRAWING: <u>Chris</u>	575 S.E. Ashley, Pl. FAX: 541-471-6251		
APPROVED: _____	Grants Pass, OR 97526 www.linxtechnologies.com		
STATUS: DRAFT/APPROVED	Covers Part #s		
DATE: 12/15/97	315 MHz = ANT-315-PW-QW		
SERIES NUMBER	418 MHz = ANT-418-PW-QW		
PART NUMBER	433 MHz = ANT-433-PW-QW		
PATH	SIZE	FSCM NO.	DWG NO.
	A		
	SCALE		SHEET