

## Test Reports

**Provided by APREL Laboratories**  
**In support of application for Class II Permissive Change for**  
**FCC ID: TPO-OTD300-0**

**RF Power Output as Radiated (ERP)**  
CFR 47 Parts 2.1046 and 22.913(a)

**Equivalent Isotropic Radiated Power (EIRP)**  
CFR 47 Parts 2.1046 and 24.232(b)

**Field Strength of Spurious Radiation**  
CFR 47 Part 2.1053, 22.917(a) &  
Part 24.238(a)

**Compliance FCC CFR 47 Part 15, Subpart B,  
Class B, Unintentional Radiator**

## Engineering Report

**Assessment of Compliance**

**with respect to**

**FCC Rules & Regulations Parts 2, 22, 24  
&  
DoC Part 15 Subpart B Class B**

**for**

**Remote MDx OTD  
Offender Tracking Device**



## Engineering Report

**Subject:** Assessment of Compliance with Respect to  
FCC Rules & Regulations Parts 2.1046/22.913,  
24.232 and 2.1053/22.917, 24.238 &  
DoC Part 15 Subpart B Class B

**FCC ID:** **TPO-OTD300-0**

**Product:** **Offender Tracking Device**

**Model:** **Trackerpal OTD**

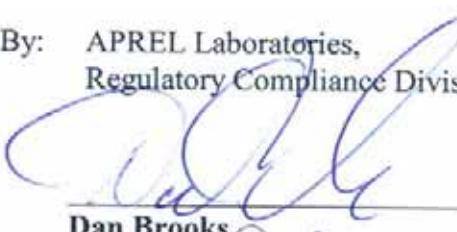
**Client:** **REMOTEMDX INC.**

**Address:** 150 W Civic Center Dr  
Suite 400, Sandy, Utah, 84070  
USA

**Project #:** **RMDB-OTD-5241**

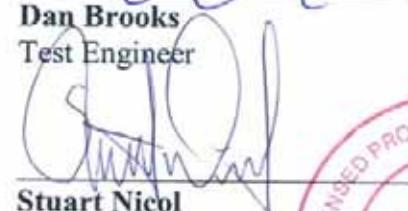
**Prepared By:** APREL Laboratories,  
Regulatory Compliance Division

Tested by:

  
**Dan Brooks**  
Test Engineer

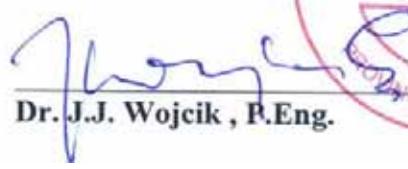
Date: August 1/2006

Approved by:

  
**Stuart Nicol**  
Director, Product Development and Doseimetric R & D

Date: August 1/2006

Released by:

  
**Dr. J.J. Wojcik, P.Eng.**

Date: Aug 4/06

FCC ID: **TPO-OTD300-0**  
Applicant: RemoteMDx Inc.  
Equipment: **Offender Tracking Device**  
Model: **REMOTEMDX OTD**  
Standard: FCC Rules and Regulations Parts 2.1046/22.913, 24.232 and 2.1053/22.917,  
24.238 & DoC Part 15 Subpart B Class B

## ENGINEERING SUMMARY

This report contains the results of the engineering evaluation performed on an **Offender Tracking Device**. The tests were carried out in accordance with the FCC Rules and Regulations Parts 2.1046/22.913, 24.232 and 2.1053/22.917, 24.238 & DOC Part 15 Subpart B Class B .

Based on the test results, it is certified that the product meets the applicable requirements as set forth in the above specifications for Certification.

## Offender Tracking Device REMOTEMDX OTD

### Summary of the Results

Test Description	Exhibit No.	Page No.	Test Set-up Figure No.	Results Summary
RF Power Output as Radiated (ERP) Ref. Parts 2.1046 and 22.913(a)	1A,B	11	1	<b>Passed</b>
Equivalent Isotropic Radiated Power (EIRP) Ref. FCC Parts 2.1046 and 24.232(b)	1A,B	11	2	<b>Passed</b>
Field Strength of Spurious Radiation Ref. Paragraph 2.1053, 22.917(a) & Part 24.238(a)	2A,B	24	3	<b>Passed</b>
Compliance FCC Part 15, Subpart B, Class B, Unintentional Radiator	3A,B,C 4A,B	30,31	3	<b>Passed</b>

## FCC SUBMISSION INFORMATION

**FCC ID:** **TPO-OTD300-0**

Equipment: **Offender Tracking Device**

Model: **REMOTEMDX OTD**

For: Certification

Applicant: REMOTEMDX INC.  
150 W Civic Center Dr  
Suite 400, Sandy, Utah, 84070  
USA

Manufacturer: NexAira INC.  
Suite 310, 525 28<sup>th</sup> St. SE  
Calgary, Alberta, T2A 6W9  
Canada

Test Laboratory: APREL Laboratories  
51 Spectrum Way  
Nepean, Ontario  
Canada K2R 1E6

## MANUFACTURER'S DATA

**Equipment Type:** Offender Tracking Device

**Model:** REMOTEMDX OTD

**Manufacturer:** NexAira

**Development Stage of Unit:** Production

## GENERAL SPECIFICATIONS

Applicable Standards: FCC CFR 47 Part 2, Part 15, Part 22, Part 24 & DoC Part 15 Subpart B Class B

Transmitter or Transceiver: Transceiver (FCC ID: IHDT56DB2)

Frequency Range: Cellular Band (Part 22), PCS Band (Part 24)

Rated Conducted Transmitter Power: 2 W (Cellular Band), 1 W (PCS Band)

Antenna Type: Helix

Antenna Gain: -0.5dBi @ 850 MHz, -1.6dBi @ 1900 MHz

Modulation Type: 242K1W

Receiver Type: Super-Heterodyne

Description: Offender Tracking Device

## INTRODUCTION

### General

This report describes the results of selected tests conducted on a **Offender Tracking Device**, model **REMOTEMDX OTD** manufactured by NexAira INC.

### Test Facility

The tests were performed for REMOTEMDX INC., 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 in 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 FCC registration number is 90416.

APREL is accredited by Standards Council of Canada under ISO 17025. All equipment used is calibrated or verified. APREL is also accredited by Industry Canada Under the terms of the MRA between NVLAP and SCC, APREL is acceptable by FCC to perform Declaration of Conformity (DoC) testing under the FCC rules.

### Standard

The evaluation and analysis were conducted in accordance with FCC Rules and Regulations Parts: 2.1046/22.913, 22.913, 24.232 and 2.1053/22.917, 24.238 & DoC Part 15 Subpart B Class B .

### Test Equipment

The test equipment used during the evaluation is listed in Appendix A. Calibration of all test equipment is performed at 12 month intervals.

### Environmental Conditions

Measurements were conducted under normal laboratory conditions including open area test site.

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

## **TEST RESULTS**

**RF POWER OUTPUT (ERP)**

**GSM 850 MODE**

**DUAL-MODE DUAL-BAND GSM**

**REMOTEMDX OTD**

**Test:** **Effective Radiated Power Output**

**Test Mode:** **GSM 850 MHz**

**Ref.:** **FCC Part 2 paragraph 2.1046 and Part 22 paragraph 22.913(a)**

**Criteria:** The effective radiated power of the mobile transmitter must not exceed 7 Watts effective radiated power ERP. The equipment must employ means to limit the power to the minimum necessary to maintain successful communications.

**Set-up:** See Figure No. 2.

#### **Environmental**

**Conditions:** Temperature:  $23^{\circ}\text{C} \pm 2$ .  
Air pressure:  $101 \pm 3 \text{ kPa}$

**Equipment:** See Appendix A.

**Procedure:** Effective Radiated Power Measurement:

The radiated RF power measurements were taken using the substitution method at APREL Laboratory's open area test site (OATS) measurement facility. 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 requirements of Section 2.948 of the Commissions rules and regulations. (FCC File No.: 90416).

The test was set-up is illustrated in Figure.1. The device under investigation DUI is configured to operate at maximum power (power level 0) mode of operation. The equipment under test was placed on a turntable positioned 3 meters away as in exhibit.1a from the receiving antenna, which in turn was connected to the spectrum analyzer.

For each transmitter frequency, the received signal was maximized by rotating the turntable and adjusting the height of the receiving antenna. The mobile device was replaced by half-wave dipole, as demonstrated in exhibit.1b, vertically polarized with the dipole antenna placed in the same location as the test device. The signal generator level was adjusted to obtain the same reading on the spectrum analyzer.

The output power  $\mathbf{P}$  from the cable connecting to the dipole was directly measured with the RF power meter. The effective radiated power (ERP) was calculated according to the relation in equation (1).

$$\text{Equation (1)} \quad \text{ERP}_{(\text{dBm})} = \mathbf{P}_{(\text{dBm})} + 0\text{dBd}$$

**Results:** **PASSED.** See Table 1.

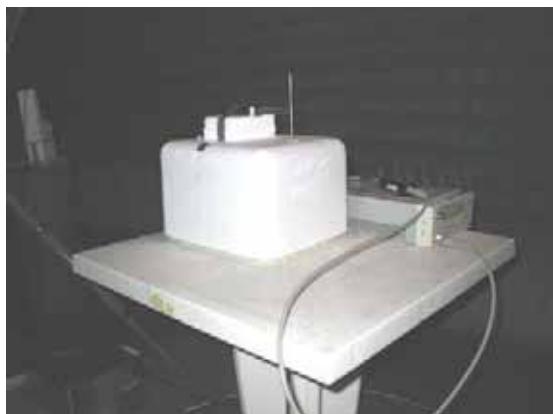
**Table.1**  
**Effective Radiated Power (ERP) GSM 850 MHz**

Channel #	Nominal Transmittin g Frequency (MHz)	ERP (dBm)	ERP (W)	Limit ERP (dBm)	Limit ERP (W)	Margin (dB)
128	824.2	23.78	0.239	38.45	7.000	-14.67
190	836.6	23.49	0.223	38.45	7.000	-14.96
251	848.8	25.18	0.329	38.45	7.000	-13.27

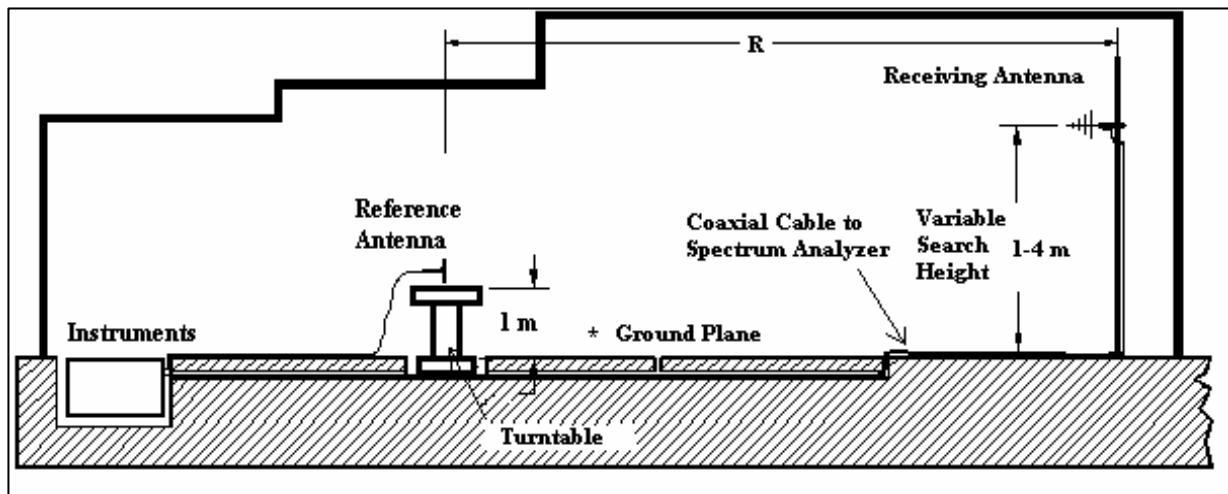
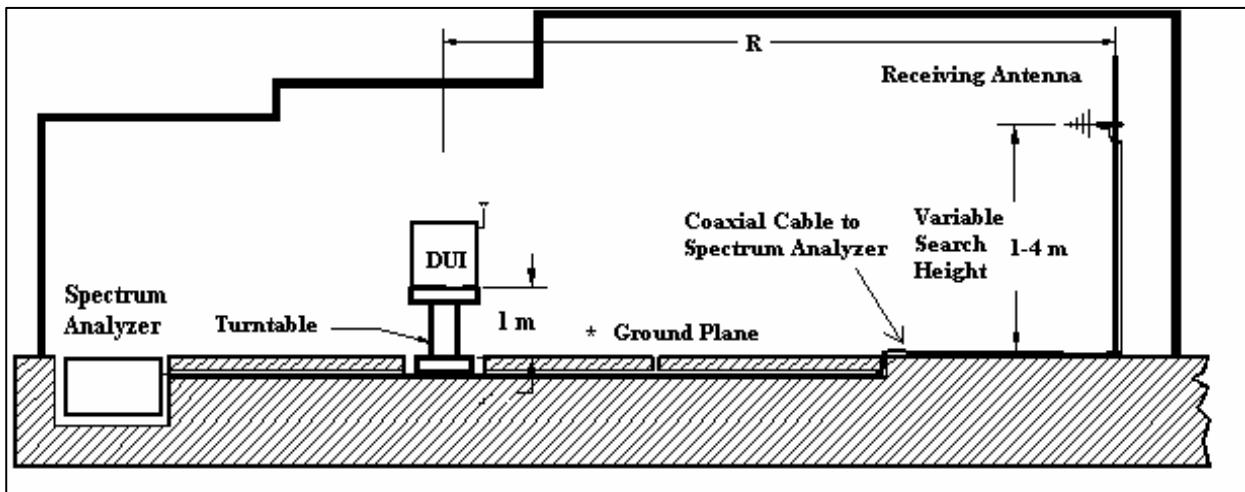
**Exhibit.1a of the Test Set-up**



**Exhibit.1b Measurement Dipole Substitution**



**Figure.1**  
**Set-up Effective Radiated Power (ERP)**



Note:

R=3 meter.

Instruments: Spectrum Analyzer, Signal Generator, RF Power Amplifier.

Receiving Antenna: Double Ridged Horn.

RF absorbing materials were used on the ground plane between transmitting and receiving antenna.

Reference Antenna is a half wave dipole (850MHz).

## **TEST RESULTS**

### **RF POWER OUTPUT (EIRP)**

#### **GSM 1900 MODE**

#### **DUAL-MODE DUAL-BAND GSM**

#### **REMOTEMDX OTD**

**Test:** **Equivalent Isotropic Radiated Power (EIRP)**

**Test Mode:** **GSM 1900MHz**

**Ref.:** **FCC Parts 2.1046 and 24 Subpart E, Paragraph 24.232**

**Criteria:** Portable stations are limited to 2 Watts EIRP peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

Peak transmit power must be measured over any interval of continuous transmission using instruments calibrated in terms of an rms equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, etc., so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.

**Set-up:** See Figure.2.

#### **Environmental**

**Conditions:** Temperature:  $23^{\circ}\text{C} \pm 2$ .  
Air pressure:  $101 \pm 3$  kappa

**Equipment:** See Appendix A.

**Procedure:** **Equivalent Isotropic Radiated Power (EIRP):**

The Equivalent Isotropic Radiated Power EIRP measurements were taken using substitution method at APREL Laboratory's open area test site (OATS) measurement facility. 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 requirements of Section 2.948 of the Commissions rules and regulations. (FCC File No.: 90416).

The test was set-up as illustrated in Figure.2. The portable was configured to operate at maximum power with appropriate mode of operation. The equipment under test was placed on a turntable positioned 3 meters away from the receiving antenna, which in turn was connected to the spectrum analyzer.

For each transmitter frequency, the received signal was maximized by rotating the turntable and adjusting the height of the receiving antenna. The mobile device was replaced by half-wave dipole antenna vertically polarized with the dipole antenna placed in the same location as the test device. The signal generator level was adjusted to obtain the same reading on the spectrum analyzer.

The output power  $\mathbf{P}$  from the cable connecting the dipole was directly measured with the RF power meter. The effective radiated power table.2 (ERP) was calculated according to the relation in equation (1).

$$\text{Equation (1)} \quad \text{ERP}_{(\text{dBm})} = \mathbf{P}_{(\text{dBm})} + 0\text{dBd}$$

**Table.2**  
**Equivalent Radiated Power (ERP) GSM 1900 MHz**

Channel #	Nominal Transmitting Frequency (MHz)	Measured ERP (dBm)	Measured ERP (W)
512	1850.2	25.47	0.352
661	1880.0	24.76	0.299
810	1909.8	24.08	0.256

The effective isotropic radiated power (EIRP) was calculated according to the relation in equation (2).

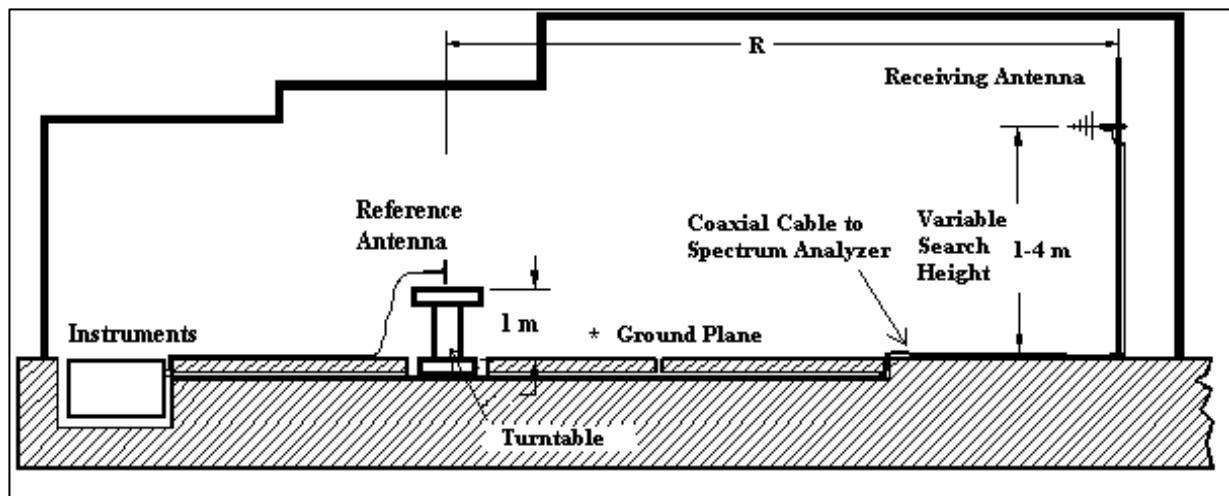
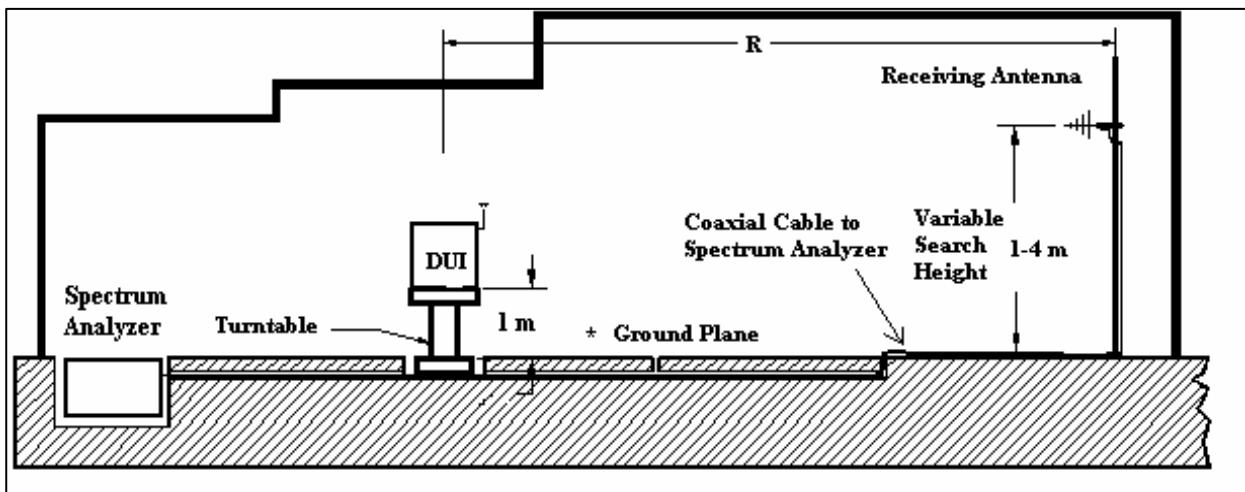
$$\text{Equation (2)} \quad \text{EIRP}_{(\text{dBm})} = \text{ERP}_{(\text{dBm})} + 2.17\text{dBi}$$

**Results:** **PASSED.** See Table.3.

**Table.3**  
**Effective Isotropic Radiated Power (EIRP) GSM 1900 MHz**

Channel #	Nominal Transmitting Frequency (MHz)	EIRP (dBm)	EIRP (W)	Limit EIRP (dBm)	Limit EIRP (W)	Margin (dB)
512	1850.2	27.64	0.581	33.00	2.000	-5.36
661	1880.0	26.93	0.493	33.00	2.000	-6.07
810	1909.8	26.25	0.422	33.00	2.000	-6.75

**Figure.2.**  
**Set-up Equivalent Isotropically Radiated Power (EIRP)**



Note:

R=3 meter.

Instruments: Spectrum Analyzer, Signal Generator, RF Power Amplifier.

Receiving Antenna: Double Ridged Horn.

RF absorbing materials were used on the ground plane between transmitting and receiving antenna.

Reference Antenna is a half wave **dipole (1900MHz)** for Wireless • Consulting • Research • Standards • Compliance • Training

**TEST RESULTS****FIELD STRENGTH OF TRANSMITTER SPURIOUS RADIATION****DUAL-MODE DUAL-BAND GSM OTD****REMOTEMDX OTD**

**Test:** **Field Strength of Spurious Radiation**  
**Cellular 850 MHz and PCS 1900 MHz**  
**GSM**

**Ref:** **FCC Part 2.1053, FCC Part 22.917(a), FCC Part 24.238(a)**

**Criteria:** *Out of band emissions.* The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (**P**) by a factor of at least  $43 + 10 \log (\mathbf{P})$  dB.

**Set-up:** See figures.3

#### **Environmental Conditions:**

*Equipment:* See Appendix A.

#### **Methodology: Measurement by Substitution Method (Radiated):**

The DUI was tested for spurious radiated emissions using the substitution method.

Test site: The radiated RF 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 Figure.3 and exhibits.2. The DUI was configured to operate at maximum power and placed on a turntable positioned 3 m away from the calibrated receiving antenna which in turn was connected to the spectrum analyzer.

Reference dipoles and horn antenna, signal generator and gain amplifier were used to measure the reference level of the DUI on the fundamental frequency. Spurious frequencies, second and third harmonic etc. were evaluated by comparing to the signals transmitted from the calibration reference horn as seen in exhibit.2.

For each transmitter frequency the received signal was maximized by rotating the turntable and adjusting the height of the receiving antenna. The mobile device was replaced by the respective half-wave dipole antenna vertically polarized in the same location as the test device, and the signal generator level was adjusted to obtain the same reading on the spectrum analyzer. The reference horn antenna was used in the substitution for the spurious frequencies.

The output power  $\mathbf{P}$  from the cable connecting the dipole or horn was directly measured with the RF power meter. The effective radiated harmonic power (ERP) was calculated according to the relation in equation (1), and the effective isotropic radiated power (EIRP) calculated according to the relation in equation (2).

$$\text{Equation (1)} \quad \text{ERP}_{(\text{dBm})} = \mathbf{P}_{(\text{dBm})} + 0\text{dBd}$$

$$\text{Equation (2)} \quad \text{EIRP}_{(\text{dBm})} = \text{ERP}_{(\text{dBm})} + 2.17\text{dBi}$$

**Criteria level: The criteria level was calculated to be: LIMIT = - 13.0 dBm.**

This level was obtained by using the following expression:

$$\text{Criteria}_{\text{Limit (dBm)}} = \text{ERP}_{\text{Carrier (dBm)}} - [43 + 10 \cdot \log_{10} \mathbf{P}_{(\text{W})}]$$

$$\text{Criteria}_{\text{Limit (dBm)}} = \text{EIRP}_{\text{Carrier (dBm)}} - [43 + 10 \cdot \log_{10} \mathbf{P}_{(\text{W})}]$$

Example:

$$\text{Criteria}_{\text{Limit(dBm)}} = 29.27 \text{ dBm} - [43 + 10 \cdot \log_{10} (0.845 \text{ W})] = -13.0 \text{ dBm}$$

.

**Results: PASSED.**

**See Tables 4 to 7.**

**Table.4**  
**Field Strength of Spurious Radiation 850 MHz GSM**  
**Antenna Polarization: Vertical**  
**SUBSTITUTION METHOD**

Frequency	ERP	FCC Maximum ERP Limit	Margin
MHz	dBm	dBm	dB
Channel 128 - Transmitting Frequency: 824.2 MHz (Fundamental)			
<b>824.2</b>		-	-
1648.4	-34.60	-13.00	-21.60
2472.6	-47.03	-13.00	-34.03
3296.8	-54.00	-13.00	-41.00
4121.0	nf	-13.00	
4945.2	nf	-13.00	
5769.4	nf	-13.00	
6593.6	nf	-13.00	
7417.8	nf	-13.00	
8242.0	nf	-13.00	
Channel 190 - Transmitting Frequency: 836.6 MHz (Fundamental)			
<b>836.6</b>		-	-
1673.2	-35.90	-13.00	-22.90
2509.8	-48.73	-13.00	-35.73
3346.4	-53.10	-13.00	-40.1
4183.0	-54.00	-13.00	-41.00
5019.6	nf	-13.00	
5856.2	nf	-13.00	
6692.8	nf	-13.00	
7529.4	nf	-13.00	
8366.0	nf	-13.00	
Channel 251 - Transmitting Frequency: 848.8 MHz (Fundamental)			
<b>848.8</b>		-	-
1697.6	-35.94	-13.00	-22.94
2546.4	-49.84	-13.00	-36.84
3395.2	-52.61	-13.00	-39.61
4244.0	-53.21	-13.00	-40.21
5092.8	-54.00	-13.00	-41.00
5941.6	nf	-13.00	
6790.4	nf	-13.00	
7639.2	nf	-13.00	
8488.0	nf	-13.00	

\*nf – noise floor

**Table.5**  
**Field Strength of Spurious Radiation 850 MHz GSM**  
**Antenna Polarization: Horizontal**  
**SUBSTITUTION METHOD**

<b>Frequency</b>	<b>ERP</b>	<b>FCC Maximum ERP Limit</b>		<b>Margin</b>
		<b>MHz</b>	<b>dBm</b>	
Channel 128 - Transmitting Frequency: 824.2 MHz (Fundamental)				
<b>824.2</b>			-	-
1648.4	-46.88	-13.00	-33.88	
2472.6	-43.87	-13.00	-30.87	
3296.8	-53.94	-13.00	-40.94	
4121.0	-54	-13.00	-41.00	
4945.2	nf	-13.00		
5769.4	Nf	-13.00		
6593.6	Nf	-13.00		
7417.8	Nf	-13.00		
8242.0	Nf	-13.00		
Channel 190 - Transmitting Frequency: 836.6 MHz (Fundamental)				
<b>836.6</b>			-	-
1673.2	-42.10	-13.00	-29.10	
2509.8	-40.18	-13.00	-27.18	
3346.4	-53.23	-13.00	-40.23	
4183.0	-54.00	-13.00	-41.00	
5019.6	nf	-13.00		
5856.2	nf	-13.00		
6692.8	Nf	-13.00		
7529.4	Nf	-13.00		
8366.0	Nf	-13.00		
Channel 251 - Transmitting Frequency: 848.8 MHz (Fundamental)				
<b>848.8</b>			-	-
1697.6	-39.83	-13.00	-26.83	
2546.4	-43.50	-13.00	-30.50	
3395.2	-51.34	-13.00	-38.34	
4244.0	-53.43	-13.00	-40.43	
5092.8	-54.00	-13.00	-41.00	
5941.6	Nf	-13.00		
6790.4	Nf	-13.00		
7639.2	Nf	-13.00		
8488.0	Nf	-13.00		

\*nf – noise floor

**Table.6**  
**Field Strength of Spurious Radiation 1900 MHz GSM**  
**Antenna Polarization: Vertical**  
**SUBSTITUTION METHOD**

<b>Frequency</b>	<b>EIRP</b>	<b>FCC Maximum EIRP Limit</b>		<b>Margin</b>
		<b>MHz</b>	<b>dBm</b>	
Channel 512 - Transmitting Frequency: 1850.2 MHz (Fundamental)				
<b>1850.2</b>			-	-
3700.4	-41.15	-13.00	-28.15	
5550.6	-50.17	-13.00	-37.17	
7400.8	-50.33	-13.00	-37.33	
9251.0	-45.40	-13.00	-32.40	
11101.2	-44.64	-13.00	-31.64	
12951.4	Nf	-13.00		
14801.6	Nf	-13.00		
16651.8	Nf	-13.00		
18502.0	Nf	-13.00		
Channel 661 - Transmitting Frequency: 1880.0 MHz (Fundamental)				
<b>1880.0</b>			-	-
3760.0	-31.08	-13.00	-18.08	
5640.0	-32.72	-13.00	-19.72	
7520.0	-50.69	-13.00	-37.69	
9400.0	-46.73	-13.00	-33.73	
11280.0	-43.81	-13.00	-30.81	
13160.0	Nf	-13.00		
15040.0	Nf	-13.00		
16920.0	Nf	-13.00		
18800.0	Nf	-13.00		
Channel 810 - Transmitting Frequency: 1909.8 MHz (Fundamental)				
<b>1909.8</b>			-	-
3819.6	-33.90	-13.00	-20.90	
5729.4	-43.09	-13.00	-30.09	
7639.2	-51.35	-13.00	-38.35	
9549.0	-47.60	-13.00	-34.60	
11458.8	-44.80	-13.00	-31.80	
13368.6	Nf	-13.00		
15278.4	Nf	-13.00		
17188.2	Nf	-13.00		
19098.0	Nf	-13.00		

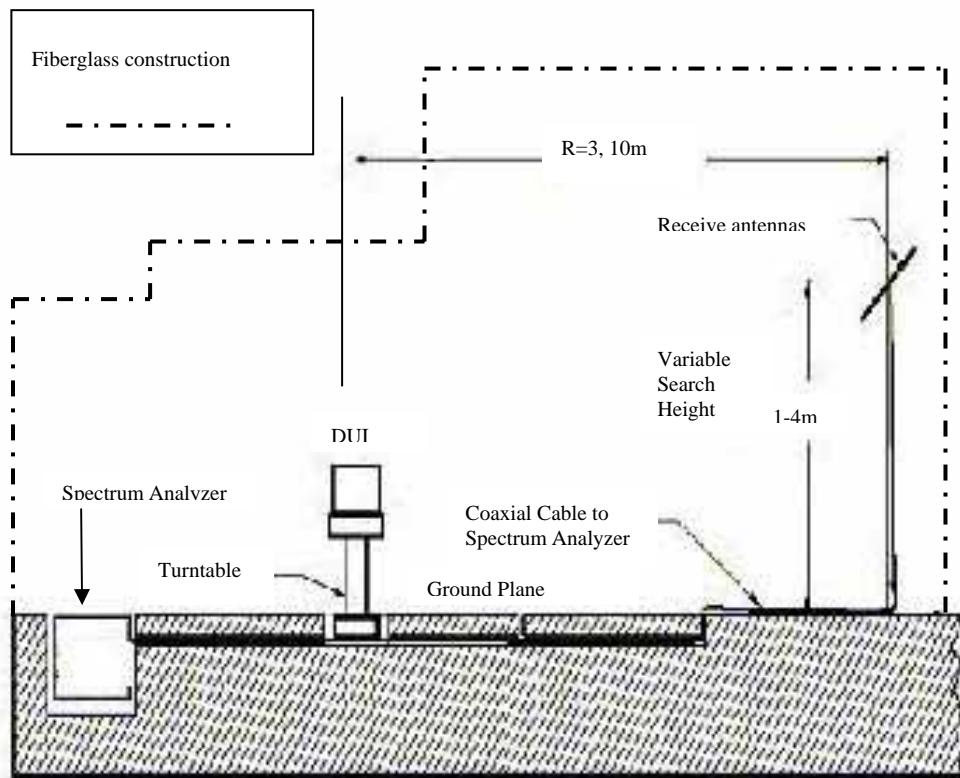
\*nf – noise floor

**Table.7**  
**Field Strength of Spurious Radiation 1900 MHz GSM**  
**Antenna Polarization: Horizontal**  
**SUBSTITUTION METHOD**

<b>Frequency</b>	<b>EIRP</b>	<b>FCC Maximum EIRP Limit</b>		<b>Margin</b>
		<b>MHz</b>	<b>dBm</b>	<b>dB</b>
Channel 512 - Transmitting Frequency: 1850.2 MHz (Fundamental)				
<b>1850.2</b>			-	-
3700.4	-37.05	-13.00	-16.9	
5550.6	-26.94	-13.00	-25.9	
7400.8	-49.37	-13.00	-28.8	
9251.0	-46.43	-13.00	-28.8	
11101.2	-44.59	-13.00	-27.1	
12951.4	-45.78	-13.00	-27.9	
14801.6	Nf	-13.00		
16651.8	Nf	-13.00		
18502.0	Nf	-13.00		
Channel 661 - Transmitting Frequency: 1880.0 MHz (Fundamental)				
<b>1880.0</b>			-	-
3760.0	-39.44	-13.00	-26.44	
5640.0	-37.17	-13.00	-24.17	
7520.0	-48.64	-13.00	-35.64	
9400.0	-45.00	-13.00	-32.00	
11280.0	-43.99	-13.00	-30.99	
13160.0	-46.57	-13.00	-33.57	
15040.0	Nf	-13.00		
16920.0	Nf	-13.00		
18800.0	Nf	-13.00		
Channel 810 - Transmitting Frequency: 1909.8 MHz (Fundamental)				
<b>1909.8</b>			-	-
3819.6	-29.91	-13.00	-16.91	
5729.4	-38.62	-13.00	-25.62	
7639.2	-50.03	-13.00	-37.03	
9549.0	-47.43	-13.00	-34.43	
11458.8	-43.9	-13.00	-30.90	
13368.6	-47.8	-13.00	-34.80	
15278.4	Nf	-13.00		
17188.2	Nf	-13.00		
19098.0	Nf	-13.00		

\*nf – noise floor

**Exhibit.2a of the Test Set-up (eg: Horizontal Polarization)****Exhibit.2b Reference Horn Substitution (eg: Vertical Polarization)**



**Figure 3a: Test set up for the radiated emission measurement in OATS (not to scale)**



**Figure 3b: APREL Laboratories all season Open Area Test Site (OATS)**

## TEST RESULTS

### **ELECTROMAGNETIC INTERFERENCE OF CONDUCTED AND RADIATED EMISSIONS**

**DUAL-MODE DUAL-BAND GSM OTD**

**REMOTEMDX OTD**

**Test:** **Electromagnetic Interference of Conducted and Radiated Emissions  
Cellular 850 MHz and PCS 1900 MHz  
GSM**

**Ref:** **FCC Part 15, Subpart B, Class B Digital Devices**

**Set-up:** See Exhibits.3&4.

### **Environmental**

**Conditions:** Temperature:  $23^{\circ}\text{C} \pm 2$ .  
Air pressure:  $101 \pm 3 \text{ kPa}$

**Criteria:** The evaluation was performed for the purpose of verification of compliance with the requirements of FCC Part 15, Subpart B, Class B Digital Devices.

**Equipment:** See Appendix A.

**Methodology:** This report describes the Electromagnetic Interference evaluation performed on an **Offender Tracking Device**, referred to as DUI (Device Under Investigation).

### **General**

This report describes the results of the Electromagnetic Interference Analysis performed on a **Offender Tracking Device, model WDP318**. APREL Laboratories performed the tests for RemoteMDx Inc. at APREL's EMI facility located in Nepean, Ontario, Canada. The laboratory operates a 3 and 10 meter Open Area Test Site (OATS) measurement facility. The test site is calibrated to ANSI C63.4-1992 document.

The DUI was evaluated for conducted and radiated emissions. The ANSI C63.4-1992 document "Method of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronic Equipment" was used as a guideline for evaluation. The methodology is described in **Section 1, Conducted Signal Analysis** and **Section 2, Radiated Signal Analysis**.

A description of the measurement facility in accordance with the radiated and AC line conducted test site criteria in 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's Open Area Test Site (OATS) is approved by Industry Canada (IC) under the certification number **IC 2068**.

APREL is accredited by Standard Council of Canada under ISO 17025. All equipment used is calibrated or verified. APREL is also accredited by Industry Canada and recognized by the Federal Communications Commission (FCC). ***Under the terms of the MRA between NVLAP and SCC, APREL is acceptable by FCC to perform Declaration of Conformity (DoC) testing under the FCC rules.***

### **Measurement Repeatability Information:**

The test data presented in this report was acquired using the guidelines set forth in ANSI C63.4-1992 and are valid only for the equipment identified herein under the test conditions described. Repeatability of these test results will only be achieved with identical measurement conditions. These conditions include the same test distance, DUI height, measurement site characteristics, and the same DUI and system components. The system must have the same interconnecting cables arranged in identical placement, with the system and/or DUI functioning in the identical mode of operation (i.e. software and so on) as on the date of the test. Any deviation from the test conditions and environment on the date of the test may result in measurement uncertainty which may be difficult to track.

Uncertainty: - for Radiated Emissions Measurement:  $\pm 4\text{dB}$   
- for Conducted Emissions Measurement:  $\pm 2\text{dB}$

## **SECTION ONE**

### **CONDUCTED SIGNAL ANALYSIS (NOT APPLICABLE)**

#### **Procedure**

Measurement of conducted emissions is carried out following the test procedure ANSI C63.4-1992 paragraph 7.2.

Conducted power-line measurements are made over the frequency range from 150 kHz to 30 MHz, to determine the line-to-ground radio noise voltage that is conducted from the DUI (Device Under Investigation) power-line input terminals that are **directly** (or indirectly via separate transformers or power supplies) connected to a public power network.

Measurements are performed using the spectrum analyzer with quasi-peak function and 9 kHz resolution bandwidth. Specific peaks are measured from the continuous plots.

The rear of the DUI and peripherals are all aligned and flush with the rear of the table top. The rear of the table top was 40 cm removed from the vertical conducting (shielded room) wall.

#### **Conclusion:**

**Conducted signal test is not required because the DUT has no wired exterior power according to exhibits.3a, and no communications ports. It is a stand alone wireless battery operated device. The battery charger exhibit.3b is a discrete unit and can not be connected to the DUT.**

**Exhibit.3a Offender Tracking Device with ankle Cuff****Exhibit.3b Adjunct Battery Charging Unit**

**Exhibit.3c DUT without Battery**

Backview



Right



Left

## SECTION TWO

### RADIATED SIGNAL ANALYSIS

#### Procedure

Measurement of radiated emissions was carried out following the test procedure ANSI C63.4-1992 Paragraph 8.1. The Open Site arrangement is shown in Figure 2.

Radiated emission measurements were made over the frequency range 30 MHz to above 960 MHz following the radiated emission limits of Subpart B, Section 15.109, paragraph A.

Radiated emissions from 30 MHz were scanned in a shielded enclosure using a broadband Biconical antenna exhibit.4a and Log-periodic antenna exhibit.4b in order to determine the characteristic frequencies of radiation.

Based on this information, measurements were performed in the open area test site at these characteristic frequencies. APREL Open Area Test Site is calibrated to ANSI C63.4-1992 and is filed with FCC. The test site is characteristically flat, free of reflecting structures. All reflecting objects, including test personnel, lie outside the perimeter of the ellipse (defined in ANSI C63.4-1992) or below the ground plane level. The horizontal and vertical site attenuation measurements are within  $\pm 4$  dB of the theoretical site attenuation of an ideal site. The DUI was placed on a turntable positioned 3 meters away from the receiving antenna, which in turn was connected to the spectrum analyzer. The DUI was operated in a manner that produced the highest emissions.

For each identified characteristic frequency, the received signal was maximized by appropriate positioning of the turntable and the height of the receiving antenna. The height of the antenna was adjusted between 1 m and 4 m in height above the ground plane. The turntable was rotated 360° from a remote control to maximize the emissions. The process was repeated for both horizontal and vertical polarization. All cables were arranged for maximum emission.

Radiated RF emission levels measured were identified as having been emitted by the DUI. Measurements were performed using the spectrum analyzer employing a CISPR quasi-peak detector function and 120 kHz bandwidth on frequencies from 30 MHz to 960 MHz, and for frequencies above 960 MHz employing an average detector function and 1 MHz resolution bandwidth. All measurements were performed, swept at discrete frequencies.

**Limit:**

According to FCC Part 15, Subpart B, Section 15.109, Paragraph B, radiated emission measurement, maximum allowable field strength for Class B Digital Devices at a distance of 3 meters is  $100\mu\text{V}/\text{m}$  (40.0  $\text{dB}\mu\text{V}/\text{m}$ ) for the frequency range of 30 to 88 MHz,  $150\mu\text{V}/\text{m}$  (43.5  $\text{dB}\mu\text{V}/\text{m}$ ) for 88 to 216 MHz,  $200\mu\text{V}/\text{m}$  (46.0  $\text{dB}\mu\text{V}/\text{m}$ ) for 216 to 960 MHz, and  $500\mu\text{V}/\text{m}$  (54.0  $\text{dB}\mu\text{V}/\text{m}$ ) for frequencies above 960 MHz.

All measurements were performed using Quasi-peak function of the spectrum analyzer with 120 kHz bandwidth up to 960 MHz and above 960 MHz averaging detector function and 1 MHz resolution bandwidth were used.

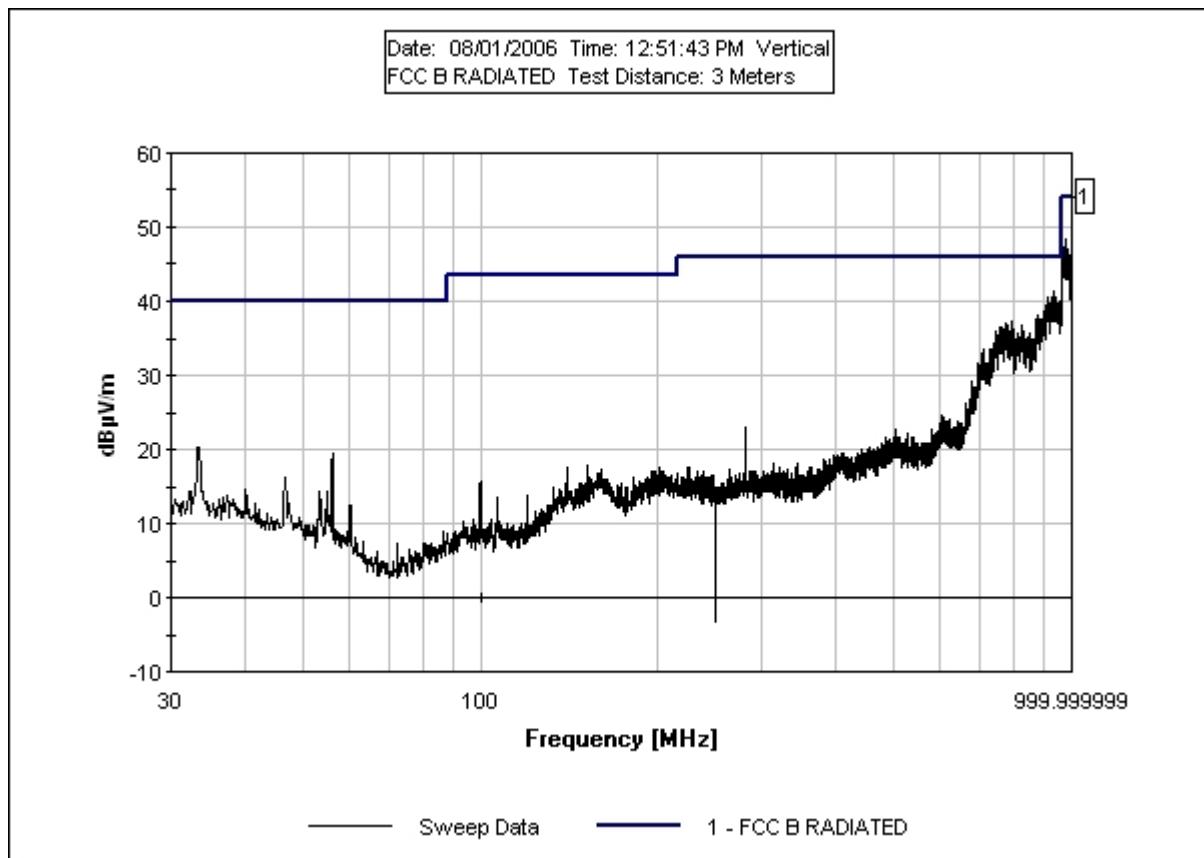
**Test Results:**

**Results:** **PASSED**, The DUI complies with *Class B* limit for radiated emissions

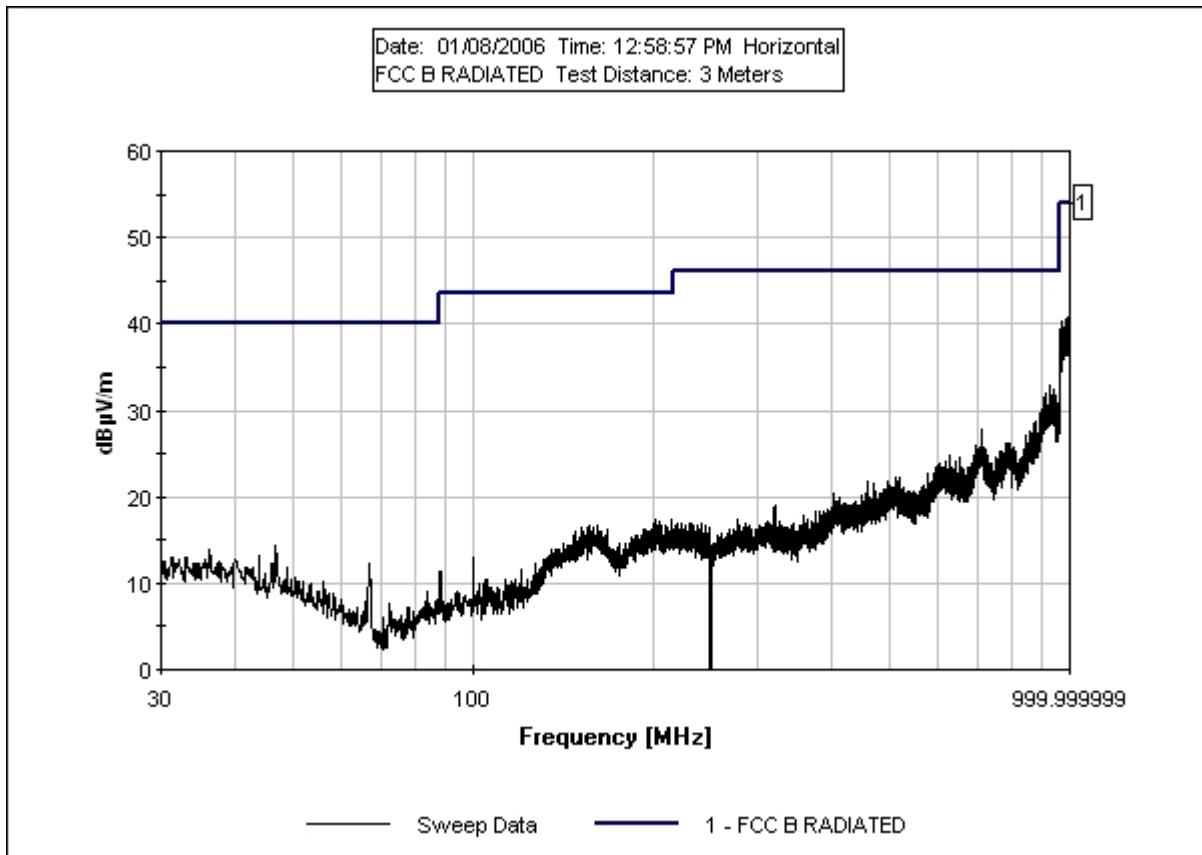
Test measurements are tabulated in Graphs 1 & 2.

**RADIATED R.F. EMISSION LEVELS**

**GRAPH 1**  
**FCC PART 15 CLASS B**  
**ANTENNA POLARIZATION: VERTICAL**



**GRAPH 2**  
**FCC PART 15 CLASS B**  
**ANTENNA POLARIZATION: HORIZONTAL**



**Exhibit.4a Radiated Emissions Measurement**  
**Frequency range: 30 MHz – 200 MHz****Vertical Polarization****Horizontal Polarization**

**Exhibit.4b Radiated Emissions Measurement**  
**Frequency range: 200 MHz – 1 GHz****Vertical Polarization****Horizontal Polarization**

## APPENDIX A

### List of Equipment used for Measurements

Description	Range	Manufacturer	Model #	APREL Asset #	Cal. Due Date
Spectrum Analyzer	9 kHz – 30GHz	Anritsu	MS2667C	301386	September 5, 2006
Radio Communication Analyser	300kHz – 3GHz	Anritsu	MT8801C	301598	August 6, 2006
RF Signal Generator	10 MHz – 26.5 GHz	Hewlett Packard	HP 8340 B	100955	Oct 5, 2006
RF Power Meter	10 MHz - 18 GHz	Giga-tronics	8541C	301393	Oct.16, 2006
RF Power Sensor	10 MHz - 18 GHz	Giga-tronics	80601A	301394	Oct.16, 2006
Bi-conical Antenna	20 MHz-200 MHz	Eaton	94455-1	100890	July 18, 2006
Log Periodic Antenna	200 MHz -1.0 GHz	Eaton	ALP-1	100063	July 31, 2006
Horn Antenna	1 GHz – 18 GHz	APREL Inc.	AA-118	100552	June 17, 2006
Horn Antenna	1 GHz – 18 GHz	APREL Inc.	AA-118	100553	June 17, 2006
RF Antenna Pre-amplifier	30 MHz-1000MHz	APREL Inc.	LNA-1	301415	August 27, 2006
Microwave Pre-amplifier	1 GHz – 26.5 GHz	Hewlett-Packard	8449B	301462	June 16, 2006
RF Power Amplifier	(0.8 – 4.2)GHz	OPHIR	TF-101	301583	Feb 27, 2007
Reference Half -wave Dipole Antenna	835 MHz	APREL Inc.	ALP-DA1/2W	301482	July 3, 2006
Reference Half -wave Dipole Antenna	1850.00 MHz	APREL Inc.	ALP-DA1/2W	301557	July 3, 2006
Mast with Controller	1 m - 4 m	EMCO	1051-12	100507	N/A
OATS	3m & 10 m	APREL Inc.	3 m & 10 m	N/A	N/A
SAC	10 kHz - 10 GHz	APREL Inc.	—	301329	N/A
High Pass Filter	3.0 GHz	Anaren	KPMC 03SJ0	301560	August 15, 2006
Attenuator	20 dB	NARDA	9779-20	301533	August 15, 2006
Notch Filter	DC - 6 GHz	Microwave Filter Co.	6367	301055	CBT