

## DECLARATION OF COMPLIANCE MPE EVALUATION

### Test Lab

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### Applicant Information

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<b>FCC Rule Part(s):</b>	<b>47 CFR §15.247, §2.1091; §1.1310</b>
<b>IC Rule Part(s):</b>	<b>RSS-210 Issue 5, RSS-102 Issue 1 (Provisional)</b>
<b>FCC Classification:</b>	<b>Digital Transmission System (DTS)</b>
<b>IC Classification:</b>	<b>Low Power Licence-Exempt Radiocommunication Device</b>
<b>Device Type:</b>	<b>Rugged Laptop PC with Cisco LMC350 DSSS PCMCIA WLAN Card, Vehicle Cradle, &amp; (2) Mobile Vehicle-Mount Antennas</b>
<b>FCC ID:</b>	<b>KBCIX260LMC350</b>
<b>Model(s):</b>	<b>IX260</b>
<b>Modulation:</b>	<b>Direct Sequence Spread Spectrum (DSSS)</b>
<b>Tx Frequency Range:</b>	<b>2412 - 2462 MHz</b>
<b>RF Output Power Tested:</b>	<b>20.4 dBm Peak Conducted (2412 MHz) 21.2 dBm Peak Conducted (2437 MHz) 21.2 dBm Peak Conducted (2462 MHz)</b>
<b>Antenna Type(s):</b>	<b>Mobile Vehicle Antenna (x2)</b>
	<b>1. MaxRad P/N: BMAX24503 (3 dBi Gain) 2. MaxRad P/N: BMAX24505 (5 dBi Gain)</b>
<b>Power Supply:</b>	<b>12V Vehicle Battery</b>

This 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. This device complies with the rules and regulations specified for Maximum Permissible Exposure (MPE) by the Federal Communications Commission and Industry Canada.

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.



**Russell Pipe**  
Senior Compliance Technologist  
Celltech Research Inc.



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## MPE EVALUATION REPORT

### 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 (see reference [3]) and Industry Canada (see reference [4]).

### 1.1 INTRODUCTION

This measurement report describes the Maximum Permissible Exposure (MPE) tests of the Itronix Corporation Model: IX260 Rugged Laptop PC FCC ID: KBCIX260LMC350 with internal Cisco LMC350 DSSS PCMCIA WLAN Card, Vehicle Cradle, & (2) Mobile Vehicle-Mount Antennas. The test procedures described in FCC 47 CFR §2.1091, §1.1310, American National Standards Institute C95.1-1992 (see reference [1]), C95.3-1992 (see reference [2]), FCC OET Bulletin 65, Supplement C, Edition 01-01 (see reference [3]), and Industry Canada RSS-102 Issue 1 (Provisional) (see reference [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 Device Under Test (DUT)

<b>EUT Type</b>	Rugged Laptop PC with internal DSSS PCMCIA WLAN Card, Vehicle Cradle, & (2) Mobile Vehicle-Mount Antennas	<b>Radio Type</b>	Cisco Systems Inc. Model: LMC350 FCC ID: LDK102040
<b>FCC Device Class</b>	Digital Transmission System (DTS)	<b>FCC Rule Part(s)</b>	§15.247, §2.1091; §1.1310
<b>IC Device Class</b>	Low Power Licence-Exempt Radiocommunication Device	<b>IC Rule Part(s)</b>	RSS-210 Issue 5 RSS-102 Issue 1
<b>RF Conducted Output Power</b>	20.4 dBm Peak (2412 MHz) 21.2 dBm Peak (2437 MHz) 21.2 dBm Peak (2462 MHz)	<b>FCC ID</b>	KBCIX260LMC350
<b>Tx Frequency Range</b>	2412 - 2462 MHz	<b>Model(s)</b>	IX260
<b>Signal Modulation</b>	Direct Sequence Spread Spectrum (DSSS)	<b>Antenna Type(s)</b>	Mobile Vehicle Antenna (x2)
<b>Power Supply</b>	12V Vehicle Battery	<b>Antenna P/N(s)</b>	1. MaxRad P/N: BMAX24503 (3 dBi Gain) 2. MaxRad P/N: BMAX24505 (5 dBi Gain)

### 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 (see reference [1]). The measurement procedure described in IEEE/ANSI C95.3-1992 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave (see reference [2]) 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 FCC OET Bulletin 65, Supplement C (01-01), Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields (see reference [3]), and Industry Canada's 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 (see reference [4]).

### 4.0 MPE 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:

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

where:

**S = Power density (mW/cm<sup>2</sup>)**

Power per unit area normal to the direction of propagation usually expressed in units of watts per square meter (W/m<sup>2</sup>), or units of milliwatts per square centimeter (mW/cm<sup>2</sup>). For plane waves, power density, electric field strength (E), and magnetic field strength (H) are related by the impedance of free space (377Ω).

**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 <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f <sup>2</sup> )*	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 <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f <sup>2</sup> )*	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

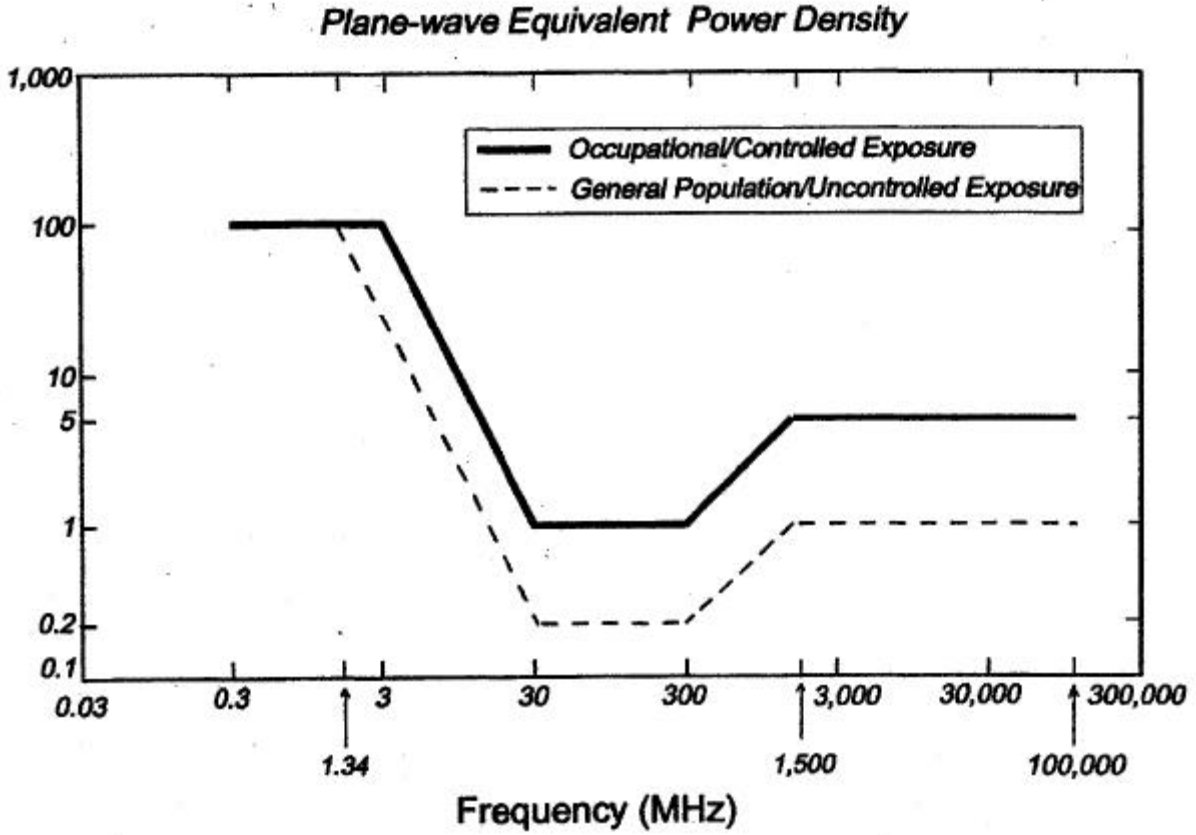
f = frequency in MHz

\*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 Itronix Corporation Model: IX260 Rugged Laptop PC FCC ID: KBCIX260LMC350 with internal Cisco LMC350 DSSS PCMCIA WLAN Card, Vehicle Cradle, and (2) Mobile Vehicle-Mount Antennas (MaxRad P/N: BMAXC24503, BMAXC24505) 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 cm from the radiating antenna and at a starting height of 5 cm 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 cm. 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.

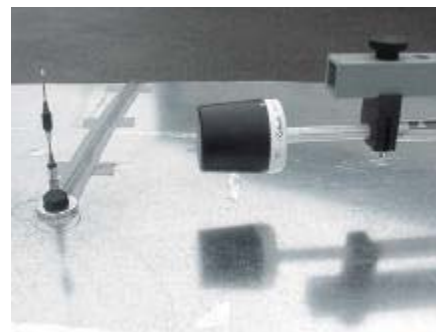
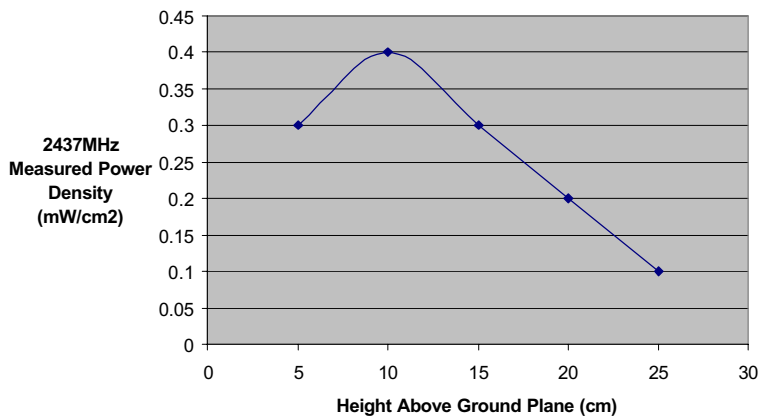


MPE Test Setup Photograph

## 7.0 MPE MEASUREMENT SUMMARY

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

with MaxRad 3dBi Gain Antenna (P/N: BMAXC24503)					
Frequency (MHz)	Height Above Ground Plane (cm)	Measured Power Density at 20cm (mW/cm <sup>2</sup> )	Correction Factor to Obtain Actual (mW/cm <sup>2</sup> )	Total E-Field Equiv. Power Density (mW/cm <sup>2</sup> )	MPE Limit (mW/cm <sup>2</sup> )
2412	5	0.1	1.11	0.111	1.0
2412	10	0.4	1.11	0.444	1.0
2412	15	0.1	1.11	0.111	1.0
2412	20	0.0	1.11	0.000	1.0
2412	25	0.0	1.11	0.000	1.0
2437	5	0.3	1.11	0.333	1.0
2437	10	0.4	1.11	0.444	1.0
2437	15	0.3	1.11	0.333	1.0
2437	20	0.2	1.11	0.222	1.0
2437	25	0.1	1.11	0.111	1.0
2462	5	0.1	1.11	0.111	1.0
2462	10	0.3	1.11	0.000	1.0
2462	15	0.0	1.11	0.000	1.0
2462	20	0.0	1.11	0.000	1.0
2462	25	0.0	1.11	0.000	1.0

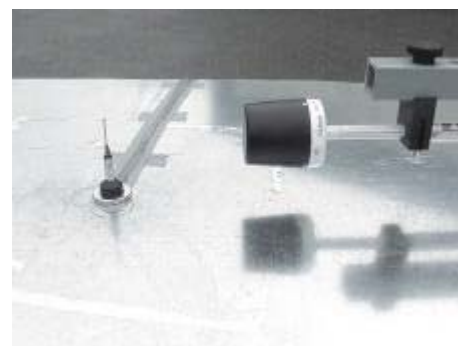
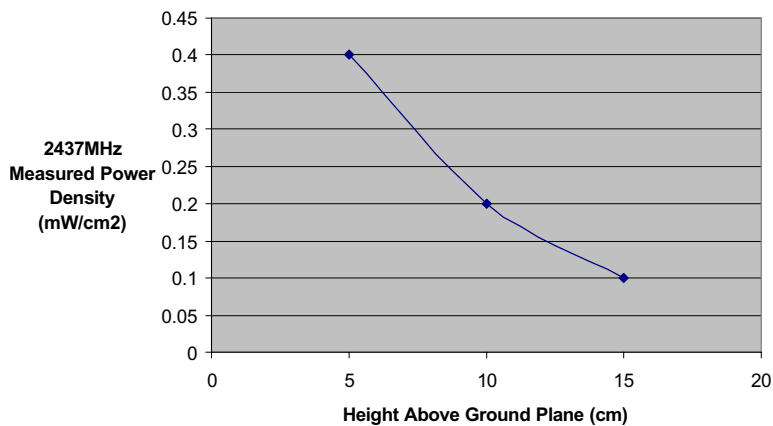


MPE Setup with 3 dBi Gain Antenna  
(MaxRad P/N: BMAXC24503)



### MPE MEASUREMENT SUMMARY (Cont.)

with MaxRad 5dBi Gain Antenna (P/N: BMAXC24505)					
Frequency (MHz)	Height Above Ground Plane (cm)	Measured Power Density at 20cm (mW/cm <sup>2</sup> )	Correction Factor to Obtain Actual (mW/cm <sup>2</sup> )	Total E-Field Equiv. Power Density (mW/cm <sup>2</sup> )	MPE Limit (mW/cm <sup>2</sup> )
2412	5	0.3	1.11	0.333	1.0
2412	10	0.1	1.11	0.111	1.0
2412	15	0.0	1.11	0.000	1.0
2412	20	0.0	1.11	0.000	1.0
2412	25	0.0	1.11	0.000	1.0
2437	5	0.4	1.11	0.444	1.0
2437	10	0.2	1.11	0.222	1.0
2437	15	0.1	1.11	0.111	1.0
2437	20	0.0	1.11	0.000	1.0
2437	25	0.0	1.11	0.000	1.0
2462	5	0.1	1.11	0.111	1.0
2462	10	0.3	1.11	0.333	1.0
2462	15	0.1	1.11	0.111	1.0
2462	20	0.0	1.11	0.000	1.0
2462	25	0.0	1.11	0.000	1.0



MPE Setup with 5 dBi Gain Antenna (MaxRad P/N: BMAXC24505)

## 8.0 SYSTEM CALIBRATION

Prior to the assessment, the Electromagnetic Radiation Survey Meter and Probe were calibrated as per instructions in the operations manual. The unit was placed into the 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 2002

### Positioning System

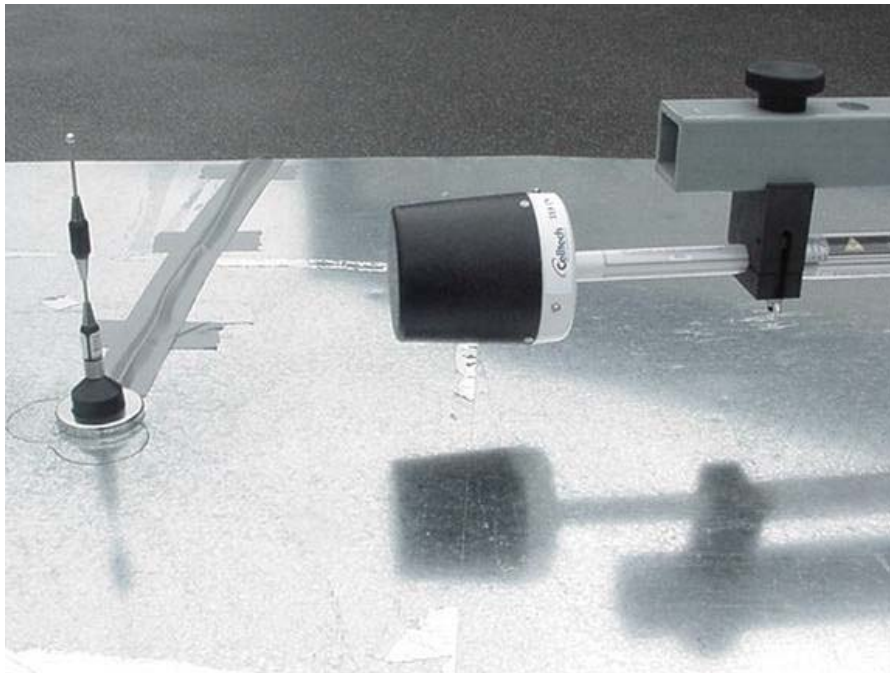
Multi-Device Controller	EMCO Model: 2090	S/N: 9912-1484
Mini-Mast	EMCO Model: 2075	S/N: 0001-2277
Turntable	EMCO Model: 2080-1.2/1.5	S/N: 0002-1002

## 10.0 REFERENCES

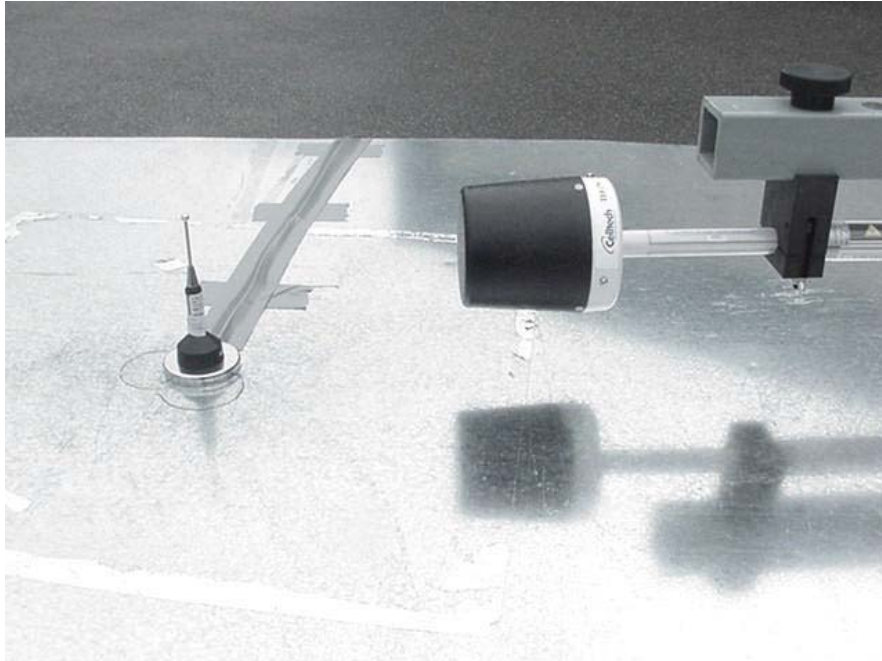
- [1] ANSI/IEEE C95.1-1992, IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3kHz to 300GHz.
- [2] ANSI/IEEE C95.3-1992, IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave.
- [3] FCC OET Bulletin 65, Supplement C (Edition 01-01), Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields.
- [4] 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**  
with 3 dBi Gain Antenna (MaxRad P/N: BMAXC24503)



**MPE TEST SETUP PHOTOGRAPHS**  
with 5 dBi Gain Antenna (MaxRad P/N: BMAXC24505)



## MPE TEST SETUP PHOTOGRAPHS

