

**FCC ID: PQS-BM28001**

**Exhibit 2a**

**Engineering Report on**

**ERP (2.1046)**



# Assessment of Compliance

for

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

## Wireless OEM Modem Module Boomer II

Wavenet Technologies Pty Ltd.



August 2002

APREL Project No.:WVTB-BoomerII-Modem-3922-1

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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:** PQS-BM28001

**Equipment:** Wireless OEM Modem Module

**Model:** BOOMER II

**Client:** Wavenet Technologies Pty Ltd.  
140 Burswood Rd  
Burswood, Perth, WA 6100  
AUSTRALIA

**Project #:** WVTB-BoomerII-Modem-3922-1

**Prepared By:** APREL Laboratories,  
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Nepean, Ontario  
K2R 1E6

**Approved by:**



**Jay Sarkar**

Technical Director, Standards & Certification

**Date:**

*Sept. 12, 2002*

**Submitted by:**



**Jay Sarkar**

Technical Director, Standards & Certification

**Date:**

*Sept. 12, 2002*

**Released by:**



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

**Date:**

*Sept 12/02*



**FCC ID:** PQS-BM28001  
**Applicant:** Wavenet Technologies Pty Ltd.  
**Equipment:** Wireless OEM Modem Module  
**Model:** BOOMER II  
**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 **Wavenet OEM Wireless Modem, model BOOMER II**. 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.

The Wireless OEM Module is an 800 MHz OEM product for integration into customer end user equipment as an OEM modem and interfaces to it via the data interface port.

The modem provides two available bands: a) 806-821 MHz and b) 821-824 MHz. The bands are software controlled and can not be switched by the user.

**This report presents test data for both frequency bands, 806-821 MHz (Mask G) and 821-824 MHz (Mask H).**

Wavenet Boomer II was tested for ERP at high, middle and low frequencies at each band, thus covering both bands. The measurements were performed at 806 MHz, 815 MHz, 821 MHz, 822 MHz and 824 MHz. The highest ERP in the frequency band 806-821 MHz is 1.828 W at 806 MHz. The highest ERP in the frequency band 821-824 MHz is 1.496 W at 821 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	<b>Passed</b>

## INTRODUCTION

### General

This report describes the results of the effective radiated power (ERP) measurement conducted on a Wavenet Wireless OEM Modem Module, model **BOOMER II**.

### Test Facility

The tests were performed for Wavenet Technologies Pty Ltd. 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. APREL is also accredited by Industry 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 Roman Kuleba, EMC Engineer and the report was written by Jay Sarkar, Technical Director, Standards and Certification.*

## FCC SUBMISSION INFORMATION

**FCC ID:** **PQS-BM28001**

Equipment (type): **Wireless OEM Modem Module**  
As Marketed

Model: **BOOMER II**

For: Certification

Applicant: **Wavenet Technologies Pty Ltd.**  
140 Burswood Rd  
Burswood, Perth, WA 6100  
AUSTRALIA

Manufacturer: **Wavenet Technologies Pty Ltd.**  
140 Burswood Rd  
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AUSTRALIA

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

## MANUFACTURER'S DATA

**FCC ID No:** PQS-BM28001

**Equipment Type:** Wireless OEM Modem Module

**Model:** BOOMER II

**Reference:** FCC Rules and Regulations Parts 2 and Part 90

**Manufacturer:** Wavenet Technologies Pty Ltd

**Development Stage of Unit:** Production

## GENERAL SPECIFICATIONS

1. Frequency Range:
  - a) 806.00 to 821.00 MHz (Transmitter)
  - b) 821.00 to 824.00 MHz (Transmitter)
2. Measured ERP
  - a) 1.828 W (32.62 dBm) at frequency 806 MHz for band 806-821 MHz
  - b) 1.496 W (31.61 dBm) at frequency 821 MHz for band 821-824 MHz
3. Emission Designators Per 47 CFR § 2.201 and §2.202
  - a) 806.00 to 821.00 MHz: 20K0F1D
  - b) 821.00 to 824.00 MHz: 12K6F1D
4. Antenna Impedance: 50 Ohms

**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: RF Power Measurement by Substitution Method:**

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 Wireless Module was configured to operate at maximum power. 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 ERP, 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 effective radiated power was read directly from the power meter.**

**The measurements were carried out at frequencies 806 MHz, 815 MHz, 821 MHz, 822 MHz, and 824 MHz covering frequency bands, 821-824 MHz and 821-824 MHz. Common to both bands is 821 MHz.**

**Results:** See Table 1



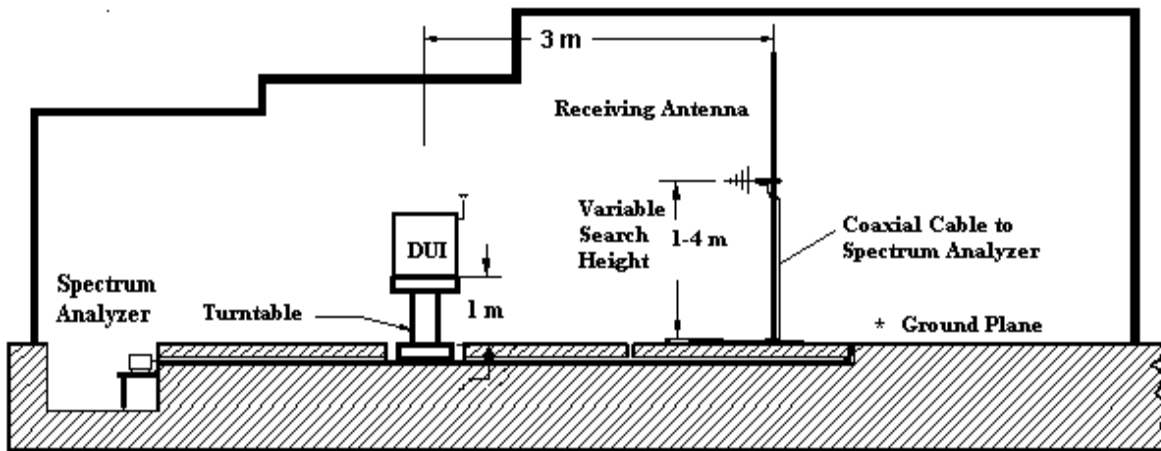
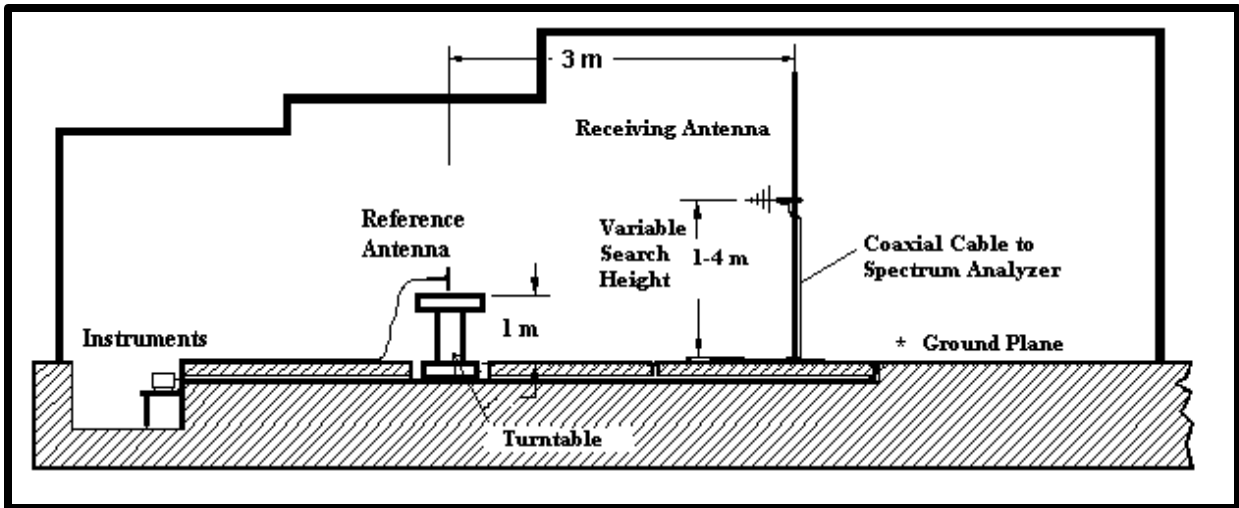


Figure 1.a Test set up for the Radiated Power (ERP) Measurement in OATS (not to scale)



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



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

**Table 1.**  
**RF Output Power Measurement**  
**Maximum ERP tested by the Substitution Method**  
806.00 to 821.00 MHz band and 821.00 to 826.00 MHz band

Frequency (MHz)	Conducted RF Power @ Antenna Port (dBm)	Effective Radiated Power ERP (dBm)	Effective Radiated Power ERP (W)
806.00	32.82	32.62	1.828
815.00	32.74	31.52	1.419
821.00	32.69	31.75	1.496
822.50	32.67	31.31	1.352
824.00	32.67	31.61	1.449

Test performed by: LuChia Pomon Date: August, 2002

## **APPENDIX A**

### List of Test Equipment

**List of Equipment used**

<b>Description</b>	<b>Manufacturer</b>	<b>Model #</b>	<b>Asset #</b>	<b>Calibration Due Data</b>
Spectrum Analyzer	Anritsu	MS2667C	301436	Sept. 2002
Power Meter	Rhode & Schwarz	NRVS	100851	Oct. 2002
20 dB Attenuator	NARDA	4774-20	301533	CBT
Signal Generator	Hewlett-Packard	HP 8340B	100955	Oct 5, 2002
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

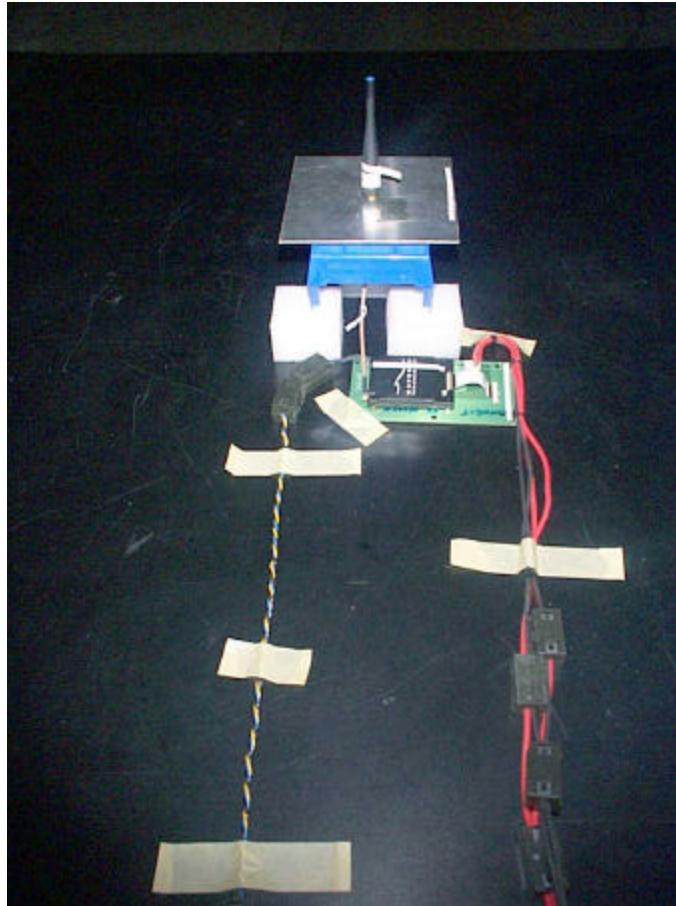
# **APPENDIX B**

## **PHOTOGRAPHS OF TESTING SETUPS**



**WaveNet BOOMER II  
Wireless OEM Modem Module**



**WaveNet BOOMER II tested for ERP**





**WaveNet BOOMER II tested for ERP**



**Reference Dipole Antenna Used for ERP Measurement**