FCC ID: PQS-BM28001

Exhibit 2c

Engineering Report on

Bandwidth (2.1049) Modulation Characteristics (2.1047)

Assessment of Compliance

for

Measurement of Modulation Characteristics/Occupied Bandwidth in accordance with the FCC Rules & Regulations Part 2.1047/49 and 90

Wireless OEM Modem Module
Boomer II

Wavenet Technologies Pty Ltd.

August 2002

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

51 Spectrum Way Nepean ON K2R 1E6
Tel: (613) 820-2730 Fax: (613) 820-4161
email: info@aprel.com

Engineering Report

Subject: **Measurements of Modulation Characteristics/ Occupied Bandwidth in accordance with the FCC Rules & Regulations Part 2.1047/49 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,**
Regulatory Compliance Division
51 Spectrum Way
Nepean, Ontario
K2R 1E6

Approved by: _____ Date: Sept. 12, 2002
Jay Sarkar
Technical Director, Standards & Certification

Submitted by: _____ Date: Sept 12, 2002
Jay Sarkar
Technical Director, Standards & Certification

Released by: _____ Date: Sept 12/02
Dr. Jack J. Wojcik, P.Eng.

LICENSED PROFESSIONAL ENGINEER
J.J. WOJCIK
PROVINCE OF ONTARIO

FCC ID: **PQS-BM28001**
Applicant: Wavenet Technologies Pty Ltd.
Equipment: Wireless OEM Modem Module
Model: BOOMER-II
Standard: FCC Rules and Regulations Part 2.1047/49 and 90

ENGINEERING SUMMARY

This report contains the results of the Occupied Bandwidth/Bandwidth Limitation measurement performed on a **Wavenet Wireless OEM Modem Module** model BOOMER-II**.** The measurements were carried out in accordance with the FCC Rules and Regulations Part 2.1049. The product was evaluated for bandwidth when it was set at the maximum power level**.**

The Wireless OEM Modem 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: 806-821 MHz and 821-824 MHz. The bands are software controlled and can not be switched by user.

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

Modulation Characteristics (FCC Rule PART 2.1047): This test is not applicable, as the device is not capable of voice transmission.

This modem has two different profiles type with appropriate settings for data rate, deviation, modulation shaping set for 806-821 MHz G Spectral Mask (MDC 48003, RDLAP 9.6 and RDLAP 19.2) and 821-824 MHz H Spectral mask (RDLAP 9.6).

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
Bandwidth/bandwidth Limitation Ref. Paragraph 2.1049 and 90	8	1	**Passed**

INTRODUCTION

General

This report describes the results of the occupied bandwidth 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 2.1049/47.

Personnel: The equipment was tested by Roman Kuleba, EMC Engineer. Methodology was developed and the report written by Jayanta (Jay) K. Sarkar, Technical Director, Standards and Certification.

Test Equipment

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

Environmental Conditions

Measurements were conducted in the EMC Laboratory.
Temperature: 25 °C ± 2, Relative Humidity: 30 - 50 %, Air Pressure: 101 kPa ± 3

FCC SUBMISSION INFORMATION

FCC ID:	**PQS-BM28001**
Equipment (type): As Marketed	**Wireless OEM Modem Module**
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 Burswood, Perth, WA 6100 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

Procedure

Test: Occupied Bandwidth, FCC Part 90

Ref: FCC Part 90.210 (g) (h) and 2.1049

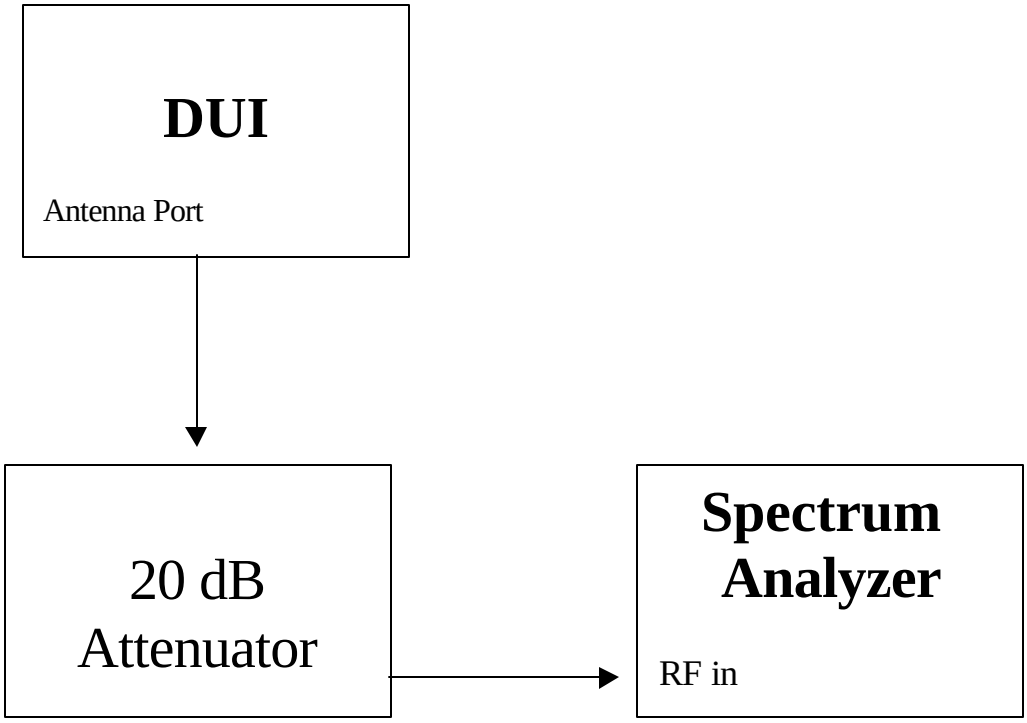
Set-up: See Figure: Test Set-up

Conditions: Temperature: 23 °C ± 2
Voltage Supply: 3.6 VDC

Equipment: See Appendix A.

Procedure: Occupied bandwidth was measured in accordance with the above noted paragraphs of the F.C.C. Rules and Regulations. A sample of the transmitter output was observed on a spectrum analyzer and side bands were observed and recorded.

Results: **Passed . See Plots**



Occupied Bandwidth
Test Set-up

Test: **Occupied Bandwidth, Emission Mask G, 806 –821 MHz**

Ref: FCC Part 90.210 (g) and 2.1049

Criteria: **806 –821 MHz**, Emission Mask G. For transmitters that are not equipped with an audio low-pass filter pursuant to 90.211(b), the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

(1) On any frequency removed from the centre of the authorized bandwidth by displacement frequency (fd in kHz) of more than 5 kHz, but no more than10 kHz: At least 83 log (fd/5) dB.

(2) On any frequency removed from the centre of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 10 kHz, but no more than 250 percent of the authorized bandwidth: At least 116 log fd/6.1) dB, or 50 + 10 log (P) dB, or 70 dB, whichever is the lesser attenuation.

(3) On any frequency removed from the centre of the authorized bandwidth by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.

Below is the description of the mask for band 806-821 MHz: 1.828 Watts ERP transmitter (P= 1.828 W ERP)

Frequency (MHz)	Formula	Limit (dB)
-26500	43+10 log (P)	45
-0.050	43+10 log (P)	45
-0.050	50+10 log (P)	52
-0.0175	116 log (f_d / 6.1)	53
-0.010	116 log (f_d / 6.1) or 83 log(f_d /5)	25
-0.005	83 log(f_d /5)	0
0.005	83 log(f_d /5)	0
0.010	116 log (f_d / 6.1) or 83 log(f_d/5)	25
0.0175	116 log (f_d / 6.1)	53
0.050	50+10 log (P)	52
0.050	43+10 log (P)	45
26500	43+10 log (P)	45

Test: **Occupied Bandwidth, Emission Mask H, 821 –824 MHz**

Ref: FCC Part 90.210 (h) and 2.1049

Criteria: **821 –824 MHz**, Emission Mask H. For transmitters that are not equipped with an audio low-pass filter pursuant to 90.211(b), the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

(1) On any frequency removed from the centre of the authorized bandwidth by a displacement frequency (f_d in kHz) of 4 kHz or less: Zero dB.
(2) On any frequency removed from the centre of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 4 kHz, but no more than 8.5 kHz: At least $107 \cdot \log (f_d/4)$ dB.
(3) On any frequency removed from the centre of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 8.5 kHz, but no more than 15 kHz: At least $40.5 \cdot \log (f_d/1.16)$ dB.
(4) On any frequency removed from the centre of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 15 kHz, but no more than 25 kHz: At least $116 \cdot \log (f_d/6.1)$ dB.
(5) On any frequency removed from the centre of the authorized bandwidth by more than 25 kHz: At least $43 + 10 \cdot \log (P)$ dB.

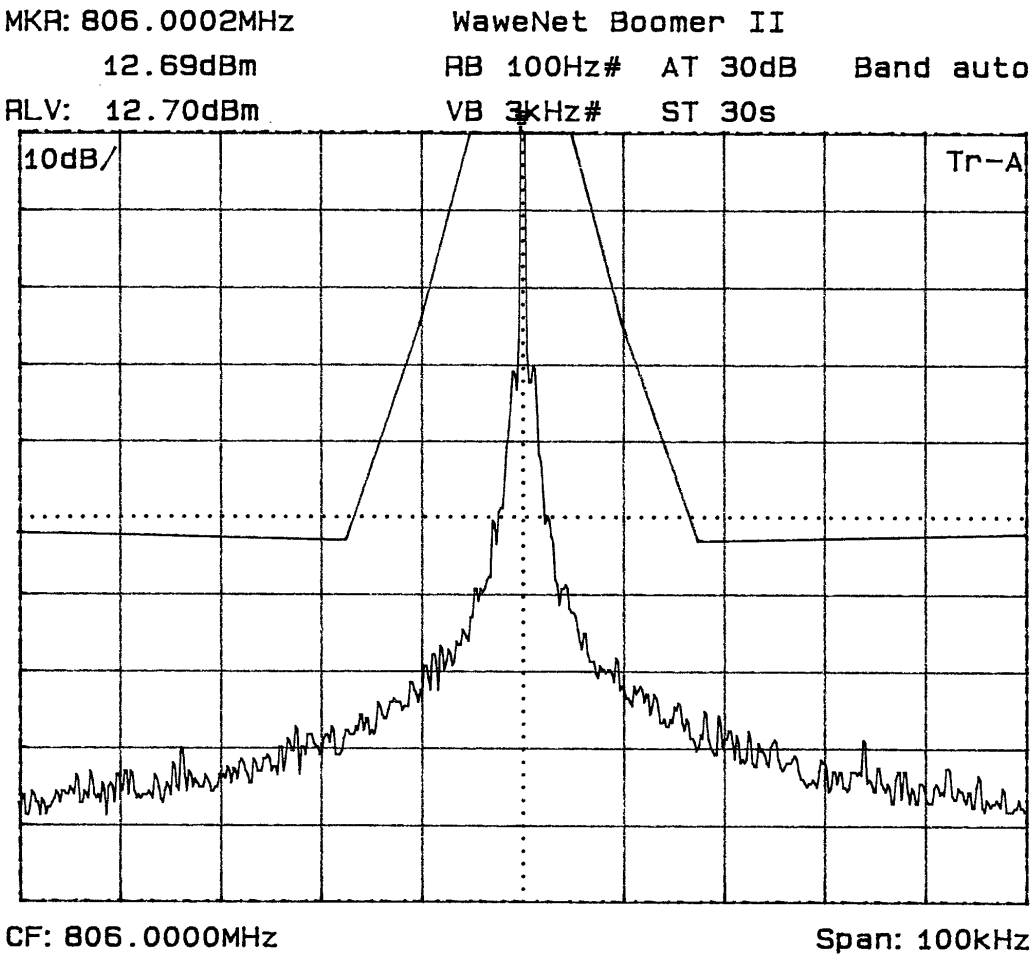
Below is the description of the mask for band 821-824 MHz: 1.496 Watts ERP transmitter (P= 1.496 W ERP)

Frequency (MHz)	Formula	Limit (dB)
-26500	43+10 log (P)	71
-0.0250	116 log (f_d / 6.1)	71
-0.0150	40.5 log (f_d / 1.16) or 116 log (f_d / 6.1)	45
-0.0085	107 log (f_d / 4) or 40.5 log(f_d/1.16)	35
-0.0040	107 log (f_d / 4)	0
0.0000	0	0
0.0040	107 log (f_d / 4)	0
0.0085	107 log (f_d / 4) or 40.5 log(f_d/1.16)	35
0.0150	40.5 log (f_d / 1.16) or 116 log (f_d / 6.1)	45
0.0250	116 log (f_d / 6.1)	71
26500	43+10 log (P)	71

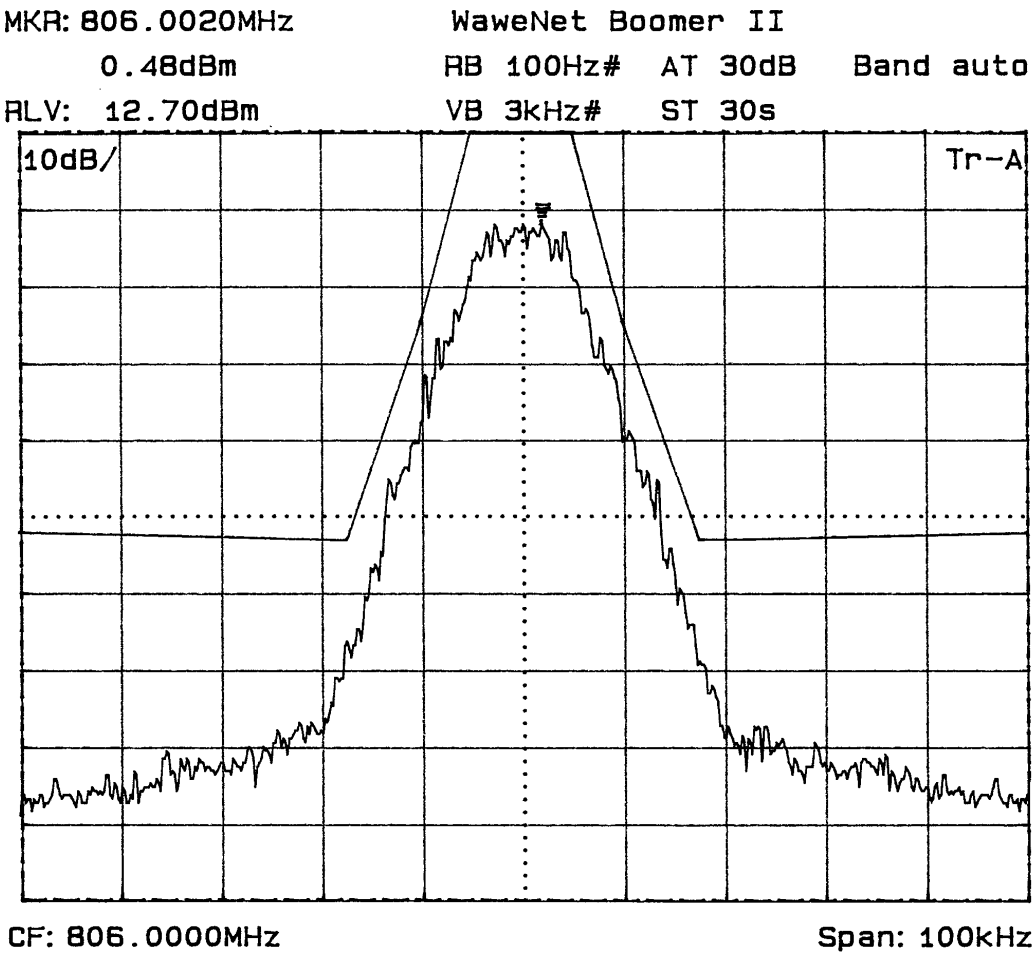
Occupied Bandwidth – Test Results

Wireless OEM Modem Module
WaveNet BOOMER-II

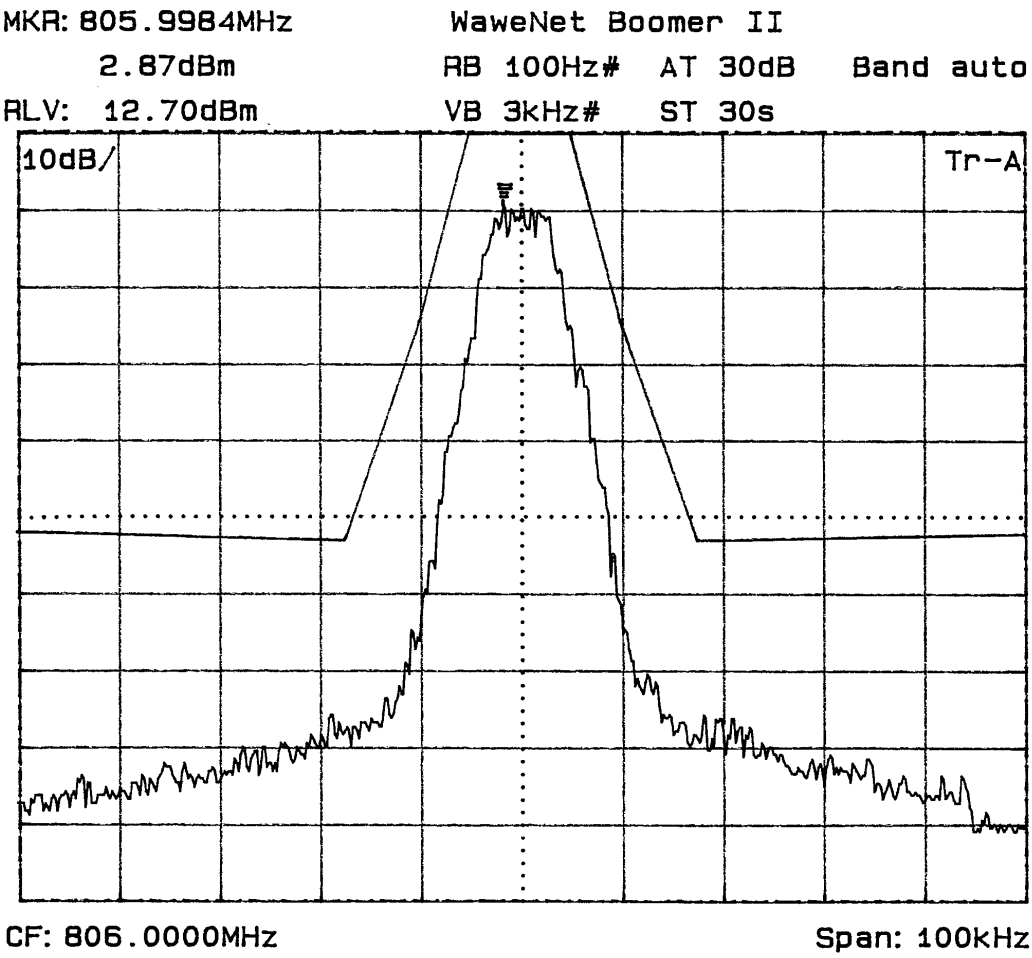
806 – 821 MHz Frequency Band
Mask G



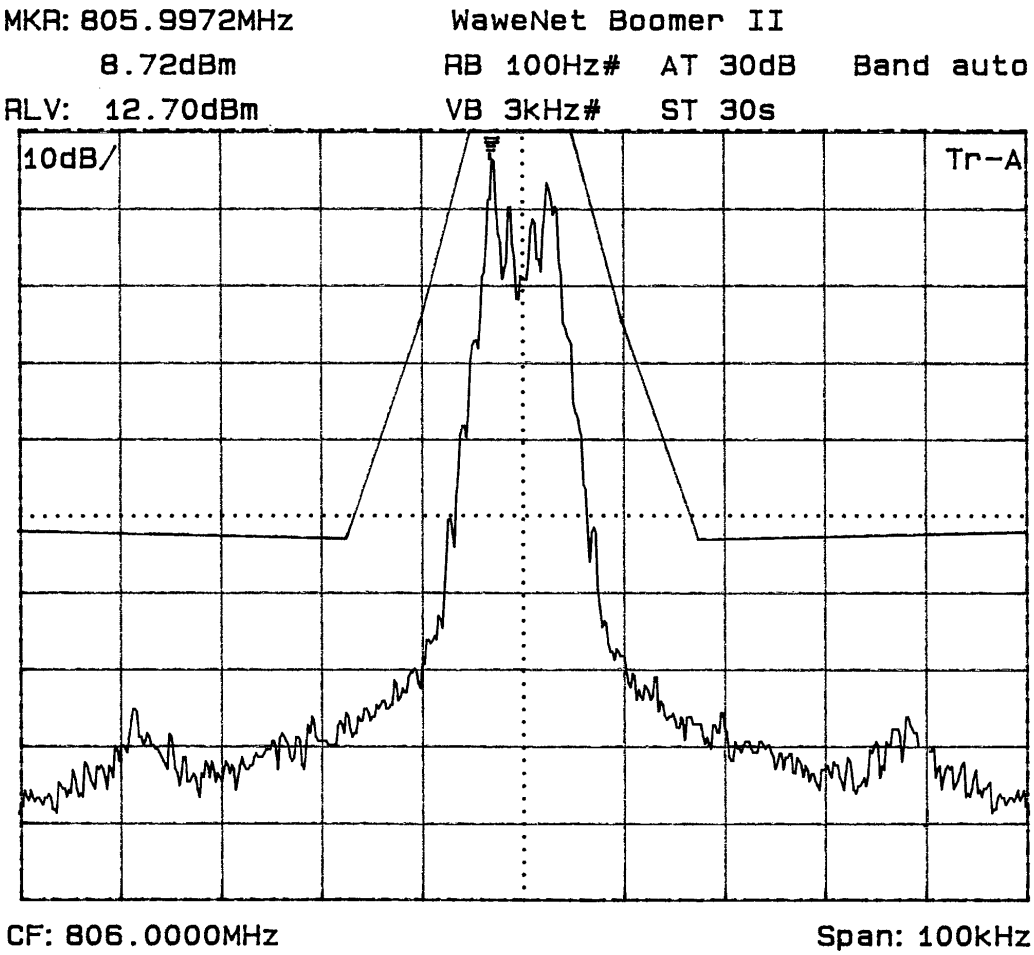
Occupied Bandwidth
Unmodulated Carrier
Mask G
Transmitting Frequency: 806 MHz



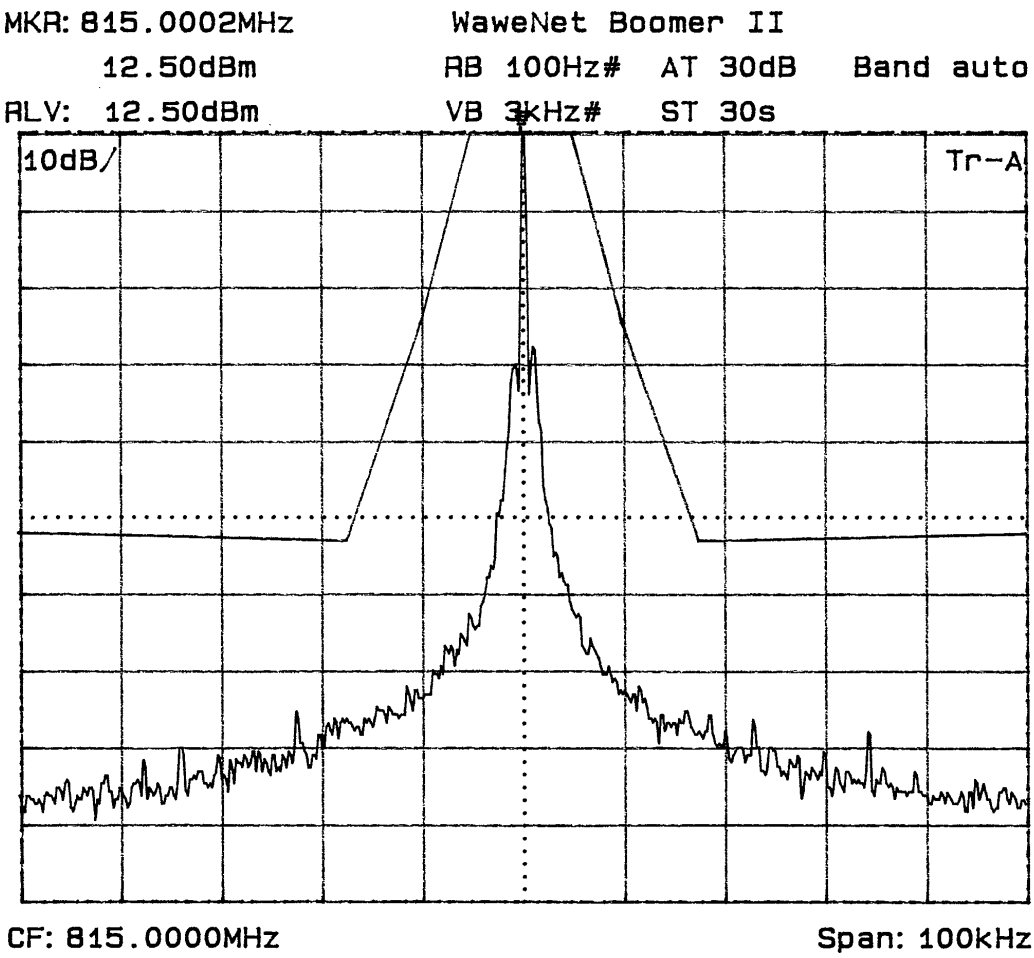
Occupied Bandwidth
Modulated Carrier: RD-LAP 19.2 kbps
Mask G
Transmitting Frequency: 806 MHz



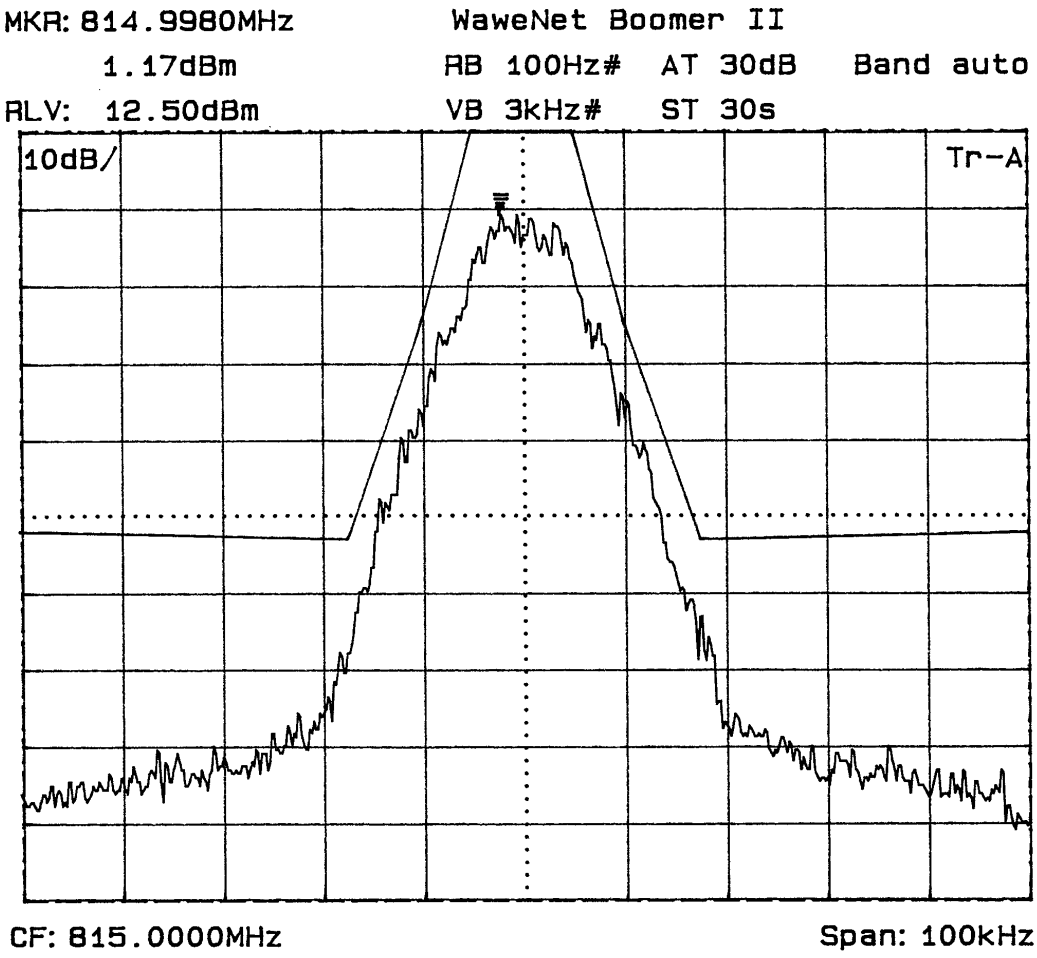
Occupied Bandwidth
Modulated Carrier: RD-LAP 9.6 kbps
Mask G
Transmitting Frequency: 806 MHz



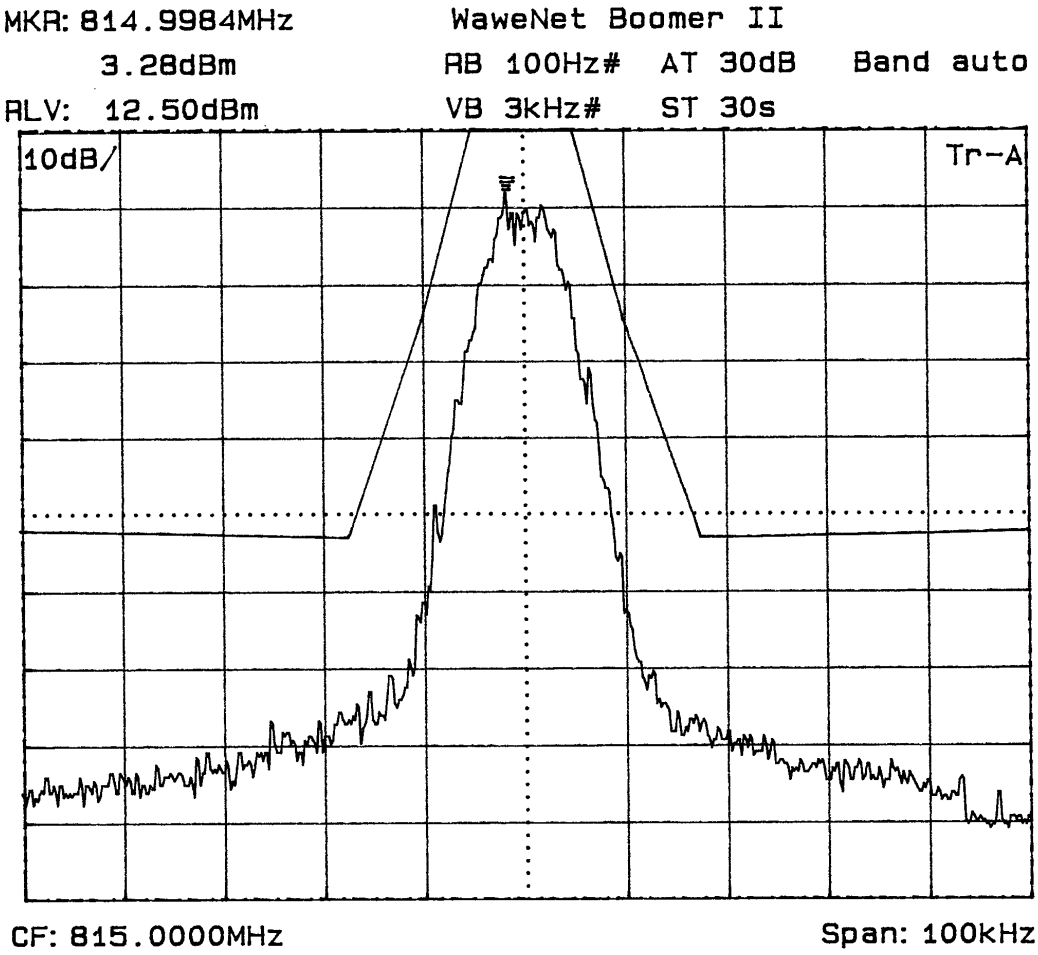
Occupied Bandwidth
Modulated Carrier: MDC 4.8 kbps
Mask G
Transmitting Frequency: 806 MHz



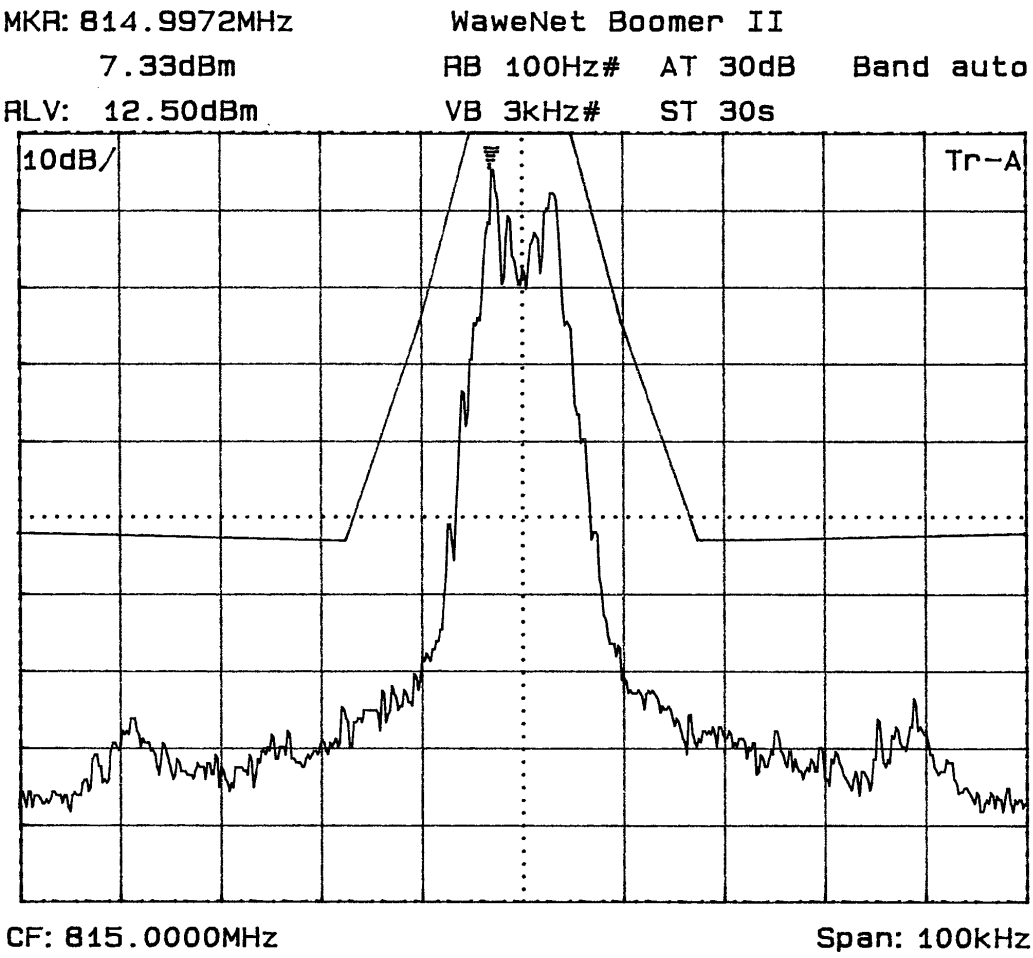
Occupied Bandwidth
Unmodulated Carrier
Mask G
Transmitting Frequency: 815 MHz



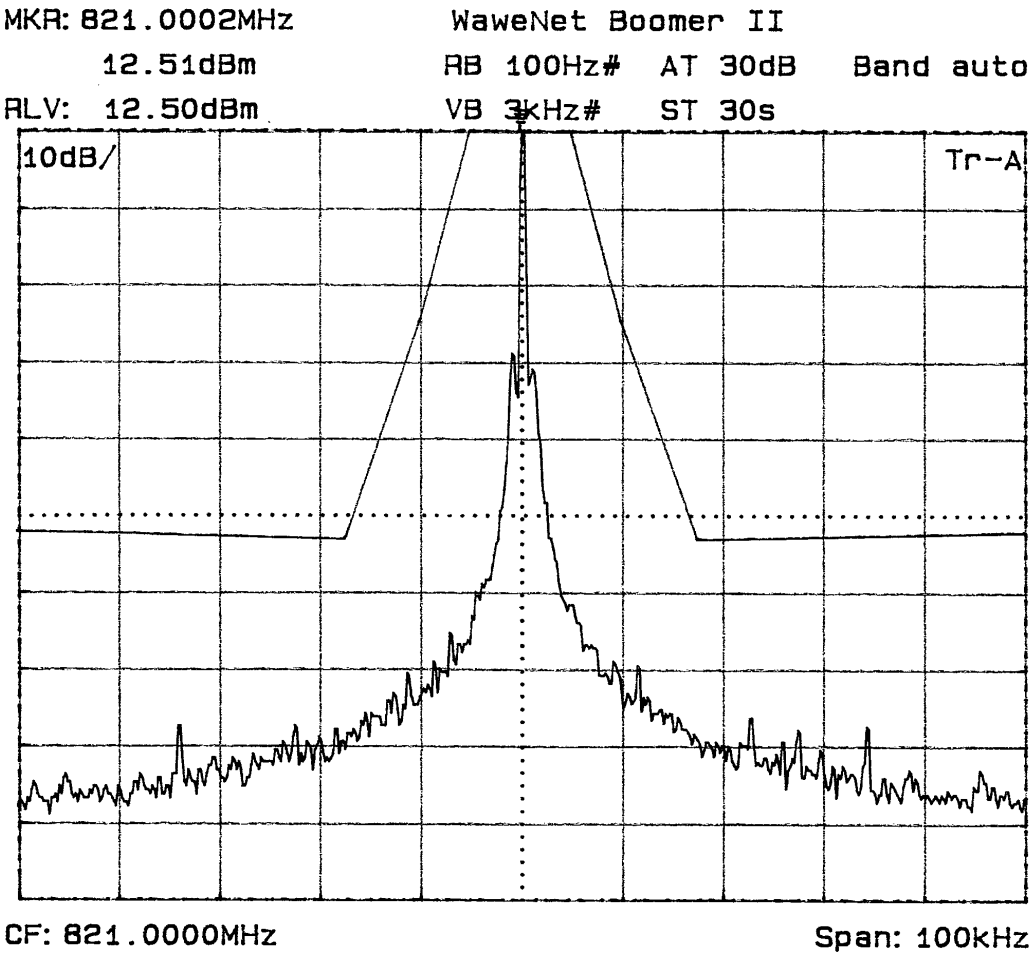
Occupied Bandwidth
Modulated Carrier: RD-LAP 19.2 kbps
Mask G
Transmitting Frequency: 815 MHz



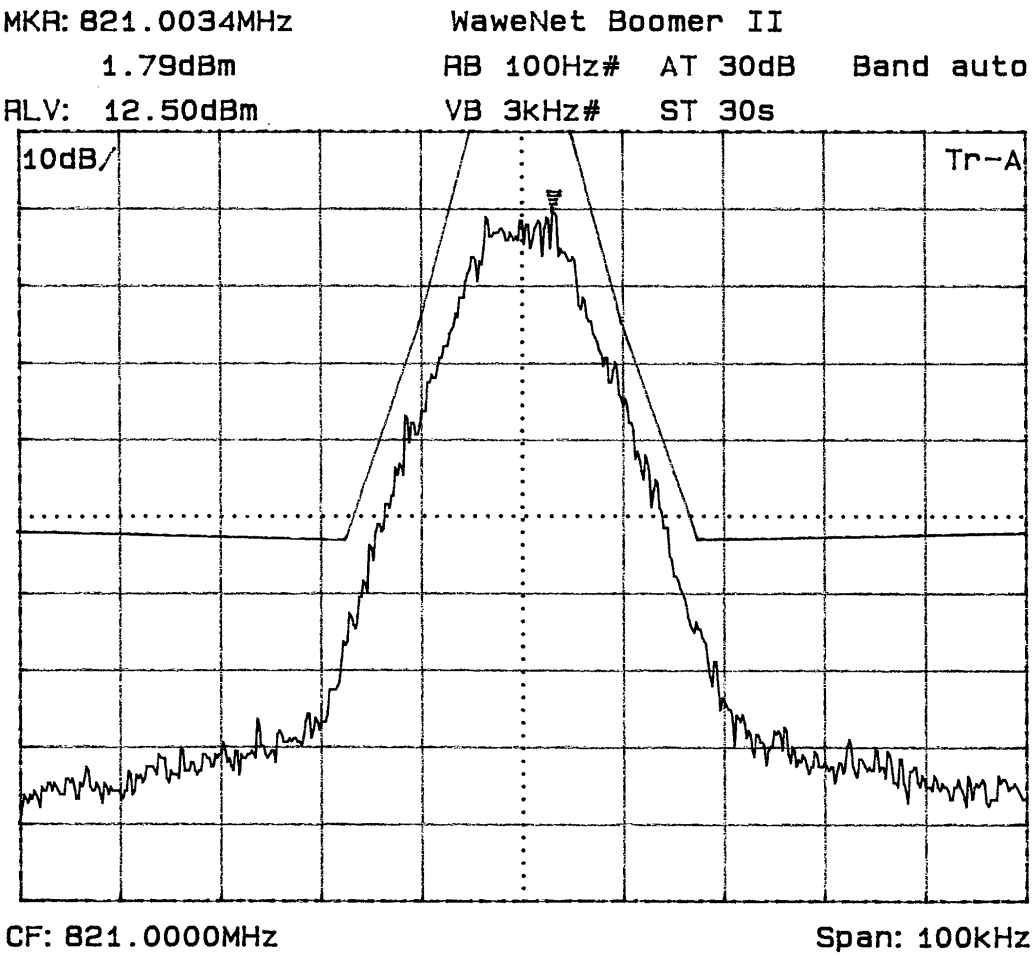
Occupied Bandwidth
Modulated Carrier: RD-LAP 9.6 kbps
Mask G
Transmitting Frequency: 815 MHz



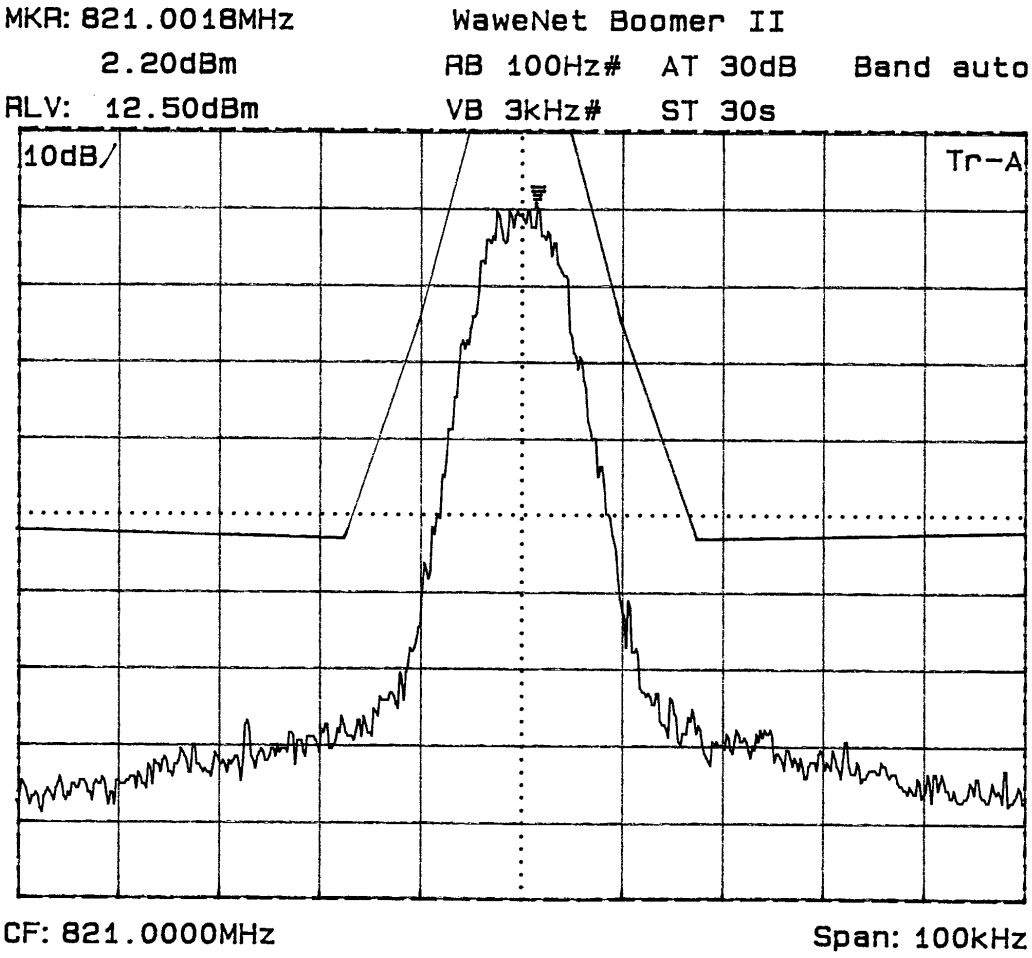
Occupied Bandwidth
Modulated Carrier: MDC 4.8 kbps
Mask G
Transmitting Frequency: 815 MHz



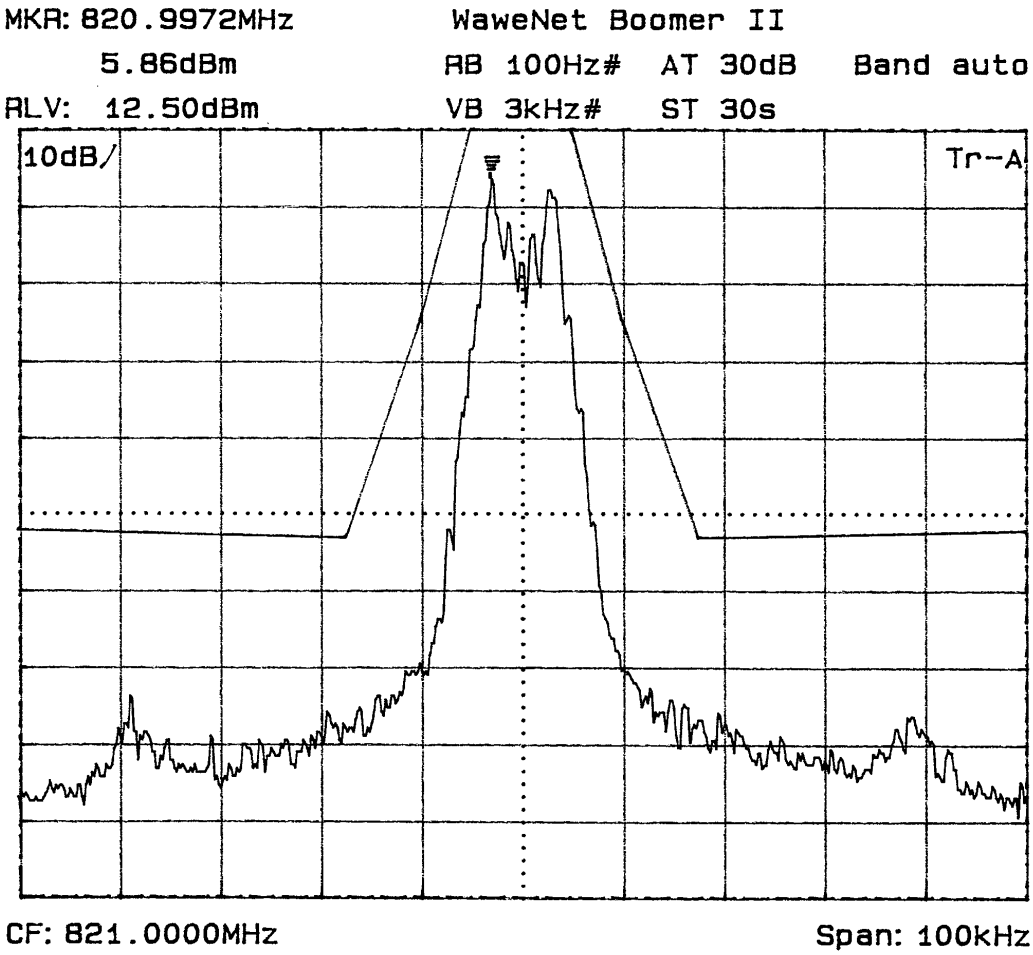
Occupied Bandwidth
Unmodulated Carrier
Transmitting Frequency: 821 MHz
Mask G



Occupied Bandwidth
Modulated Carrier: RD-LAP 19.2 kbps
Transmitting Frequency: 821 MHz
Mask G



Occupied Bandwidth
Modulated Carrier: RD-LAP 9.6 kbps
Transmitting Frequency: 821 MHz
Mask G

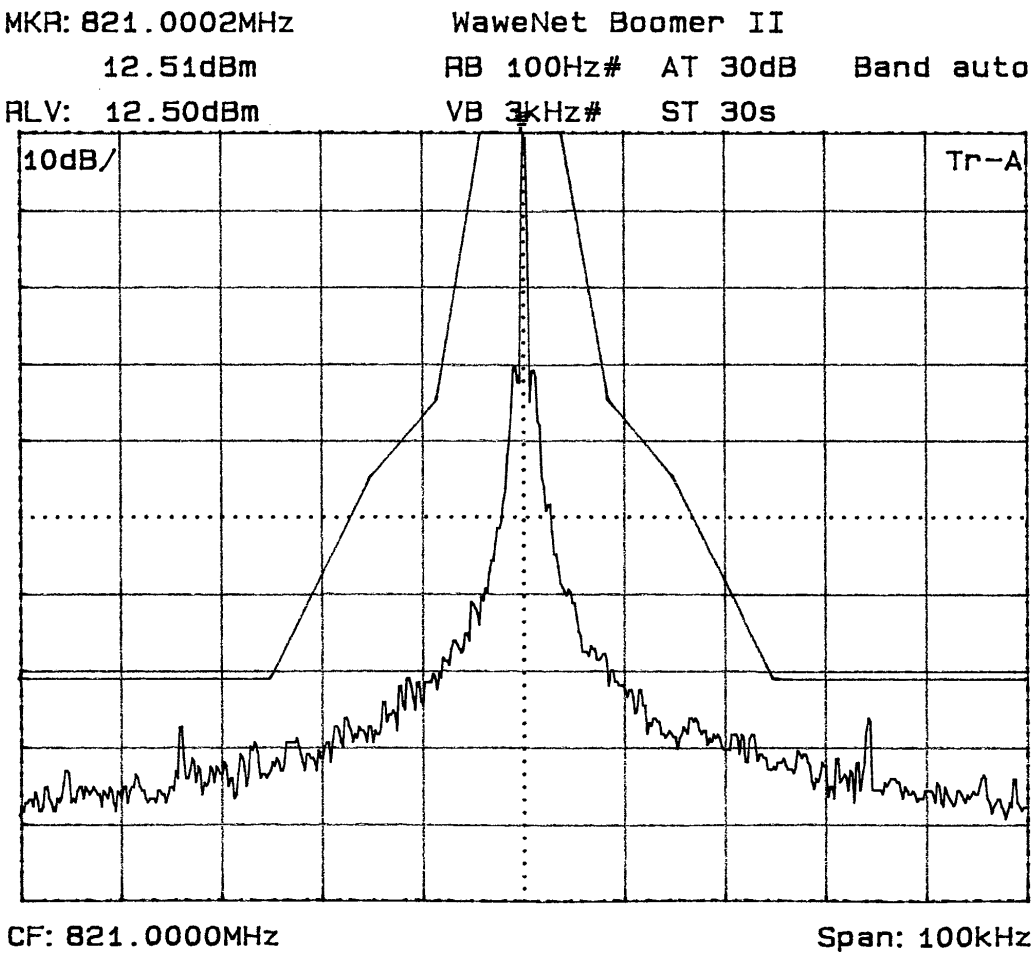


Occupied Bandwidth
Modulated Carrier: MDC 4.8 kbps
Transmitting Frequency: 821 MHz
Mask G

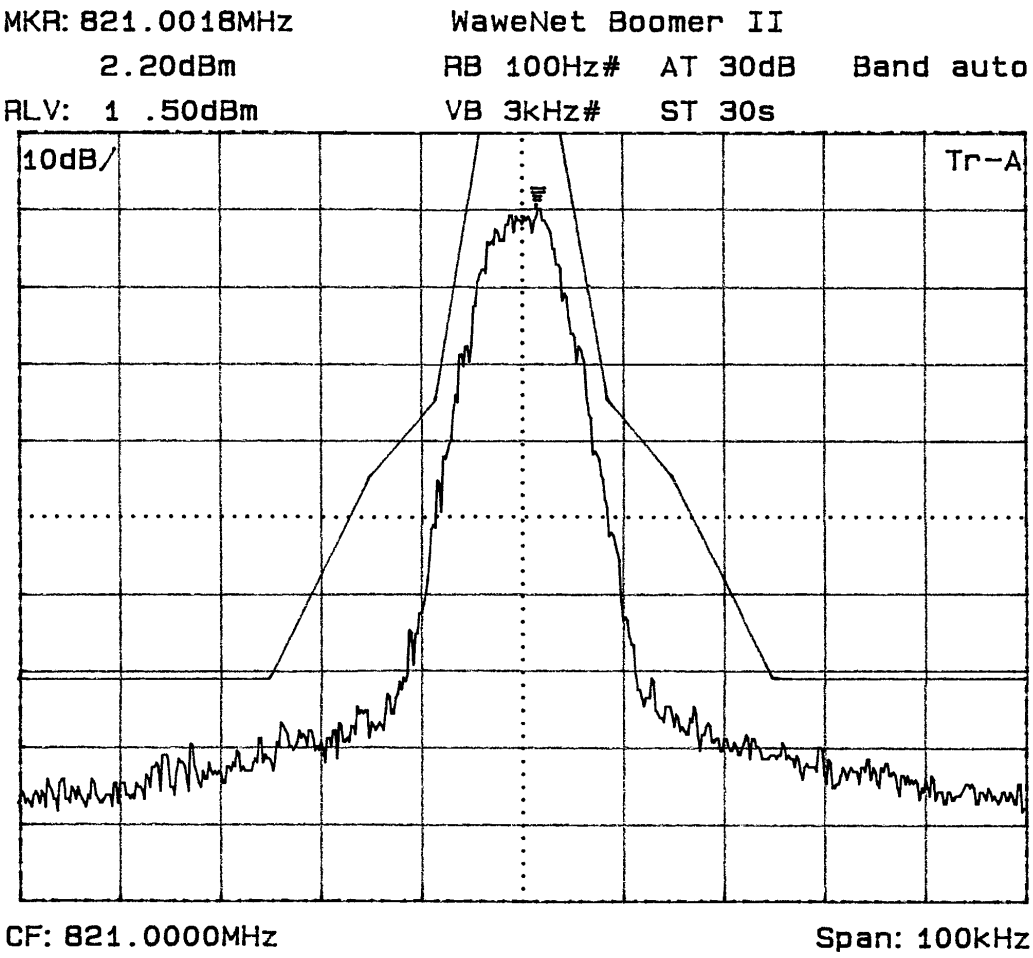
Occupied Bandwidth – Test Results

Wireless OEM Modem Module
WaveNet BOOMER-II

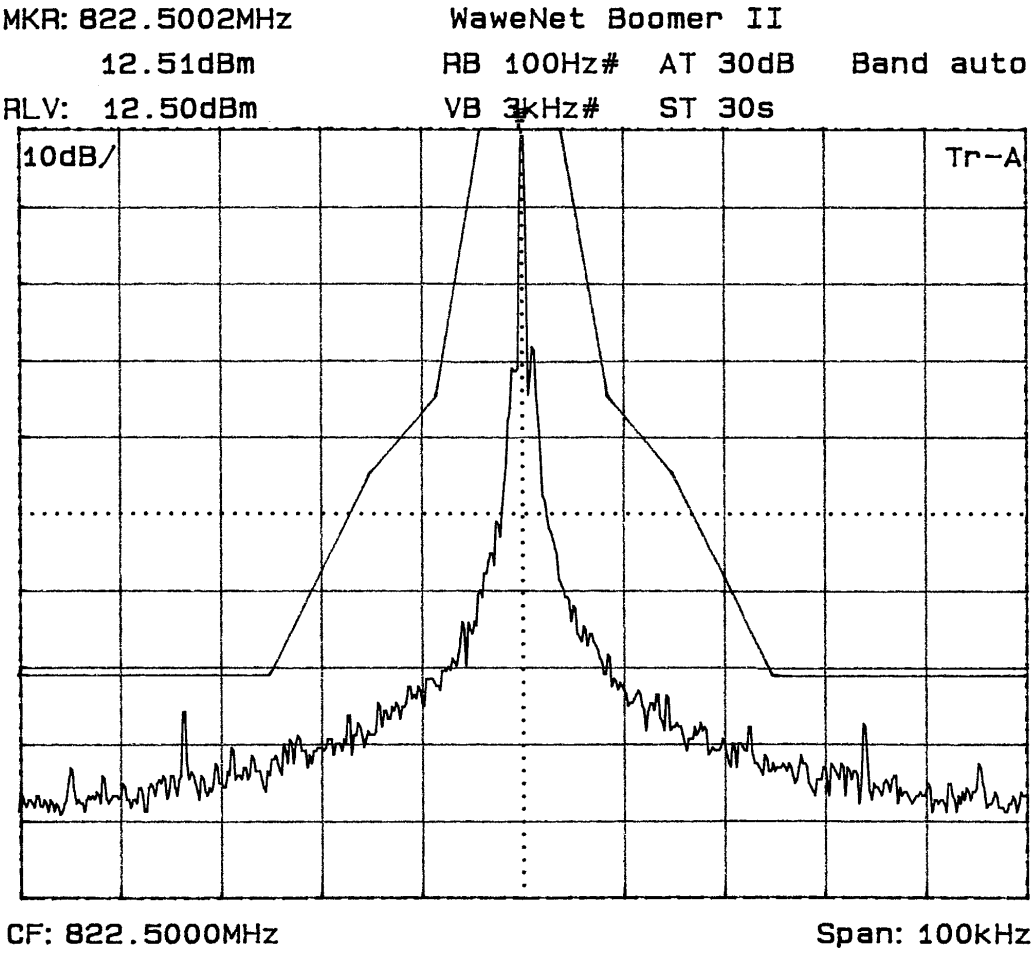
821 – 824 MHz Frequency Band
Mask H



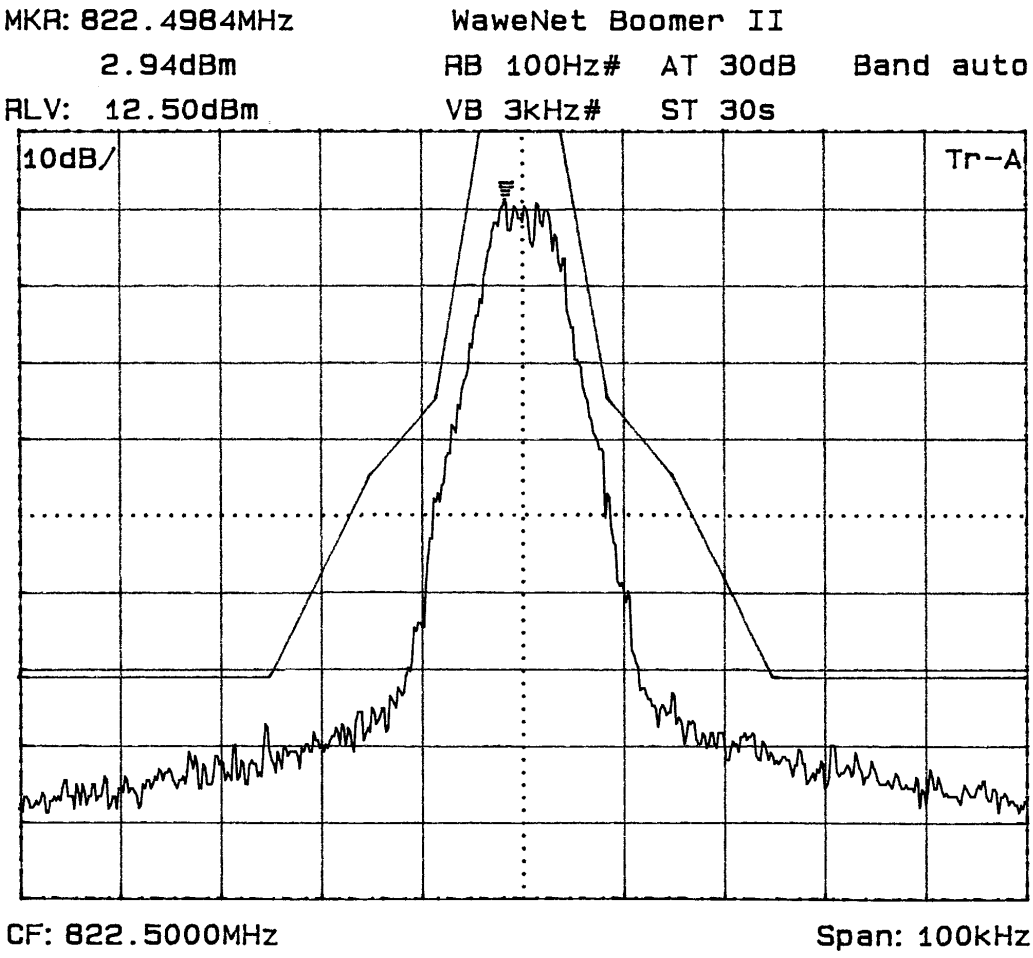
Occupied Bandwidth
Unmodulated Carrier
Transmitting Frequency: 821 MHz
Mask H



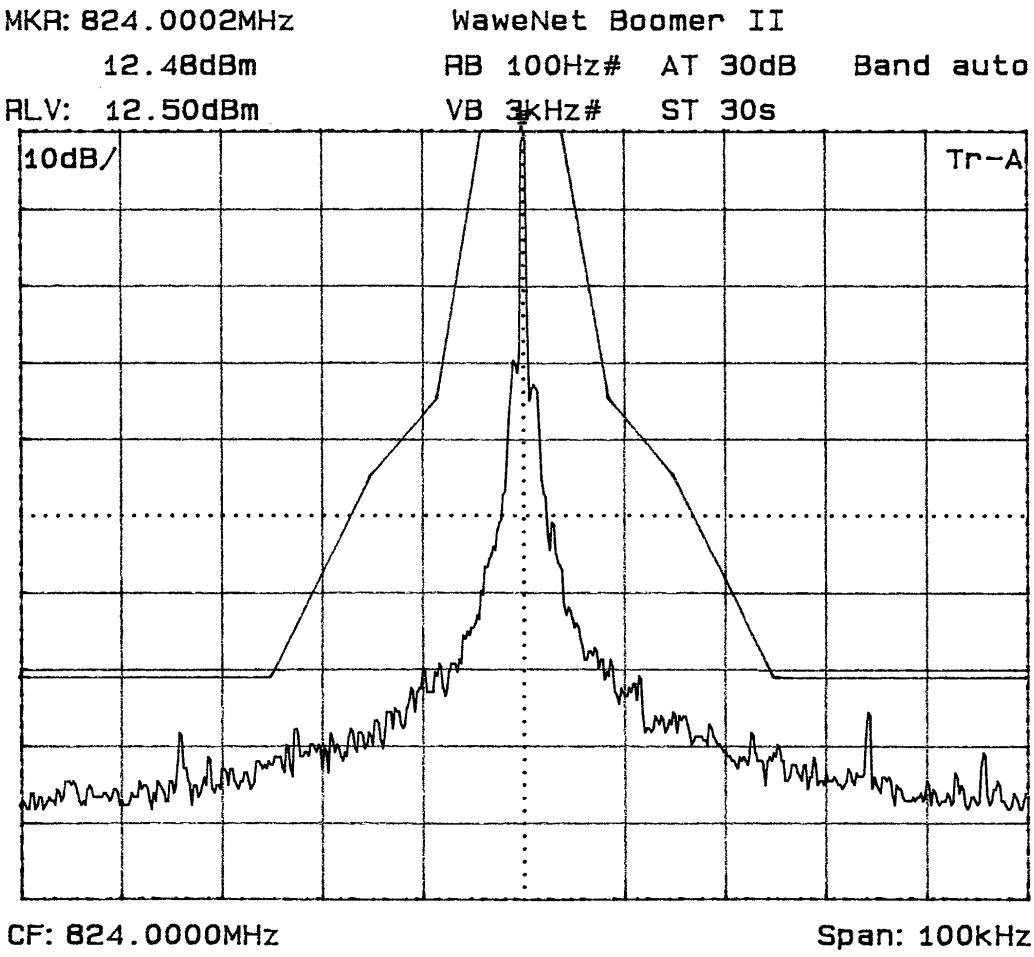
Occupied Bandwidth
Modulated Carrier: RD-LAP 9.6 kbps
Transmitting Frequency: 821 MHz
Mask H



Occupied Bandwidth
Unmodulated Carrier
Transmitting Frequency: 822.5 MHz
Mask H

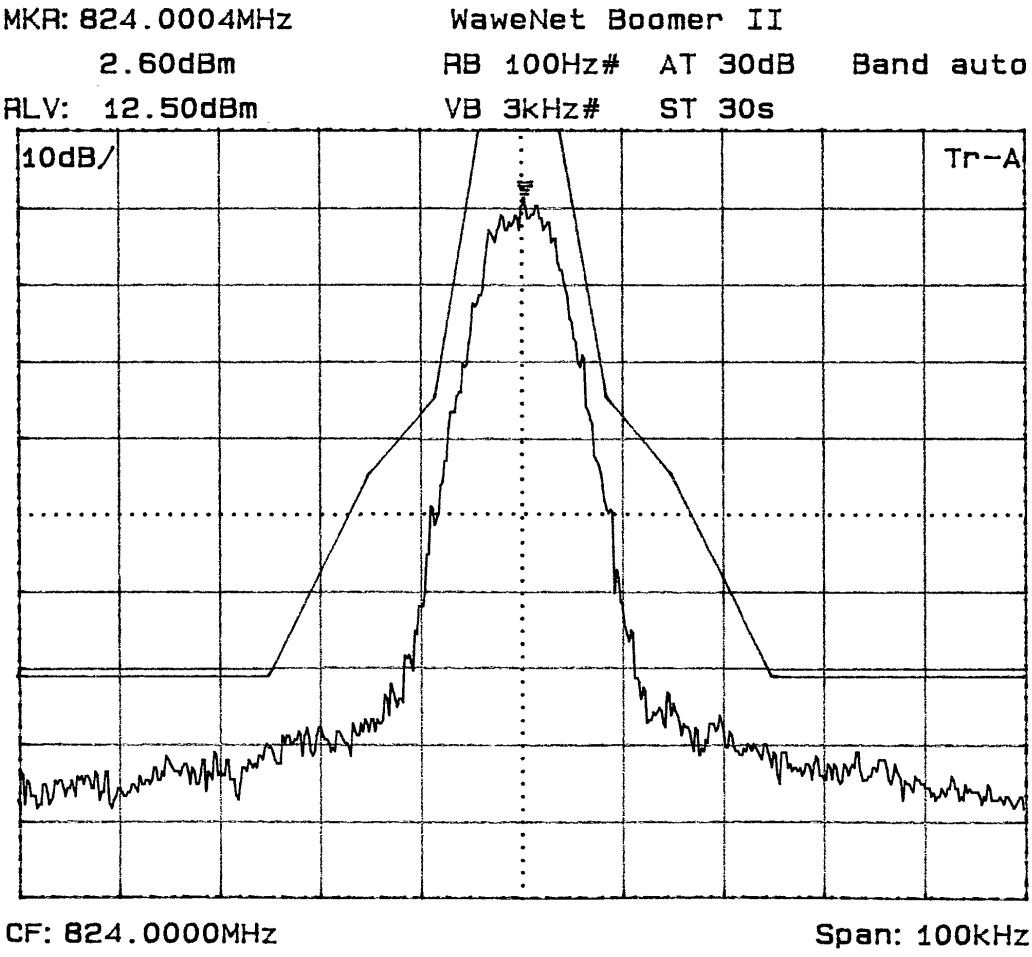


Occupied Bandwidth
Modulated Carrier: RD-LAP 9.6 kbps
Transmitting Frequency: 822.5 MHz
Mask H



Occupied Bandwidth

Unmodulated Carrier
Transmitting Frequency: 824 MHz
Mask H



Occupied Bandwidth
Modulated Carrier: RD-LAP 9.6 kbps
Transmitting Frequency: 824 MHz
Mask H

Test Equipment

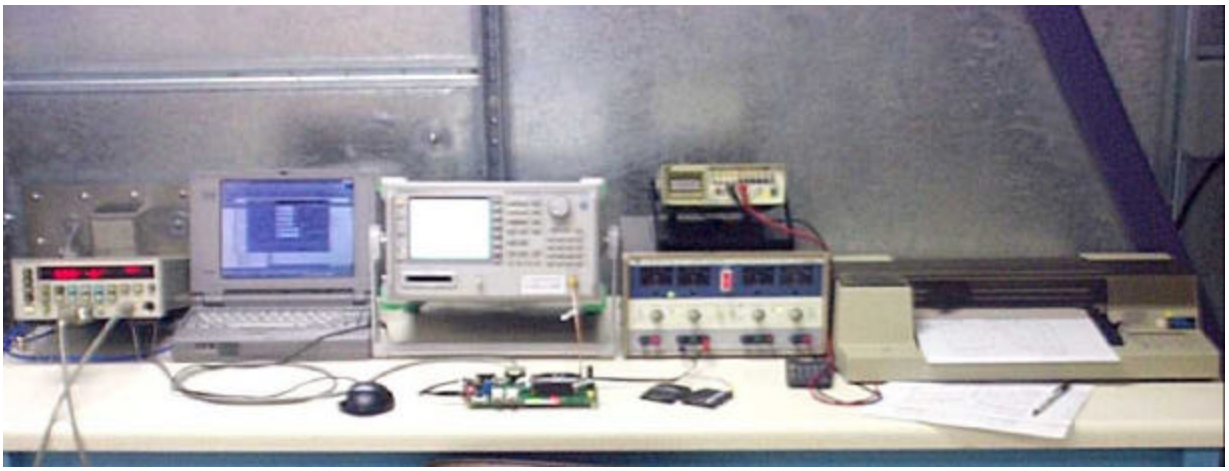
List of Equipment used

Description	Manufacturer	Model #	Asset #	Calibration Due Data
Spectrum Analyzer	Anritsu	MS2667C	301436	Sep, 2002
Power Meter	Rhode & Schwarz	NRVS	100851	Oct, 2002
20 dB Attenuator	Narda	4774-20	301533	CBT

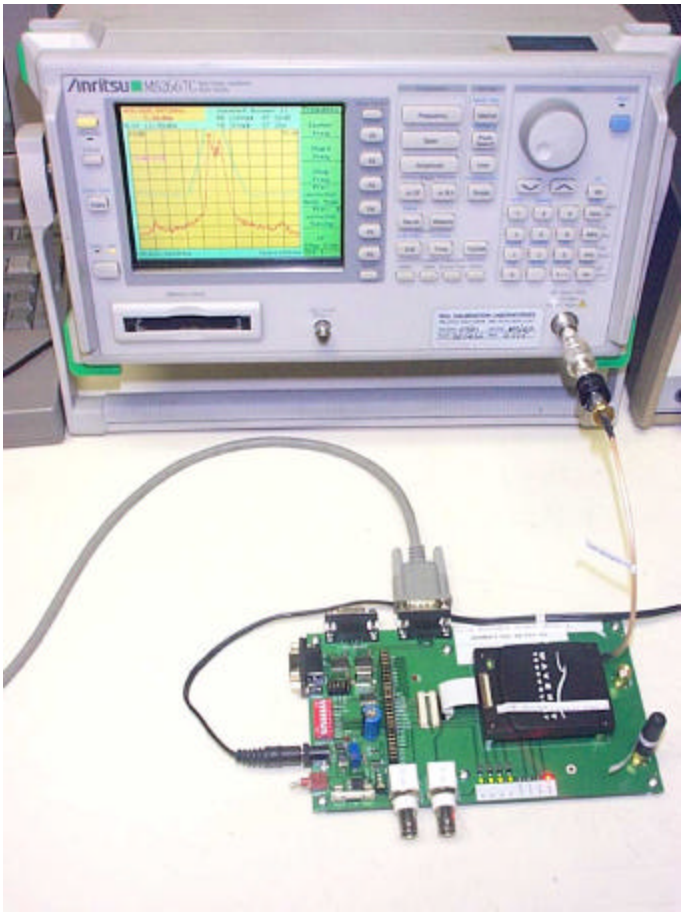
Appendix

Photographs

Wireless OEM Modem Module
WaveNet BOOMER-II



Occupied Bandwith – Testing Setup



Testing Occupied Bandwidth on
Wireless OEM Modem Module
WaveNet BOOMER-II