

Assessment of Compliance

for

Measurement of Effective Radiated Power (ERP) in accordance with
the FCC Rules & Regulations Part 2.1046 and 90

BlackBerry Wireless Handheld
Model: RAL10IN

Research in Motion



August 2003

APREL Project No.:RIMB-RAL10IN-4043

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Engineering Report

Subject: Measurement of Effective Radiated Power (ERP) in accordance with the FCC Rules & Regulations Part 2.1046 and 90

FCC ID: L6ARAL10IN

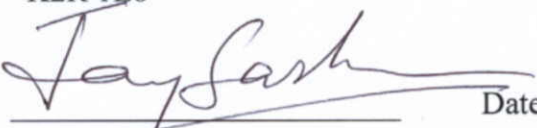
Equipment: BlackBerry Wireless Handheld

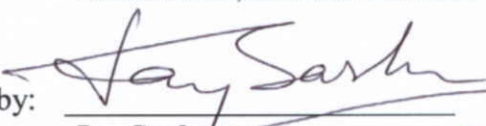
Model: RAL10IN

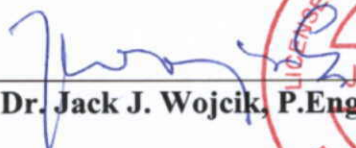
Client: Research in Motion
295 Phillip Street
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CANADA, N2L 3W8

Project #: RIMB-7510-4043

Prepared By: APREL Laboratories,
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Approved by:  **Date:** Sept. 3, 2003
Jay Sarkar
Technical Director, Standards & Certification

Submitted by:  **Date:** Sept. 3, 2003
Jay Sarkar
Technical Director, Standards & Certification

Released by:  **Date:** Sept 3/03
Dr. Jack J. Wojcik, P.Eng.



FCC ID: L6ARAL10IN
Applicant: Research in Motion
Equipment: BlackBerry Wireless Handheld
Model: RAL10IN
Standard: FCC Rules and Regulations Part 2.1046 and 90

ENGINEERING SUMMARY

This report contains the results of the effective radiated power (ERP) measurement performed on a **RIM** BlackBerry Wireless Handheld, **model RAL10IN**. The measurements were carried out in accordance with the FCC Rules and Regulations Part 2.1046 and 90. The product was evaluated for ERP when it was set at the maximum power level.

RIM Model: RAL10IN was tested for ERP at high, middle and low frequencies at each band, thus covering both bands. The measurements were performed at 806.0125 MHz, 815.5000 MHz, and 824.9875 MHz. The highest ERP in the frequency band 806-825 MHz is 0.646 W at 824.9875 MHz.

(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 and 90	8	1	Passed

INTRODUCTION

General

This report describes the results of the effective radiated power (ERP) measurement conducted on a RIM BlackBerry Wireless Handheld, model **RAL10IN**.

Test Facility

The tests were performed for Research in Motion 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. Industry Canada File No. is IC 2068 for APREL OATS.**

APREL is accredited by Standard Council of Canada.

Standard

The evaluation and analysis were conducted in accordance with FCC Rules and Regulations Parts 2.1046 and the appropriate limits (90).

Test Equipment

The test equipment used during the evaluation is listed in Appendix A.

Environmental Conditions

Measurements were conducted in open area test site.

Temperature: 25 °C ± 2- **Relative Humidity:** 30 - 50 % **Air Pressure:** 101 kPa ± 3

Personnel: The equipment was tested by Y. Chen, EMC Engineer and the report was written by Jay Sarkar, Technical Director, Standards and Certification.

The sample of the evaluation consisted of the following:

<u>Description</u>	<u>Model No</u>	<u>S/N</u>
BlackBerry Wireless Handheld (FCC ID:L6ARAL10IN)	Model RAL10IN	IMEI No. 010001000083170
Battery Charger	BCM6T10A	D0321
IBM Thinkpad Laptop PC (FCC ID: 4U6JPN-32476-D-T-M)	(Type No. 2645-4BU)	78-CLDMO

FCC SUBMISSION INFORMATION

FCC ID: L6ARAL10IN

Equipment (type):
As Marketed **BlackBerry Wireless Handheld**

Model: **RAL10IN**

For: Certification

Applicant: **Research in Motion**
295 Phillip Street
Waterloo, Ontario
CANADA, N2L 3W8

Manufacturer: **Research in Motion**
295 Phillip Street
Waterloo, Ontario
CANADA, N2L 3W8

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

Test: RF Power Output as Radiated (ERP)

Ref.: FCC Part 2 paragraph 2.1046 and 90

Criteria: N/A

Set-up: See Figure No. 1.

Equipment: See Appendix A.

Methodology:

ERP was measured in the following two steps.

A.) Measurement of antenna gain employing substitution method.

B) Measurement of the conducted power at the antenna port.

A) Antenna Gain: The antenna gain 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 Wireless Module was configured to transmit a CW signal at a certain power. The output of the wireless module was disconnected from its antenna port and connected to a RF power meter. The reading was taken directly from the power meter and used for gain calculation.

The antenna of the DUI was then connected and the DUI was placed on a turntable positioned 3 m away from the calibrated receiving antenna, which in turn was connected to the spectrum analyzer.

The received signal was **maximised** by rotating the turntable and adjusting the height of the receiving antenna. The peak reading on the spectrum analyser was recorded. To obtain the antenna gain, the DUI 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 DUI. 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 DUI 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 RF power fed to the substitute dipole antenna was measured and recorded. The reading was taken directly from the power meter and used for gain calculation.

The measurements were carried out at frequency 815.5000MHz.

B) Conducted Power Measurement: The maximum output power level was measured using a spectrum analyser in series with a 15.5 dB attenuator. The conducted power shown in table 1 takes into account the calibrated insertion loss for the attenuator plus the compensation factor for measuring the pulse average.

Results: See Table 1

Sample calculation:

1) Antenna gain calculation

The measured conducted CW signal power is

$$P_{CW} = 17.0 \text{ dBm}$$

The measured RF power fed to the substitute dipole antenna is

$$P_{\text{dipole}} = 16.9 \text{ dBm}$$

So the antenna gain is

$$\text{Gain} = P_{\text{dipole}} - P_{CW} = 16.9 - 17.0 = -0.1 \text{ dBd}$$

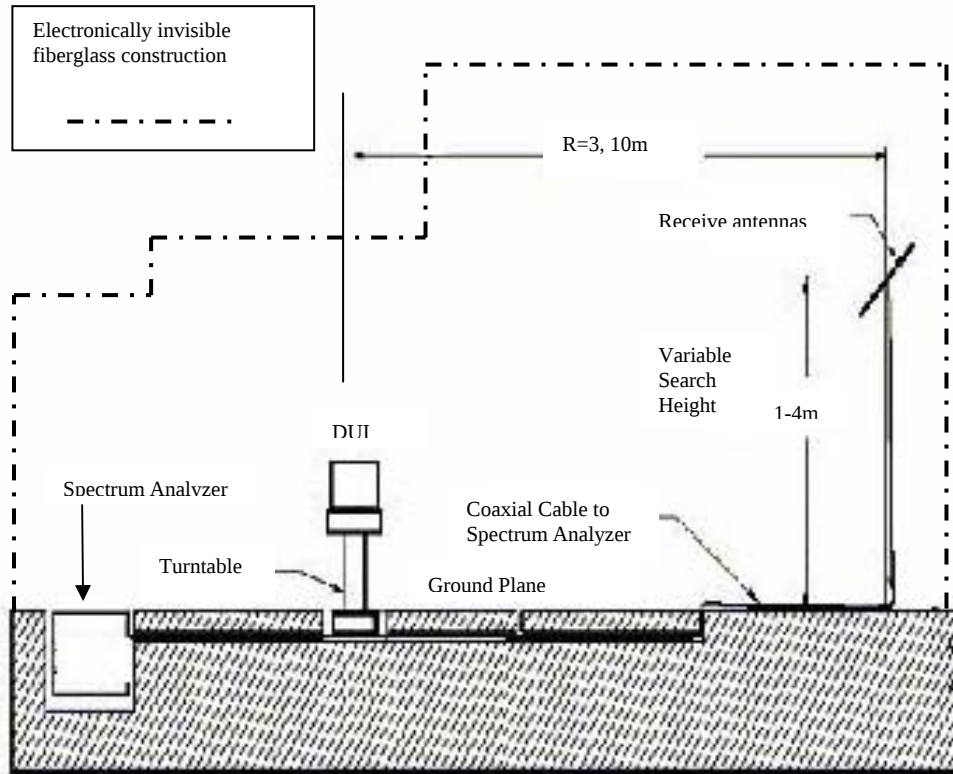


Figure 2.a: Test set up for the radiated power measurement in OATS (not to scale)
Fig. 1.b APREL's OATS (Open Area Test Site)

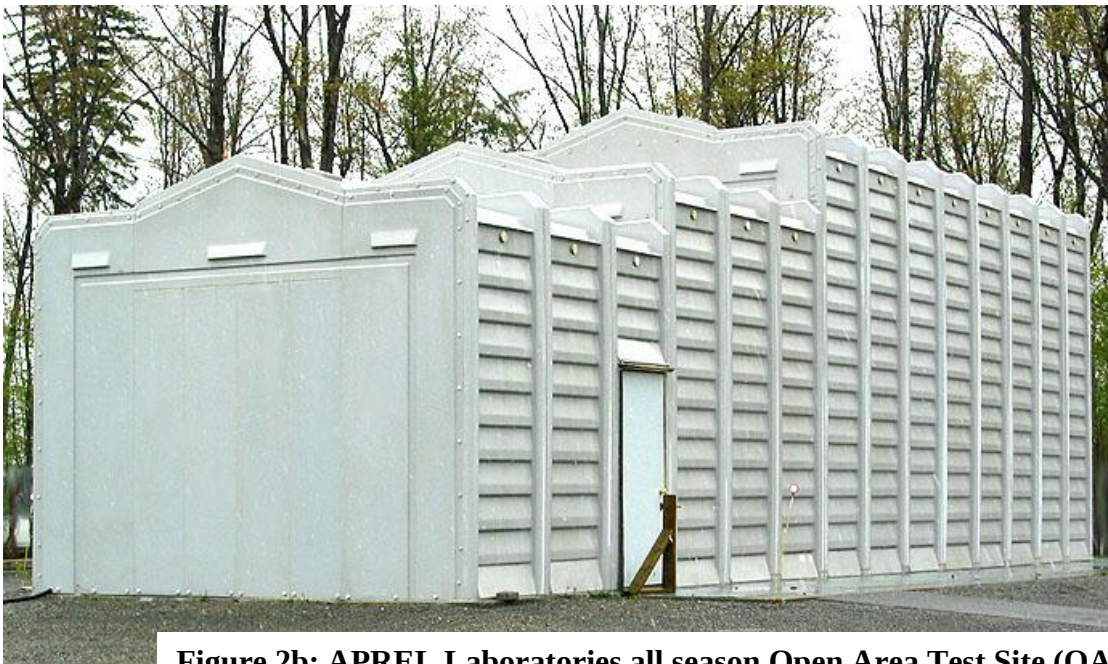
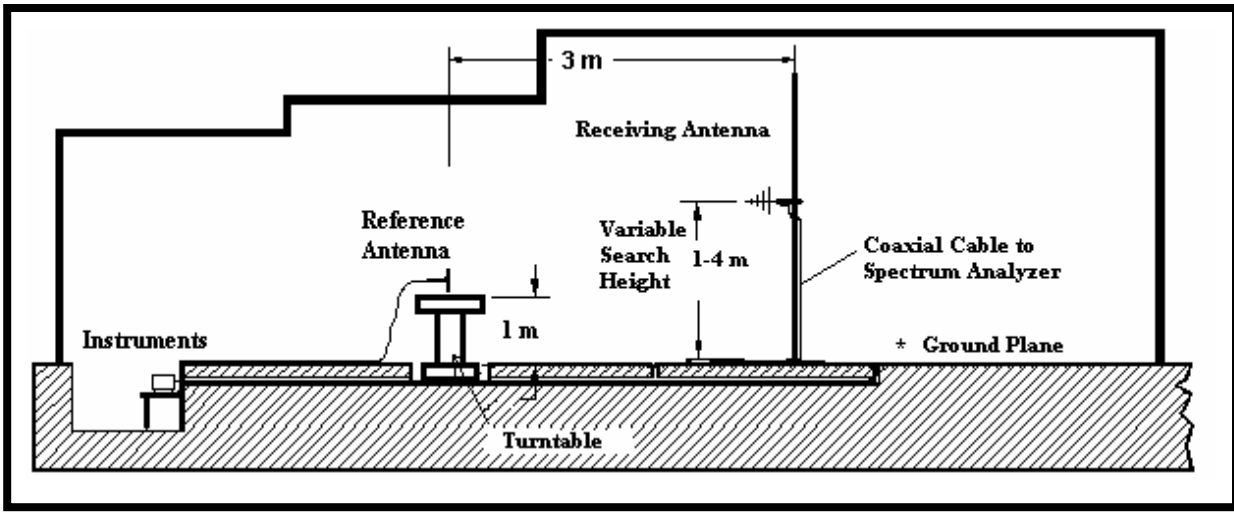


Figure 2b: APREL Laboratories all season Open Area Test Site (OATS)



**Figure 1.c Test set up for the Radiated Power (ERP) Measurement in OATS (not to scale)
Shown: Reference Dipole Antenna.**

TEST DATA

Table 1.
RF Output Power Measurement
Maximum ERP, Substitution Method

Frequency (MHz)	Measured Pulse Average Conducted RF Power at Antenna Port (dBm)	Antenna Gain Substitution Method (dBd)	Effective Radiated Power ERP (dBm)	Effective Radiated Power ERP (W)
806.0125	28.1	-0.1	28.0	0.631
815.5000	27.4	-0.1	27.3	0.537
824.9875	28.2	-0.1	28.1	0.646

Test performed by:

Yinghe Chen

Date:

Aug. 2003

APPENDIX A

List of Test Equipment

List of Equipment used

Description	Manufacturer	Model #	Asset #	Calibration Due Data
Spectrum Analyzer	Anritsu	MS2667C	301436	Sept. 2003
Power Meter	Rhode & Schwarz	NRVS	100851	Oct. 2003
3 dB Attenuator	Bird	-	100889	CBT
6 dB Attenuator	Pasternack	-	301565	CBT
6 dB Attenuator	Pasternack	-	301566	CBT
Signal Generator	Hewlett-Packard	HP 8340B	100955	Oct 5, 2003
RF Power Amplifier	Amplifier Research	25W100M	100735	CBT
Reference Half wave Dipole	APREL Inc.	D-8355	301482	N/A
Log Periodic Antenna	Eaton	ALP-1	100063	July 2003
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 OF TESTING SETUPS



RIM RAL10IN BlackBerry Wireless Handheld



RIM MODEL: RAL10IN tested for ERP



Reference Dipole Antenna Used for ERP Measurement