

FCC ID: PQS-BM29001

Exhibit 2c

Engineering Report on Boomer II 900 MHz

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 900 MHz**

Wavenet Technologies Pty Ltd.



October 2002

APREL Project No.:WVTB-BoomerII-Modem-3922-2

51 Spectrum Way Nepean ON K2R 1E6
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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-BM29001

Equipment: Wireless OEM Modem Module

Model: BOOMER II 900 MHz

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

Project #: WVTB-BoomerII-Modem-3922-2

Prepared By: APREL Laboratories,
Regulatory Compliance Division
51 Spectrum Way
Nepean, Ontario
K2R 1E6

Approved by:


Jay Sarkar
Technical Director, Standards & Certification

Date:

Oct. 18, 2002

Submitted by:


Jay Sarkar
Technical Director, Standards & Certification

Date:

Oct. 18, 2002

Released by:


Dr. Jack J. Wojcik, P.Eng.

Date:

Oct 18/02



FCC ID: PQS-BM29001
Applicant: Wavenet Technologies Pty Ltd.
Equipment: Wireless OEM Modem Module
Model: BOOMER II 900 MHz
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 896~901 MHz OEM product for integration into customer end user equipment as an OEM modem and interfaces to it via the data interface port.

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

This modem provides profile type for 896-901 MHz, J Spectral Mask, 4-Level FSK RDLAP 9.6, 2.5 kHz deviation.

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 900 MHz

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 Y. Chen, 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-BM29001

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

Model: **BOOMER II 900 MHz**

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-BM29001

Equipment Type: Wireless OEM Modem Module

Model: BOOMER II 900 MHz

Reference: FCC Rules and Regulations Parts 2 and Part 90

Manufacturer: Wavenet Technologies Pty Ltd

**Development
Stage of Unit:** Prototype

GENERAL SPECIFICATIONS

1. Frequency Range: 896-901 MHz (Transmitter)
2. Measured ERP 1.556 W (31.92 dBm)
3. Emission Designators Per 47 CFR § 2.201 and §2.202
9K8F1D
4. Antenna Impedance: 50 Ohms

Measurement: Occupied Bandwidth

BOOMER II 900 MHz

Ref: FCC Part 90.210 (J) and 2.1049

Criteria: See Section under criteria

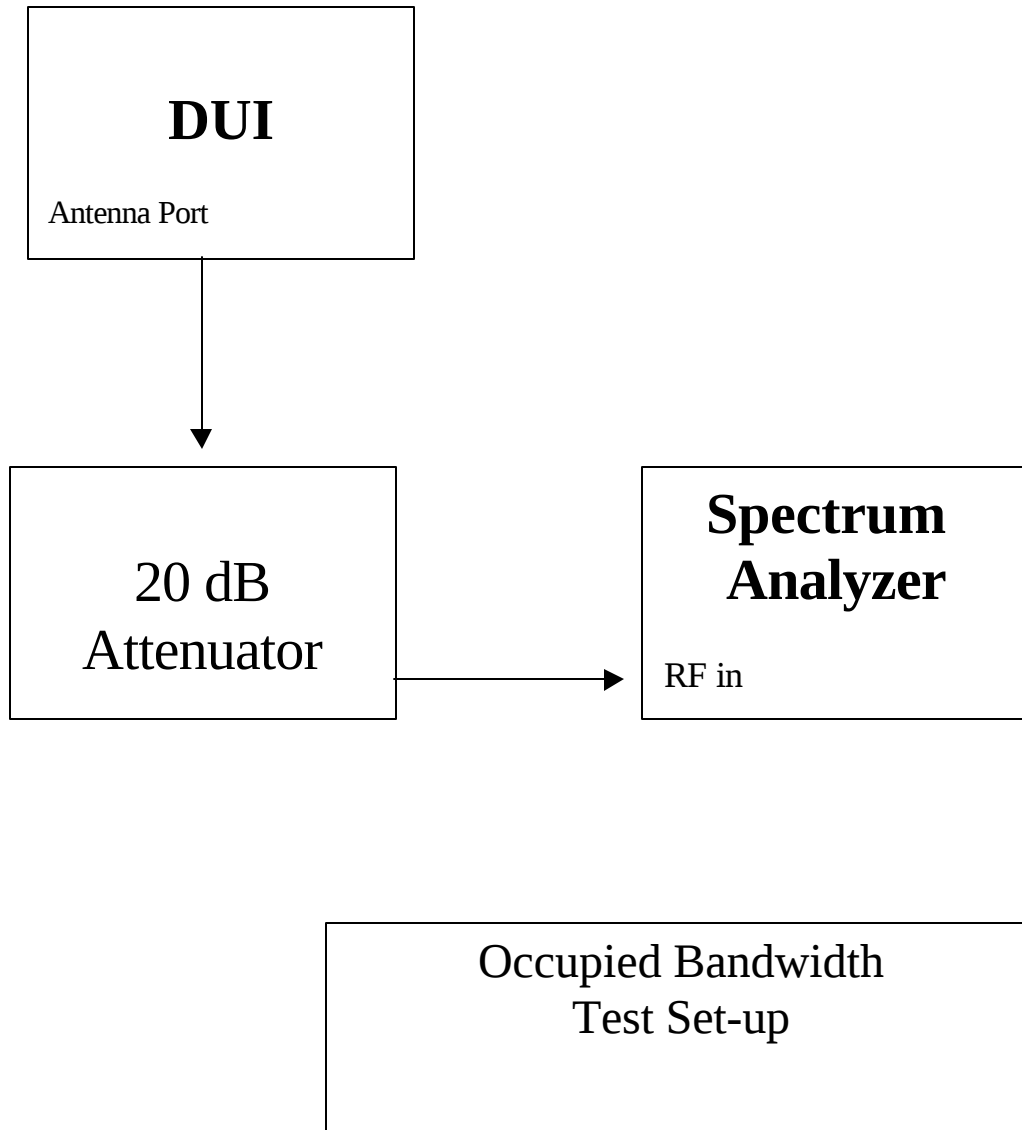
Set-up: See Figure: Test Set-up

Conditions: Temperature: 23 °C ± 2

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**



Section: Criteria

Test: Occupied Bandwidth

Ref: FCC Part 90.210 (h) and 2.1049

Criteria: **Emission Mask J (896~901 MHz).** 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 more than 2.5 kHz, but no more than 6.25 kHz: At least $53 \log (f_d/2.5)$ dB.
- (2) On any frequency removed from the centre of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 6.25 kHz, but no more than 9.5 kHz: At least $103 \log (f_d/3.9)$ dB.
- (3) On any frequency removed from the centre of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 9.5 kHz: At least $157 \log (f_d/5.3)$ dB, or $50 + 10 \log (P)$ dB or 70 dB whichever is the lesser attenuation.

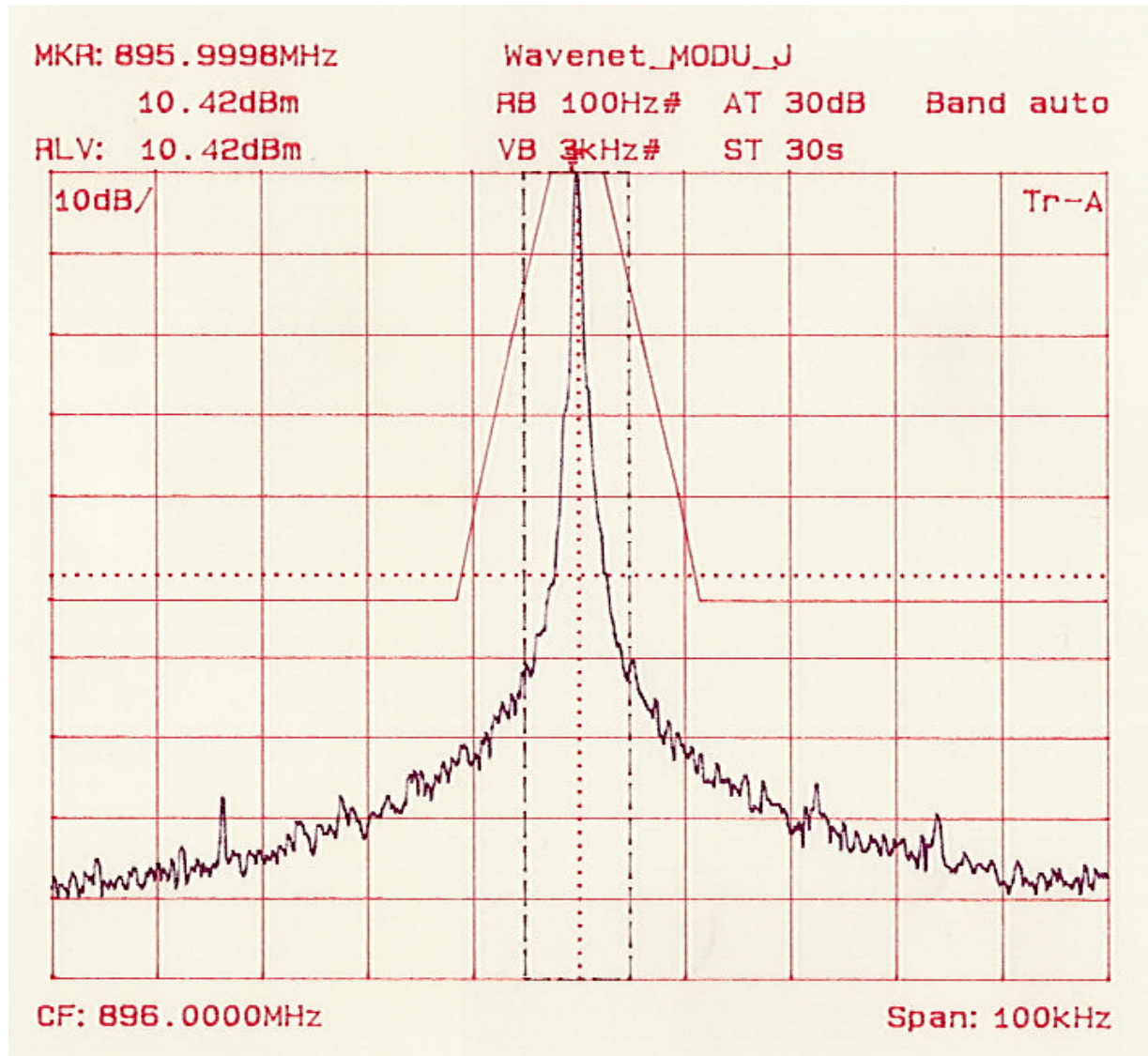
Below is the description of the mask for band 896 –901 MHz: 2 Watts ERP transmitter:

Frequency (MHz)	Formula	Limit (dB)
-26500	$50+10 \log (P)$	-53
-0.0115	$157 \log (f_d / 5.3)$	-53
-0.0095	$157 \log (f_d / 5.3)$ or $103 \log (f_d / 3.9)$	-39.8
-0.0062	$103 \log (f_d / 3.9)$ or $53 \log (f_d / 2.5)$	-21.1
-0.0025	$53 \log (f_d / 2.5)$	0.0
0.0025	$53 \log (f_d / 2.5)$	0.0
0.0062	$103 \log (f_d / 3.9)$ or $53 \log (f_d / 2.5)$	-21.1
0.0095	$157 \log (f_d / 5.3)$ or $103 \log (f_d / 3.9)$	-39.8
0.0115	$157 \log (f_d / 5.3)$	-53
26500	$50 + 10 \log (P)$	-53

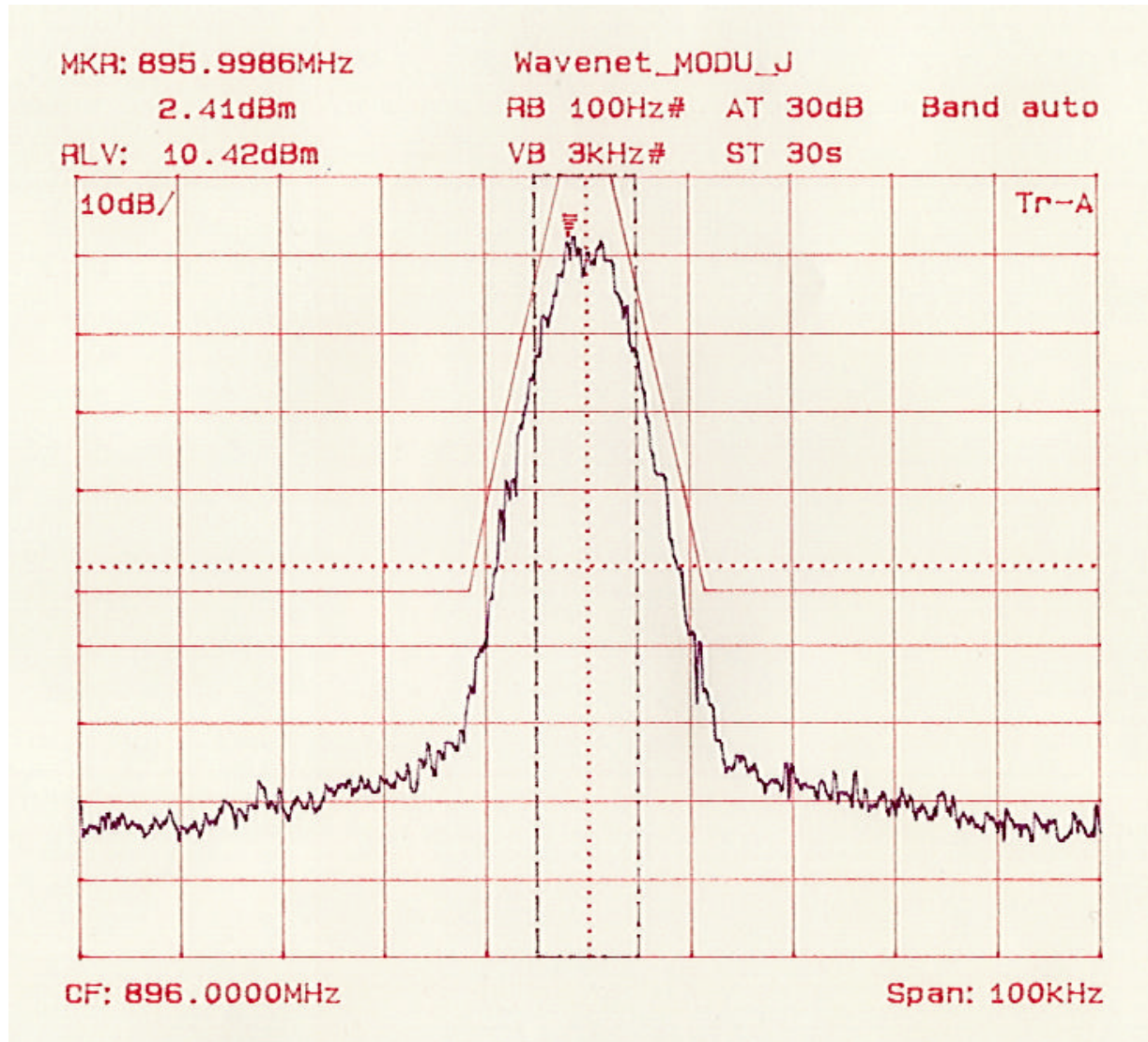
Occupied Bandwidth – Test Results

**Wireless OEM Modem Module
WaveNet BOOMER-II 900 MHz**

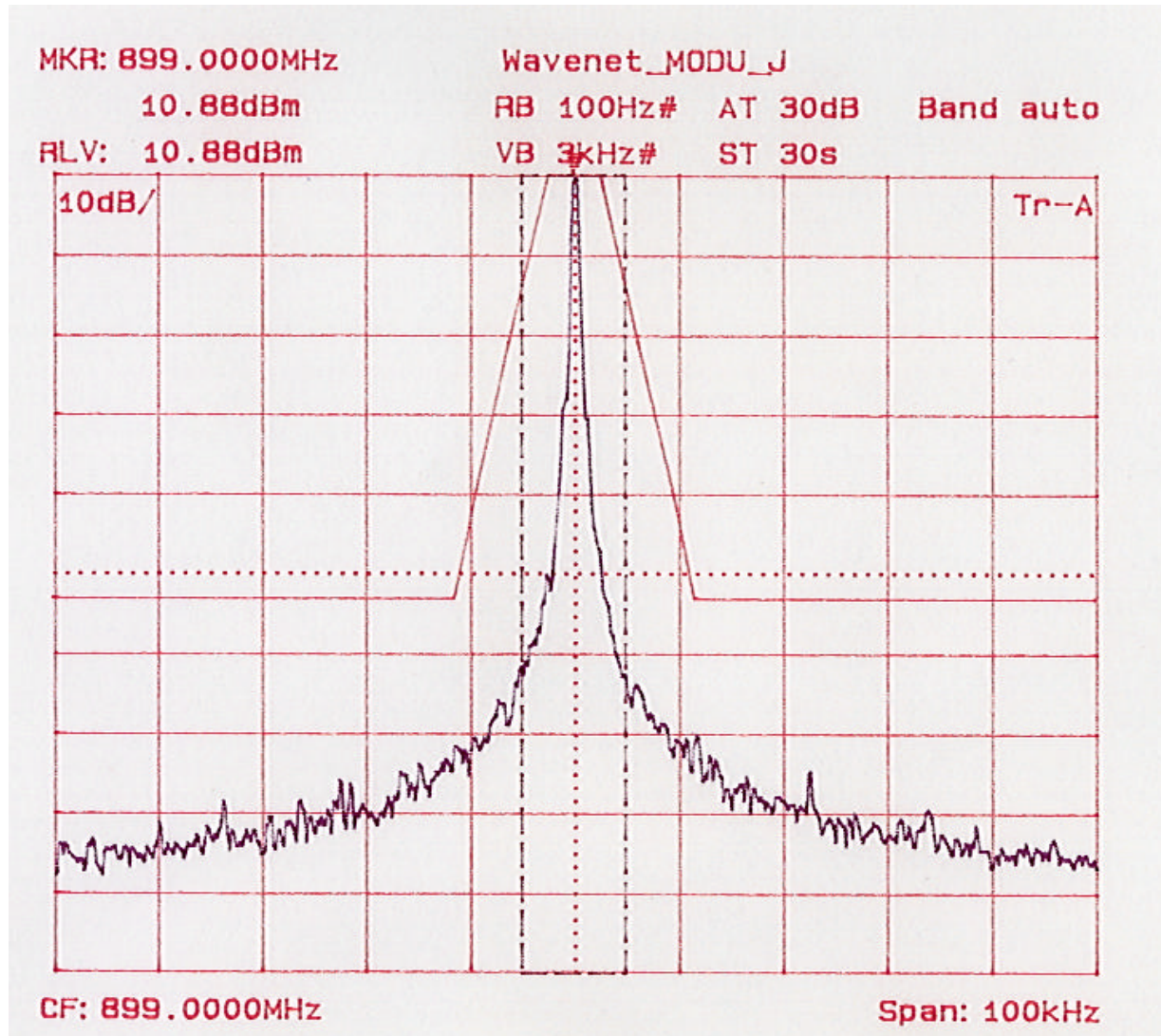
**896-901 MHz Frequency Band
Mask J**



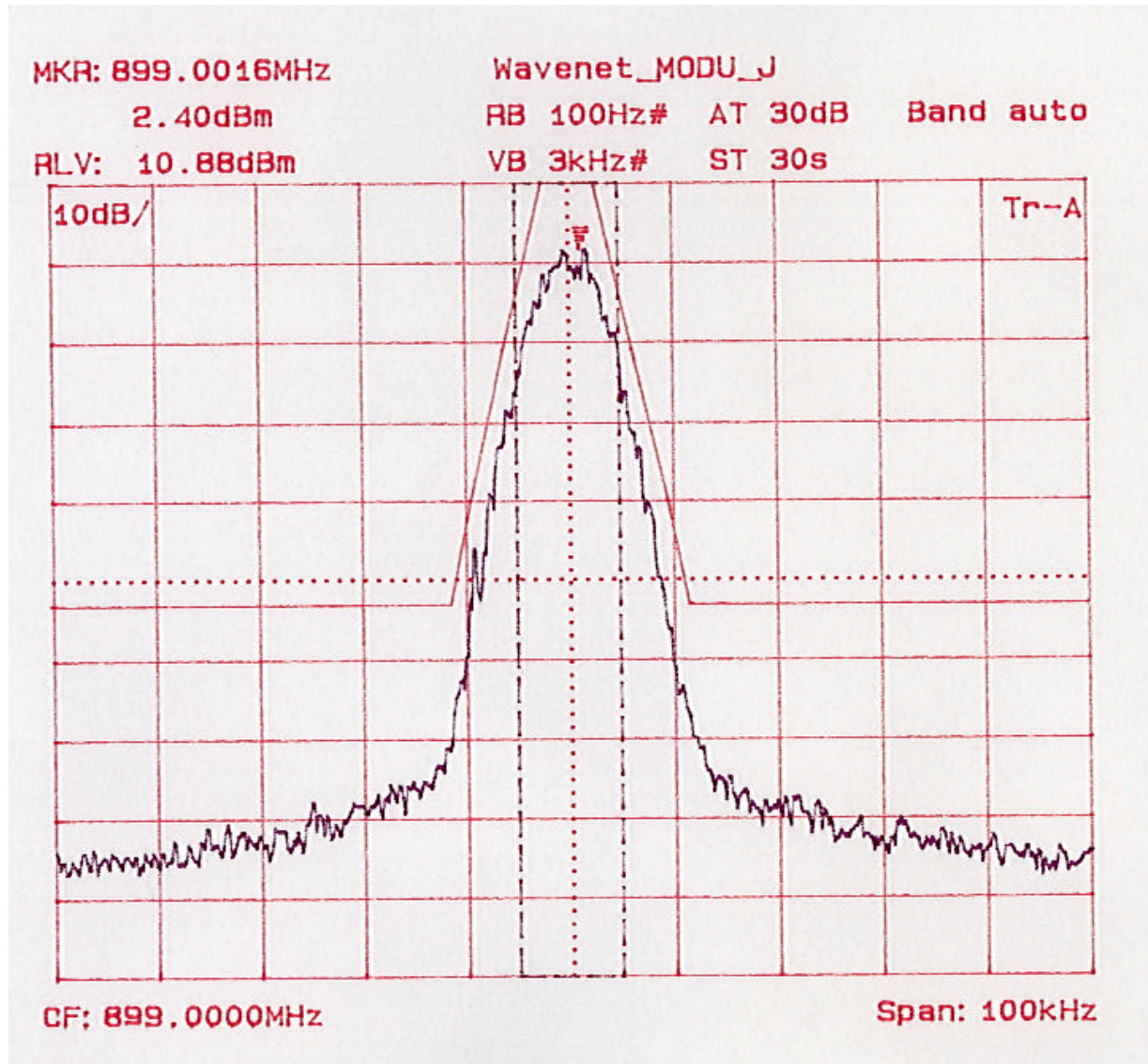
**Occupied Bandwidth
Unmodulated Carrier
Mask J
Transmitting Frequency: 896 MHz**



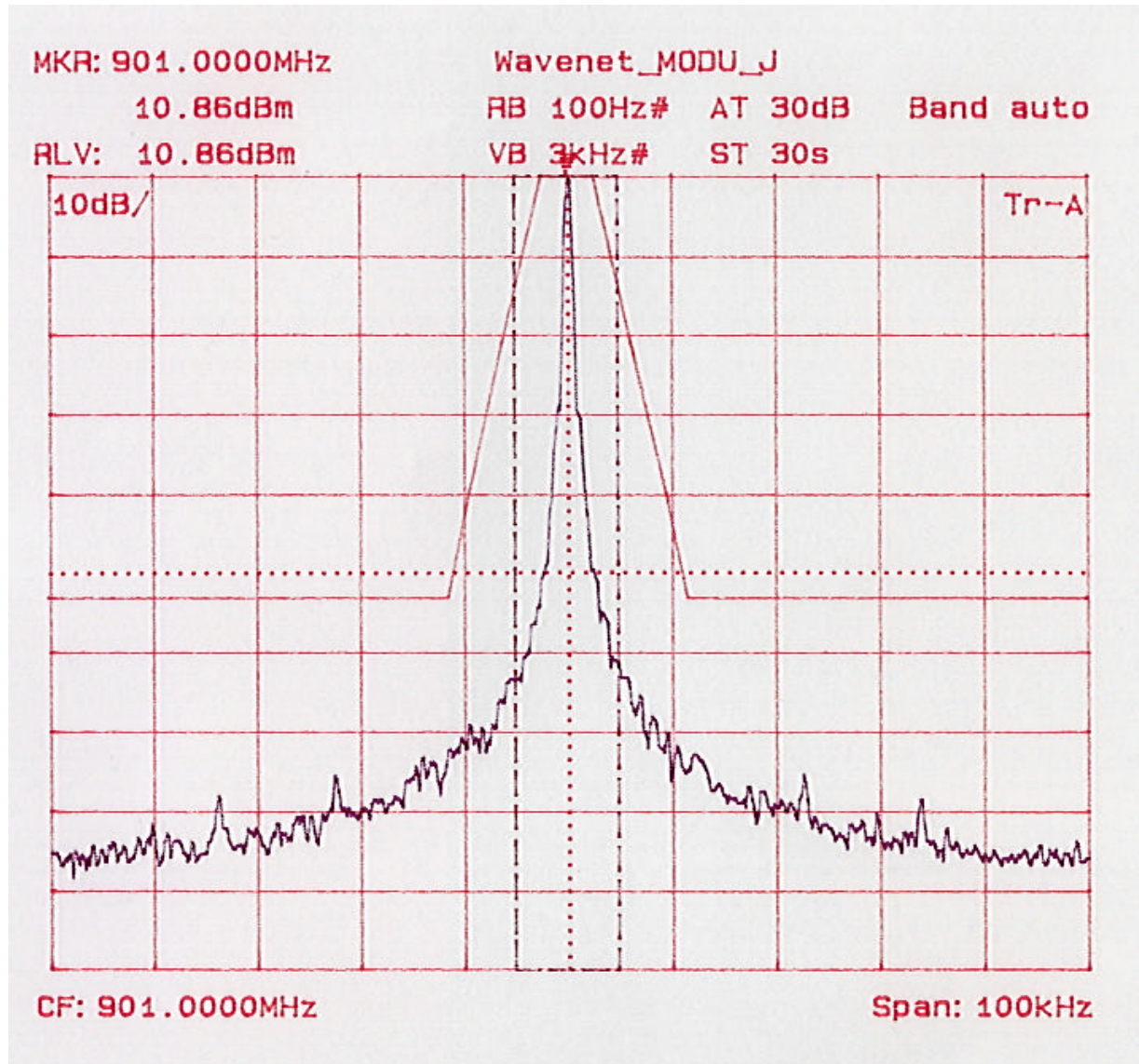
Occupied Bandwidth
Modulated Carrier: RDLAP 9.6 kbps
Mask J
Transmitting Frequency: 896 MHz



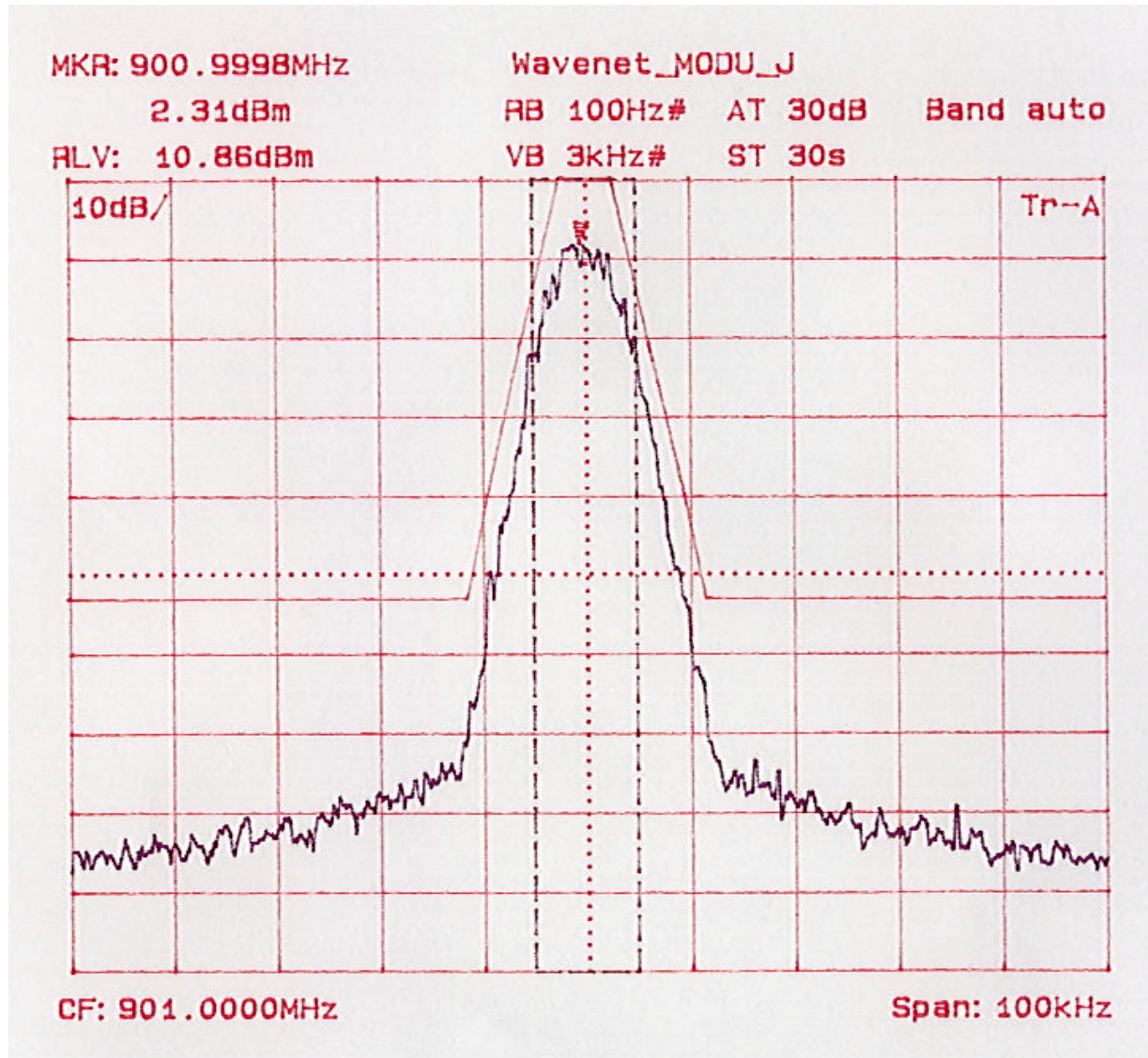
**Occupied Bandwidth
Unmodulated Carrier
Mask J
Transmitting Frequency: 899 MHz**



Occupied Bandwidth
Modulated Carrier: RD-LAP 9.6 kbps
Mask J
Transmitting Frequency: 899 MHz



Occupied Bandwidth
Unmodulated Carrier
Mask J
Transmitting Frequency: 901 MHz



Occupied Bandwidth
Modulated Carrier: RD-LAP 9.6 kbps
Mask J
Transmitting Frequency: 901 MHz

Test Equipment

List of Equipment used

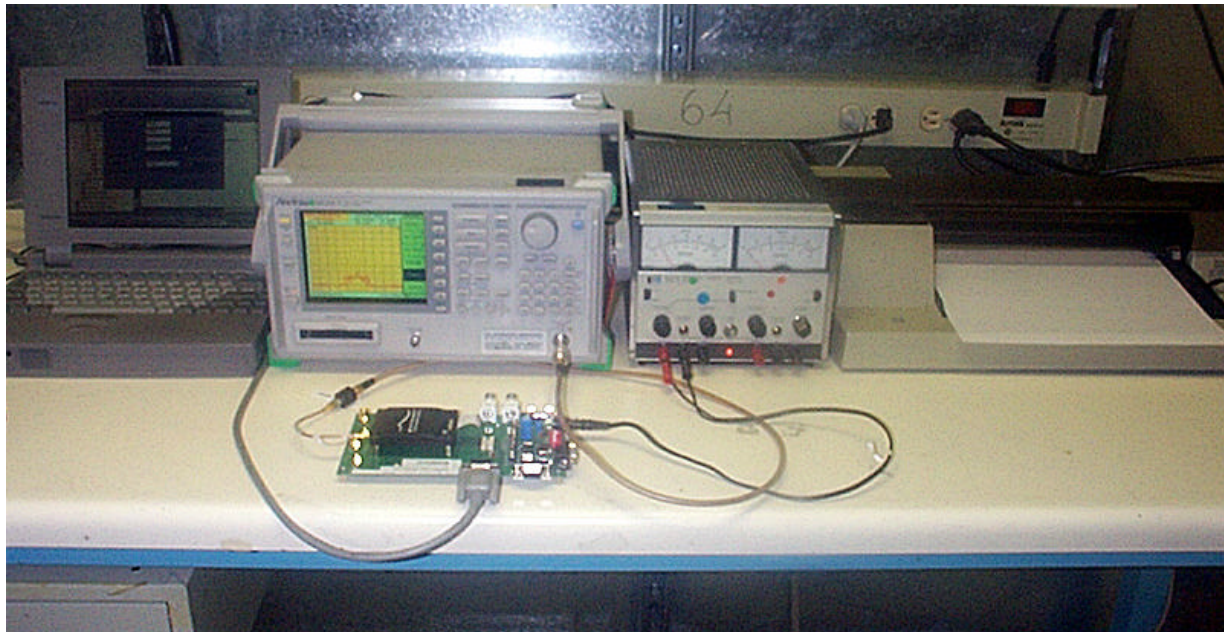
Description	Manufacturer	Model #	Asset #	Calibration Due Data
Spectrum Analyzer	Anritsu	MS2667C	301386	Sept. 5, 2003
Power Meter	HP	HP438A	301417	Sept. 5, 2003
20 dB Attenuator	Narda	4774-20	301533	Oct. 15, 2003

Appendix

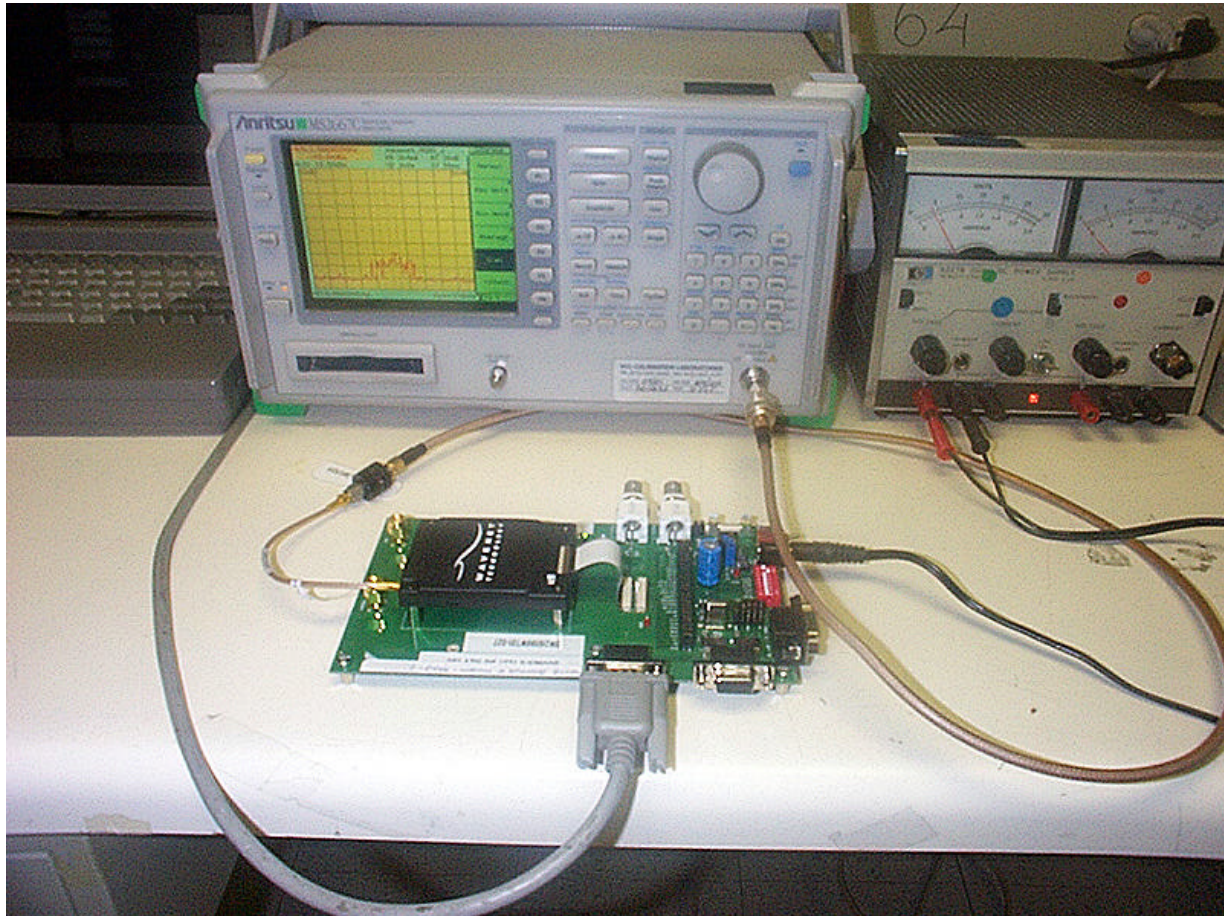
Photographs



Wireless OEM Modem Module
WaveNet BOOMER-II
900 MHz



**Occupied Bandwidth – Testing Setup
Mask J**



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