Israel Testing Laboratories

ACCREDITED
Cert. No. 1152.01
Electrical (EMC)

**DATE: 15 June 2009**

# I.T.L. (PRODUCT TESTING) LTD.

# FCC Radio Test Report

**for**

# Mobile Access Networks

## Equipment under test:

## EnCOVER 1000 WiMAX Distributed Antenna System

**1. WiMax Remote Hub Unit (WIMAX-RU-IS)**
**2. WiMax Remote Antenna Interface (WIMAX-RAI)**
**3. WiMax Remote Antenna (WIMAX-RA-BRS)**

Written by: _____
D. Shidlowsky, Documentation

Approved by: _____
A. Sharabi, Test Engineer

Approved by: _____
I. Raz, EMC Laboratory Manager

Israel Testing Laboratories

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# Measurement/Technical Report for

## Mobile Access Networks

## EnCOVER 1000 WiMAX Distributed Antenna System

1. WiMax Remote Hub Unit (WIMAX-RU-IS)
2. WiMax Remote Antenna Interface (WIMAX-RAI)
3. WiMax Remote Antenna (WIMAX-RA-BRS)

## FCC ID:OJFMA1000WIMAX

| | |
|---|---|
| This report concerns: | Original Grant: X<br>Class II change:<br>Class I change: |
| Equipment type: | WiMAX Licensed Transmitter |

Limits used:
47CFR Parts 2; 27

Measurement procedure used is ANSI C63.4-2003.
Substitution Method used as in ANSI/TIA-603-B: 2002


Application for Certification prepared by:

Ishaishou Raz
ITL (Product Testing) Ltd.
Kfar Bin Nun
D.N. Shimshon 99780
Israel
e-mail sraz@itl.co.il

Applicant for this device:
(different from "prepared by")

Steve Blum
Mobile Access Networks
8391 Old Courthouse Rd., Suite #300
Vienna, VA. 22182
U.S.A.
Tel: +1-541-758-2880
Fax: +1-703-848-0260
e-mail: sblum@mobileaccess.com

# TABLE OF CONTENTS

# 1. General Information

## *1.1 Administrative Information*

| | |
|---|---|
| Manufacturer: | Mobile Access Networks |
| Manufacturer's Address: | 8391 Old Courthouse Rd.<br>Suite #300<br>Vienna, VA 22182<br>U.S.A.<br>Tel: +1-541-758-2880<br>Fax: +1-703-848-0260 |
| Manufacturer's Representative: | Steve Blum |
| Equipment Under Test (E.U.T): | EnCOVER 1000 WiMAX Distributed Antenna System |
| Equipment Model No.: | 1. WiMax Remote Hub Unit (WIMAX-RU-IS)<br>2. WiMax Remote Antenna Interface (WIMAX-RAI)<br>3. WiMax Remote Antenna (WIMAX-RA-BRS) |
| Equipment Serial No.: | 1. 0827FE8 2. 08481ED 3. 083569E |
| Date of Receipt of E.U.T: | 02.05.09 |
| Start of Test: | 02.05.09 |
| End of Test: | 05.05.09 |
| Test Laboratory Location: | I.T.L (Product Testing) Ltd.<br>Kfar Bin Nun,<br>ISRAEL 99780 |
| Test Specifications: | FCC Parts 2; 27 |

## *1.2 List of Accreditations*

The EMC laboratory of I.T.L. is accredited by the following bodies:

1. The American Association for Laboratory Accreditation (A2LA) (U.S.A.), Certificate No. 1152.01.
2. The Federal Communications Commission (FCC) (U.S.A.), Registration No. 90715.
3. The Israel Ministry of the Environment (Israel), Registration No. 1104/01.
4. The Voluntary Control Council for Interference by Information Technology Equipment (VCCI) (Japan), Registration Numbers: C-1350, R-1285.
5. Industry Canada (Canada), IC File No.: 46405-4025; Site No. IC 4025B-1.
6. TUV Product Services, England, ASLLAS No. 97201.
7. Nemko (Norway), Authorization No. ELA 207.

I.T.L. Product Testing Ltd. is accredited by the American Association for Laboratory Accreditation (A2LA) and the results shown in this test report have been determined in accordance with I.T.L.'s terms of accreditation unless stated otherwise in the report.

## 1.3 Product Description

MobileAccess WiMAX Indoor Coverage Solution provides a complete, cost effective, scalable indoor coverage solution for up to two MIMO WiMAX.

The MA-WiMAX solution enables distributing signals from a WiMAX BTS located at a central location over fiber optic connections to remote locations (different floors or areas) throughout the building infrastructure.

The solution can be used as stand-alone - providing only WiMAX coverage via a dedicated antenna infrastructure, or in conjunction with MA-1000 or MA-2000 MobileAccess systems – combining WiMAX with other wireless services for distribution over a common antenna infrastructure.

MA WiMAX system provides a truly integrated solution offering a combined services approach to distribute WiMAX and cellular/PCS through a single antenna infrastructure while maintaining a reliable application independent environment.

The stand-alone MA WiMAX solution elements is set up as follows:

The MA WiMAX front end equipment is installed near the WiMAX BTS. In the downlink, it conditions the signal and converts it to fiber optic for transmission to each remote site over the optic fiber. At each remote site it is reconverted to RF and distributed by two WiMAX antennas.

Each MA WiMAX element is set up and monitored through a local connection from a computer running the MCT application.

The antenna type recommended is a dipole with N-type connector with a gain of 7 dBi.

## 1.4 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4: 2003. Radiated testing was performed at an antenna to EUT distance of 3 meters.

## 1.5 Test Facility

The radiated emissions tests were performed at I.T.L.'s testing facility at Kfar Bin-Nun, Israel. This site is a FCC listed test laboratory (FCC Registration No. 90715, date of listing 22 August 2006).
I.T.L.'s EMC Laboratory is also accredited by A2LA, certificate No. 1152.01.

## 1.6 Measurement Uncertainty

Radiated Emission

The Open Site complies with the ±4 dB Normalized Site Attenuation requirements of ANSI C63.4-2003. In accordance with Paragraph 5.4.6.1 of this standard, this tolerance includes instrumentation calibration errors, measurement technique errors, and errors due to site anomalies.

# 2. System Test Configuration

## 2.1 Justification

The test setup was configured to closely resemble the standard installation.

## 2.2 EUT Exercise Software

The E.U.T is operated by the Embedded SW version 1.2 Build 00 and managed by the MCT SW version WiMAX.22. The SW is used by the professional installers to Operate, maintain and calibrate the unit. The main features are enabling and disabling transmission and adjusting unit output power per a given input signal.

## 2.3 Special Accessories

No special accessories were needed in order to achieve compliance.

## 2.4 Equipment Modifications

No modifications were necessary in order to achieve compliance.

## 2.5 Configuration of Tested System

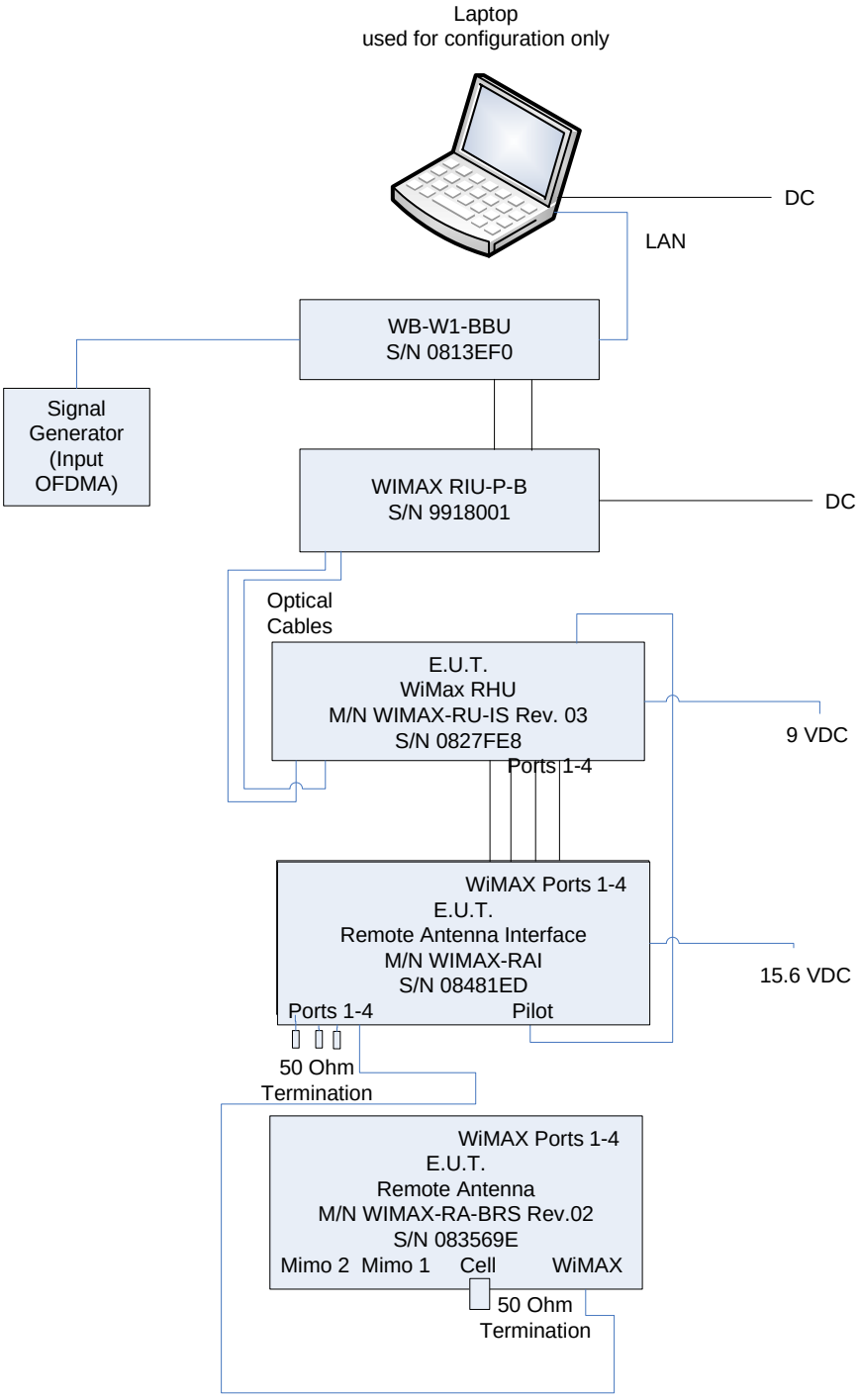


**Figure 1. Test Set-up**

# 3. Maximum Peak Output Power

## 3.1 Test Specification

FCC Part 27, Sub-part C (27.50(h)(2))

## 3.2 Test procedure

Peak Power Output must not exceed 2W. The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator (20 dB) and an appropriate coaxial cable (1 dB). The E.U.T. RF output was OFDMA modulated with 64QAM at 10MHz at the 2503.5 to 2688.5MHz. Special attention was taken to prevent Spectrum Analyzer RF input overload. The Spectrum Analyzer was set to 1.0 MHz RBW.

Tested frequencies: 2508.5MHz, 2560MHz and 2683.5MHz

ANTENNA TYPE Dipole antenna with N type connector (Antenna Gain : 7dBi)

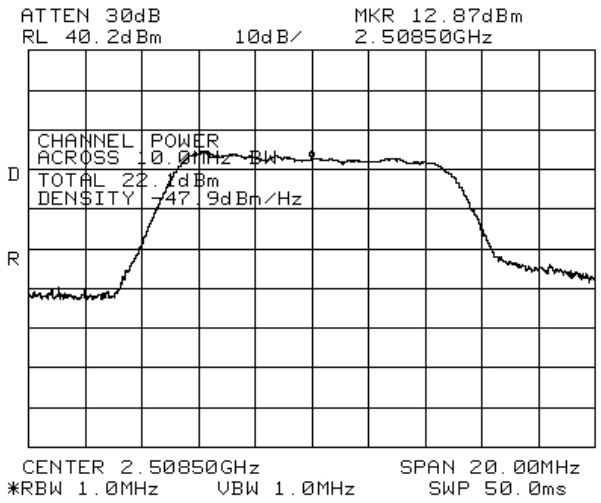


**Figure 2.— 2508.50 MHz**

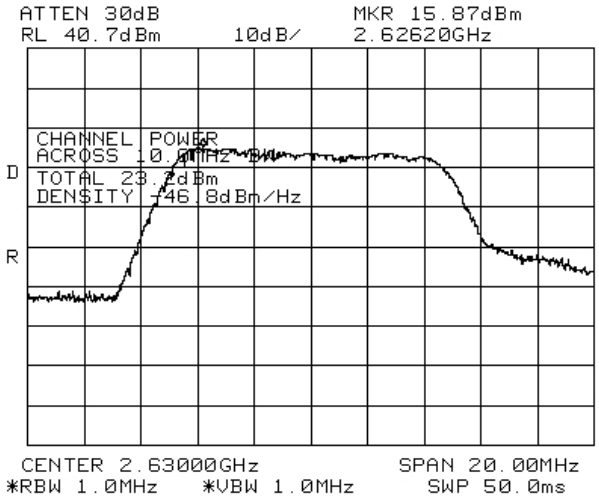


**Figure 3.— 2630.00 MHz**

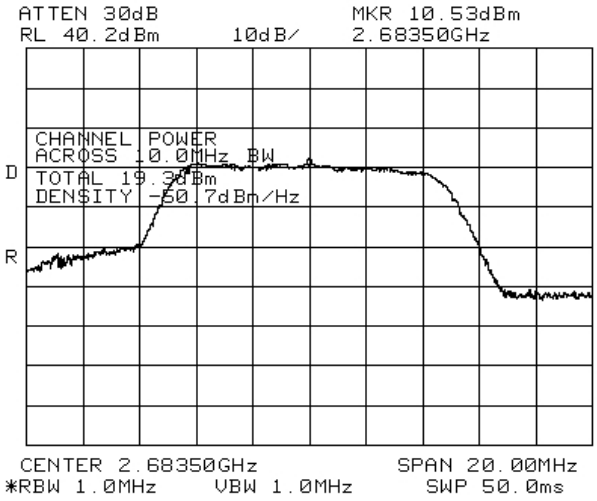


**Figure 4.— 2683.50 MHz**

### 3.3 Results table

E.U.T. Description: EnCOVER 1000 WiMAX Distributed Antenna System
Model No.: 1. WiMax Remote Hub Unit (WIMAX-RU-IS)
2. WiMax Remote Antenna Interface (WIMAX-RAI)
3. WiMax Remote Antenna (WIMAX-RA-BRS)
Serial Number: 1. 0827FE8 2. 08481ED 3. 083569E
Specification: FCC Part 27, Sub-part C, Section 27.50 (h) (2)

| Modulation | Operation Frequency (MHz) | Reading (dBm) | Antenna Gain (dB) | Reading (EIRP) (mW) | Specification (mW) | Margin (mW) |
|---|---|---|---|---|---|---|
| OFDMA | 2508.5 | 22.1 | 7 | 162.18 | 2000 | -1837.82 |
| OFDMA | 2630.0 | 23.2 | 7 | 208.93 | 2000 | -1791.07 |
| OFDMA | 2683.5 | 19.3 | 7 | 85.11 | 2000 | -1914.89 |

**Figure 5 Maximum Peak Power Output**

JUDGEMENT: Passed by 1791.07 mW

TEST PERSONNEL:

Tester Signature: _____ Date: 09 July 2009

Typed/Printed Name: A. Sharabi

### *3.4 Test Equipment Used.*

Maximum Peak Output Power

| Instrument | Manufacturer | Model | Serial Number | Calibration | |
|---|---|---|---|---|---|
| | | | | Last Calibr. | Period |
| Spectrum Analyzer | HP | 8546E | 3442A00275 | December 15, 2008 | 1 year |
| Signal Generator | HP | E4432B ESG-D | GB38450502 | 28 May 2008 | 1 year |
| Attenuator | HP | 8491A | 58267 | 30 June 2008 | 1 year |
| Cable | Rhophase | KPS-5000-KPS | A1674 | 23 April 2009 | 1 year |

**Figure 6 Test Equipment Used**

# 4. Emission Bandwidth

## 4.1 Test Specification

FCC Part 2, Section 1049; FCC Part 27 Section 27.53(m)(6)

## 4.2 Test Procedure

The E.U.T. was set to the applicable test frequency with OFDMA and 64QAM 10 MHz modulation in the 2503.5-2688.5MHz
The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (at the output test) and an appropriate coaxial cable. The spectrum analyzer was set to proper resolution B.W.
The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limit, the mean powers radiated are each equal to 0.5% of the total mean power radiated by a given emission.
Occupied bandwidth measured was repeated in the input terminal of the E.U.T.

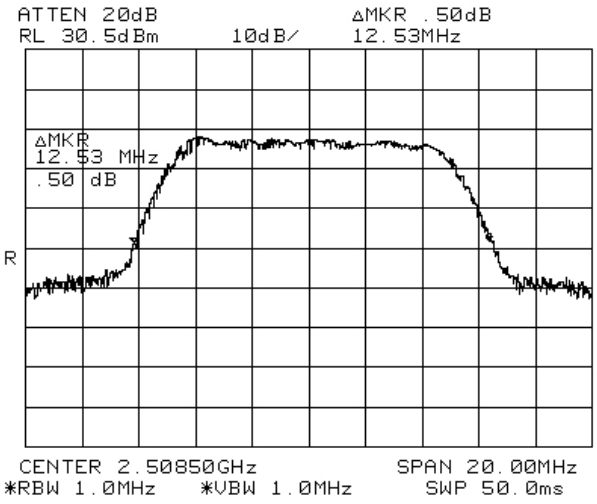


**Figure 7.— 2508.50 MHz IN**

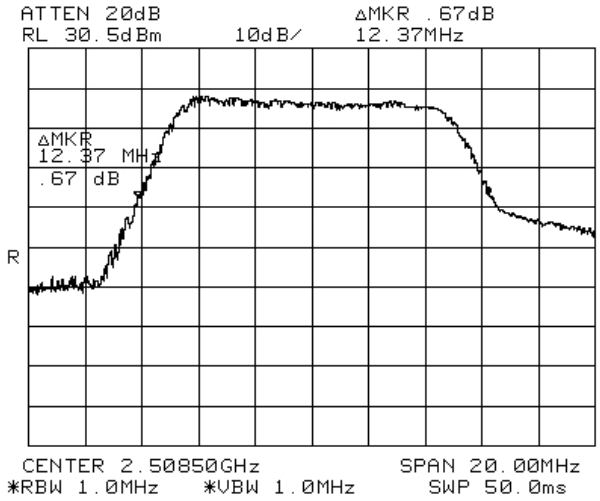


**Figure 8.— 2508.50 MHz OUT**

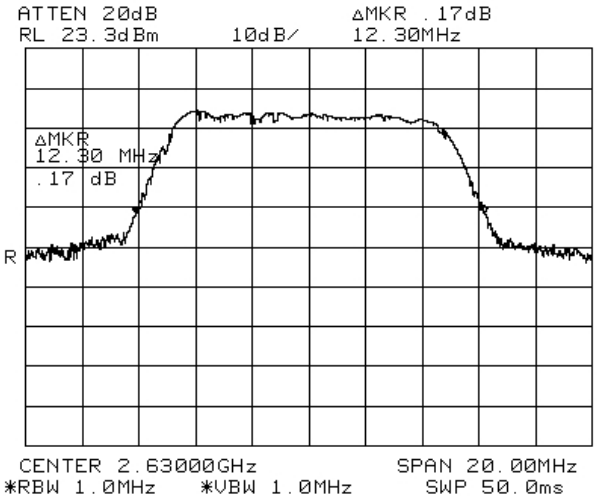


**Figure 9.— 2630.00 MHz IN**

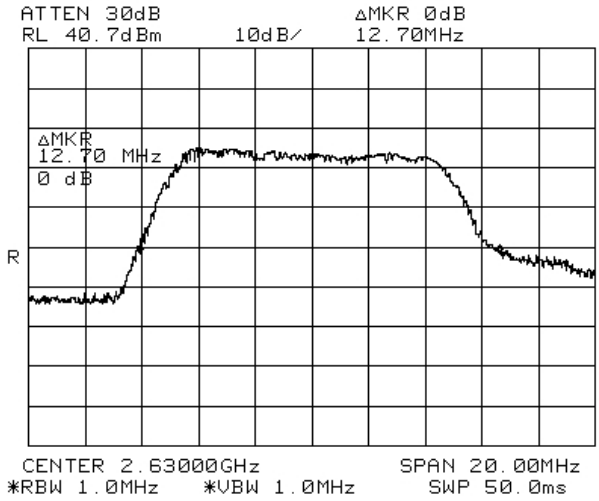


**Figure 10.— 2630.00 MHz OUT**

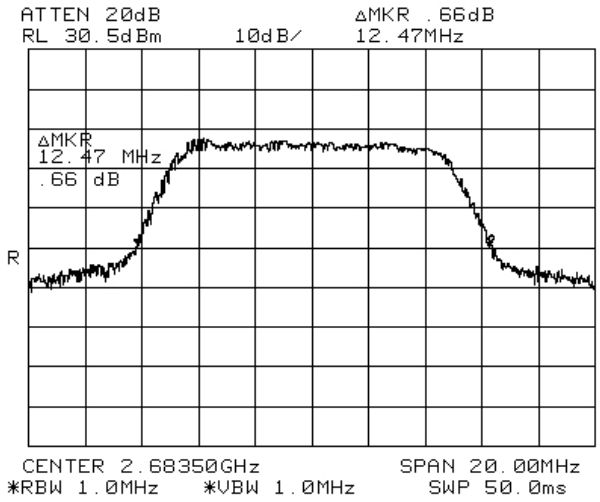


**Figure 11.— 2683.50 MHz IN**

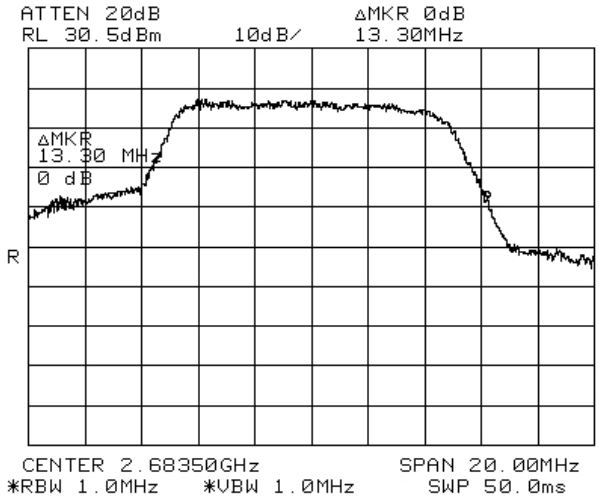


**Figure 12.— 2683.50 MHz OUT**

### 4.3 Results Table

E.U.T. Description: EnCOVER 1000 WiMAX Distributed Antenna System
Model No.: 1. WiMax Remote Hub Unit (WIMAX-RU-IS)
2. WiMax Remote Antenna Interface (WIMAX-RAI)
3. WiMax Remote Antenna (WIMAX-RA-BRS)
Serial Number: 1. 0827FE8 2. 08481ED 3. 083569E
Specification: FCC Part 2, Section 1049; FCC Part 27 Section 27.53(m)(6)

| Modulation | | Operating Frequency (MHz) | Reading (26dBc) (MHz) |
|---|---|---|---|
| OFDMA | Input | 2508.50 | 12.53 |
| OFDMA | Output | 2508.50 | 12.37 |
| OFDMA | Input | 2630.00 | 12.30 |
| OFDMA | Output | 2630.00 | 12.70 |
| OFDMA | Input | 2683.50 | 12.47 |
| OFDMA | Output | 2683.50 | 13.30 |

**Figure 13 Emission Bandwidth**

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: _____ Date: 09 July 2009

Typed/Printed Name: A. Sharabi

### *4.4 Test Equipment Used.*

Occupied Bandwidth

| Instrument | Manufacturer | Model | Serial Number | Calibration | |
|---|---|---|---|---|---|
| | | | | Last Calibr. | Period |
| Spectrum Analyzer | HP | 8546E | 3442A00275 | December 15, 2008 | 1 year |
| Signal Generator | HP | E4432B ESG-D | GB38450502 | 28 May 2008 | 1 year |
| Attenuator | HP | 8491A | 58267 | 30 June 2008 | 1 year |
| Cable | Rhophase | KPS-5000-KPS | A1674 | 23 April 2009 | 1 year |

**Figure 14 Test Equipment Used**

# 5. Conducted Spurious Emissions

## 5.1 Test Specification

FCC Part 27, Sub-part C, Section 27.53 (m)

## 5.2 Test procedure

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 55 + 10 log (P) dB at 5.5 MHz from the channel edges.
The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator and an appropriate coaxial cable (21.0 dB).

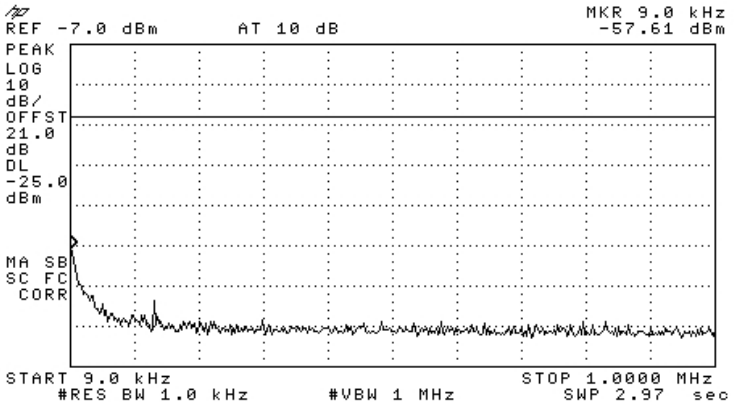


**Figure 15.— 2508.50 MHz**

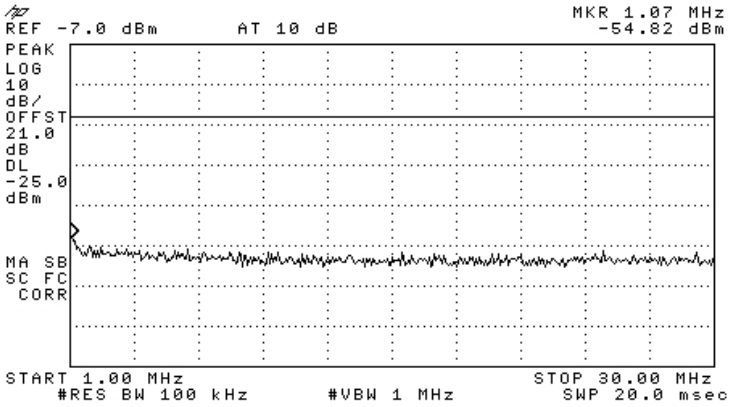


**Figure 16.— 2508.50 MHz**

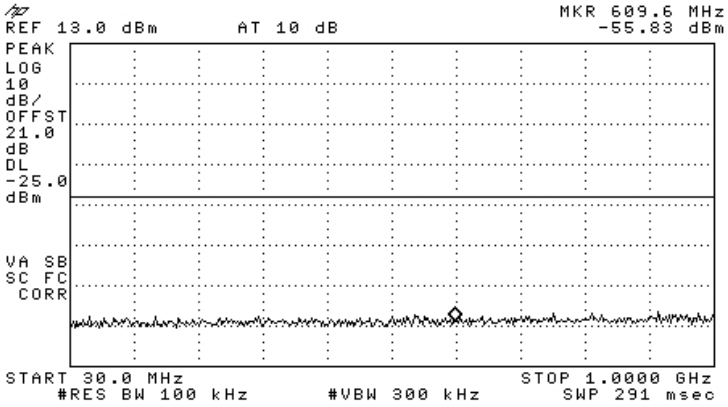


**Figure 17.— 2508.50 MHz**

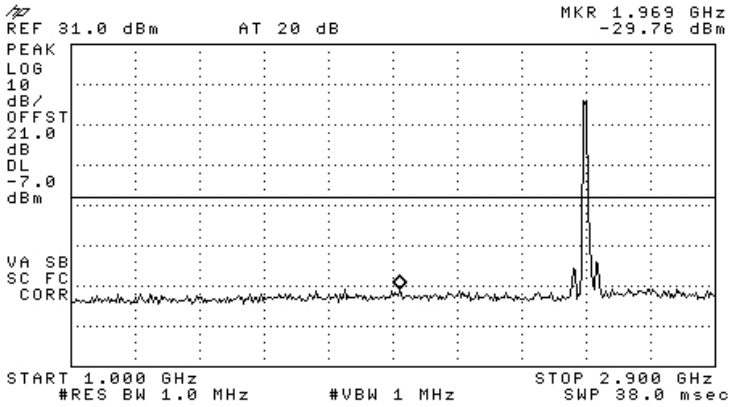


**Figure 18.— 2508.50 MHz**

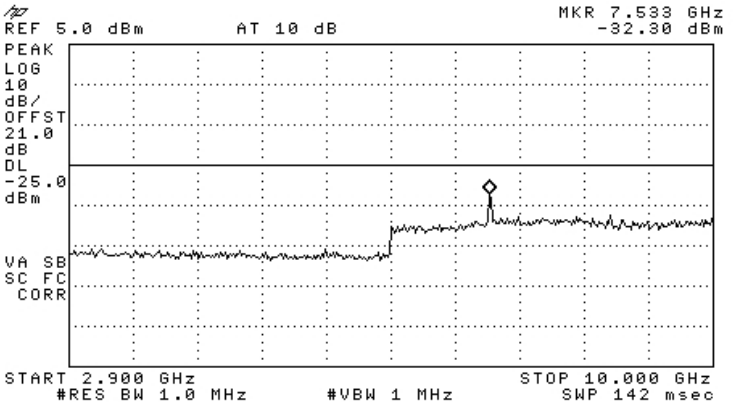


**Figure 19.— 2508.50 MHz**

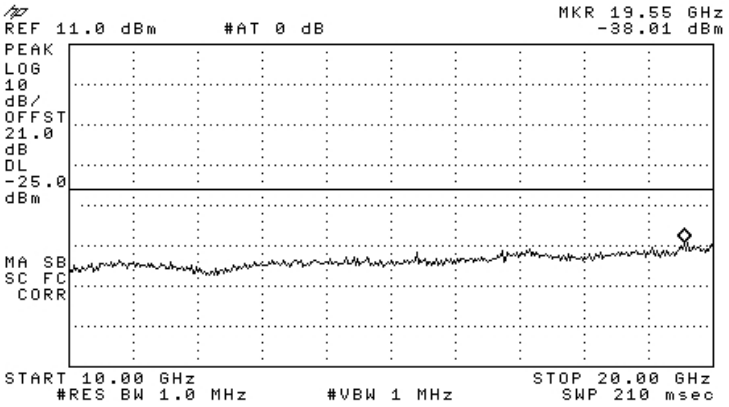


**Figure 20.— 2508.50 MHz**

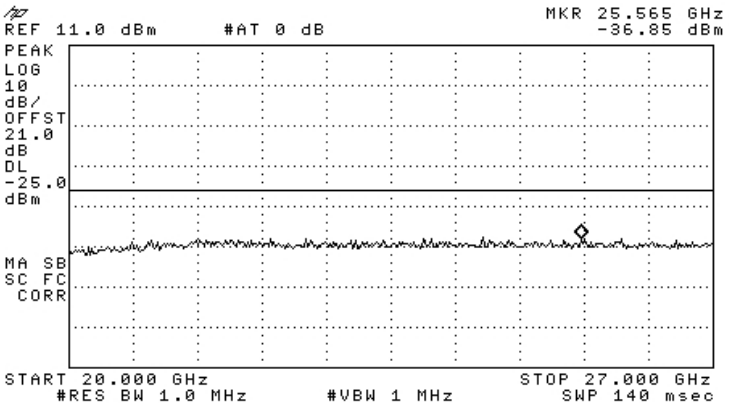


**Figure 21.— 2508.50 MHz**

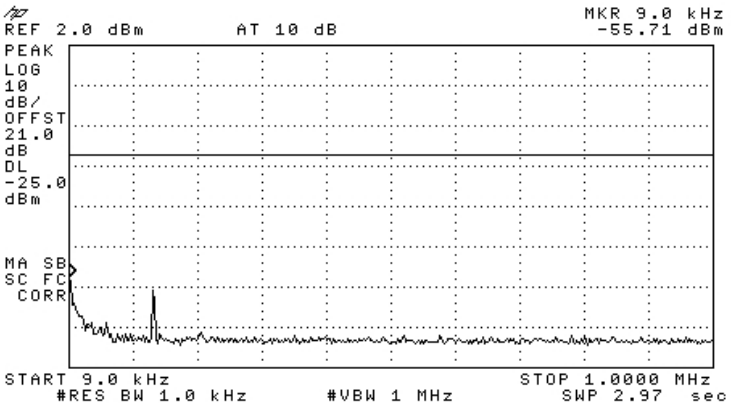


**Figure 22.— 2630.00 MHz**

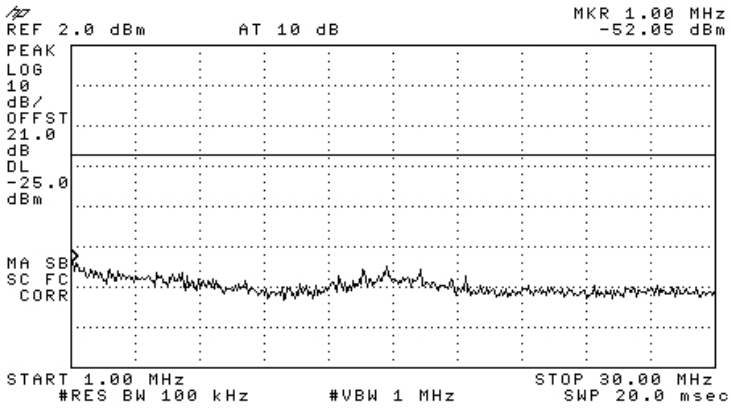


**Figure 23.— 2630.00 MHz**

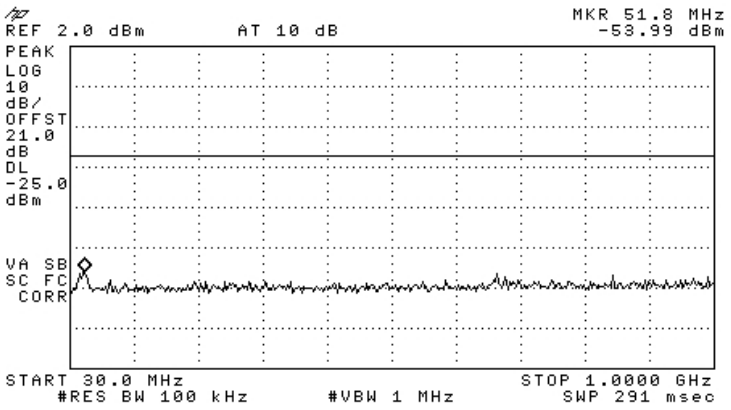


**Figure 24.— 2630.00 MHz**

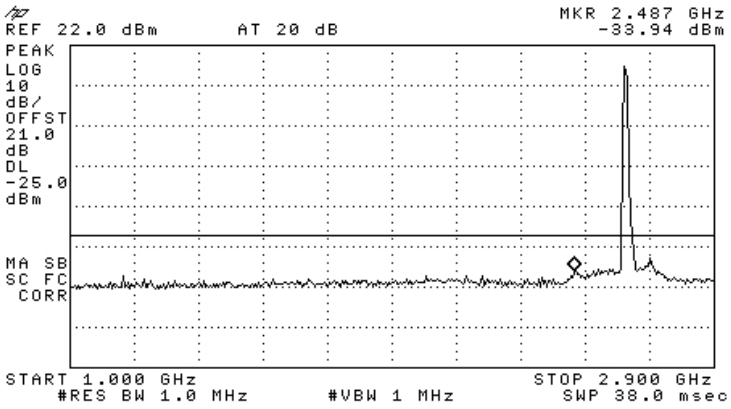


**Figure 25.— 2630.00 MHz**

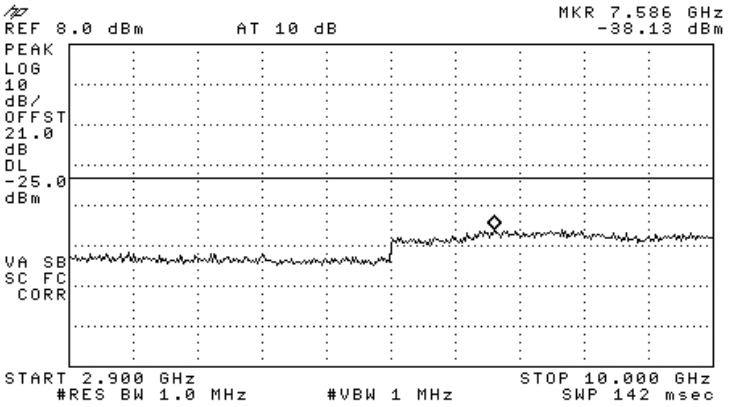


**Figure 26.— 2630.00 MHz**

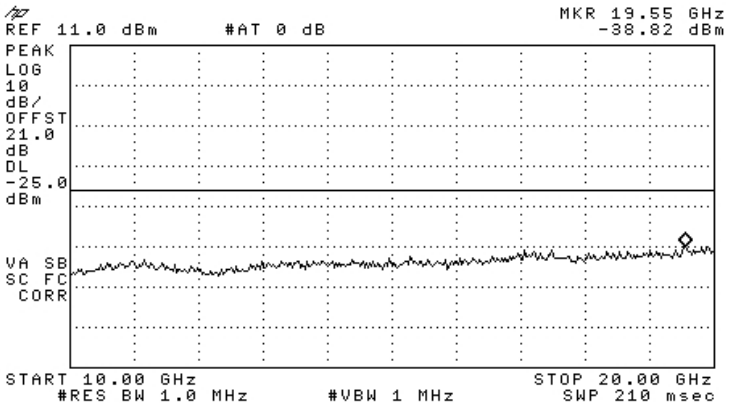


**Figure 27.— 2630.00 MHz**

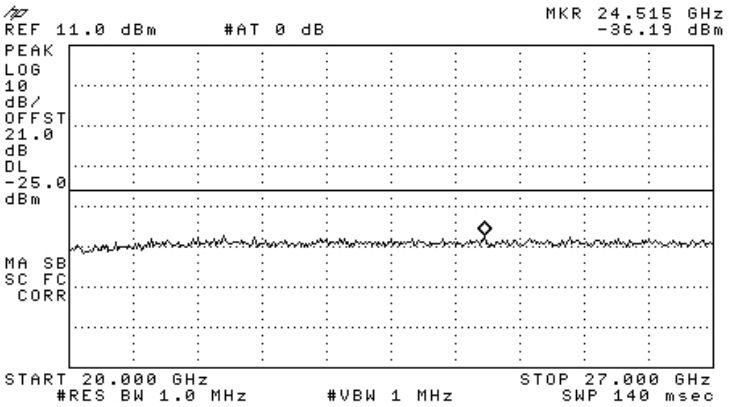


**Figure 28.— 2630.00 MHz**

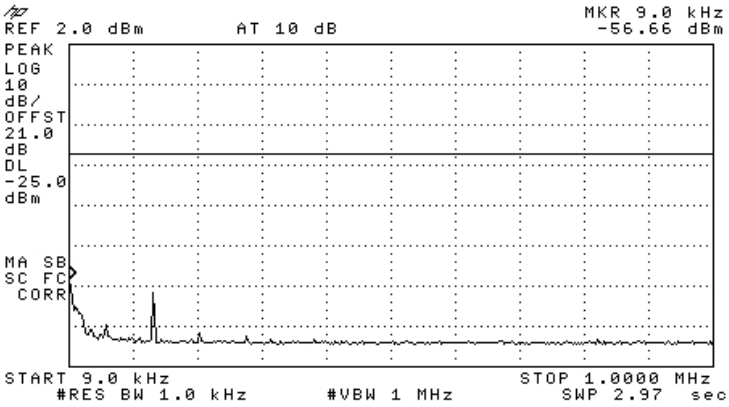


**Figure 29.— 2683.50 MHz**

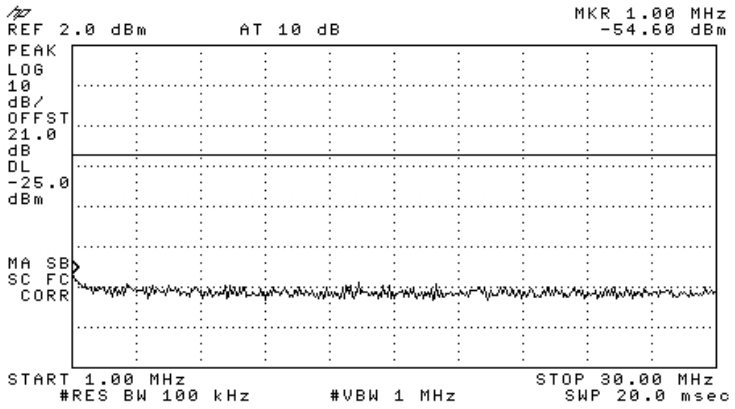


**Figure 30.— 2683.50 MHz**

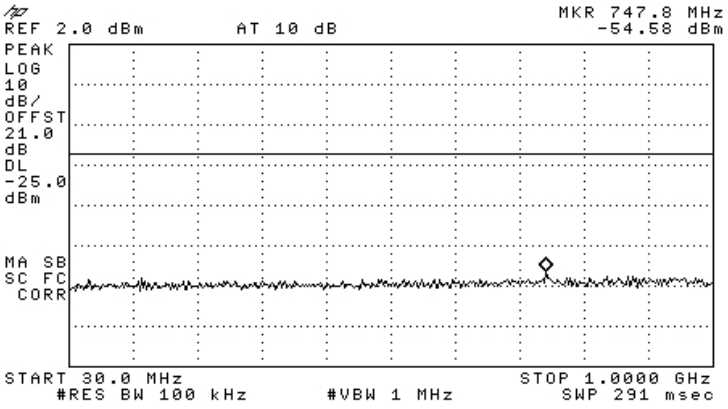


**Figure 31.— 2683.50 MHz**

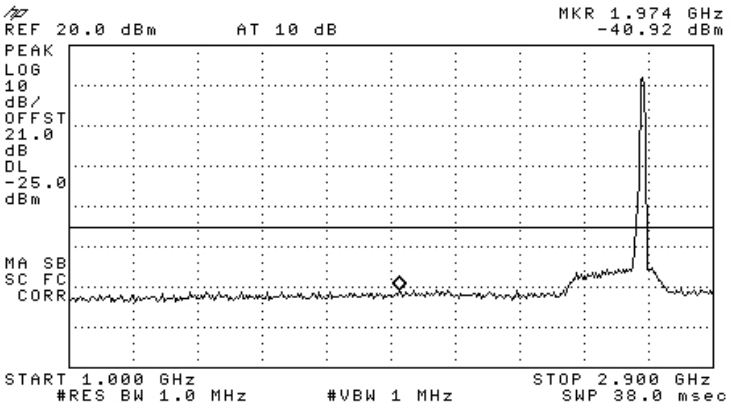


**Figure 32.— 2683.50 MHz**

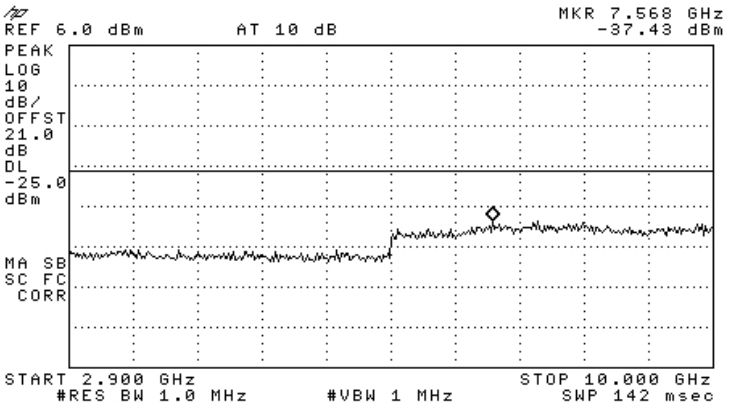


**Figure 33.— 2683.50 MHz**

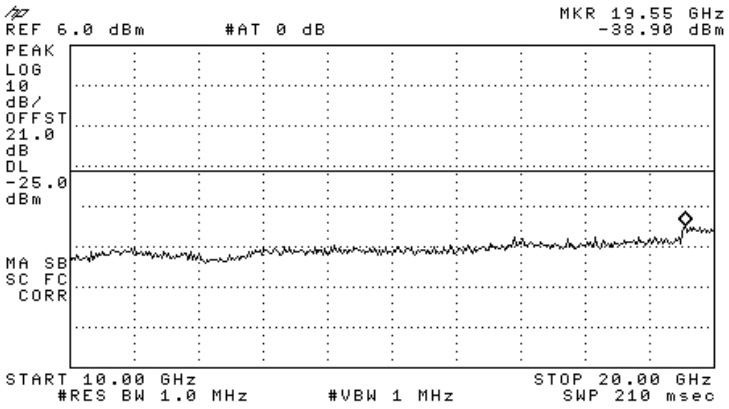


**Figure 34.— 2683.50 MHz**

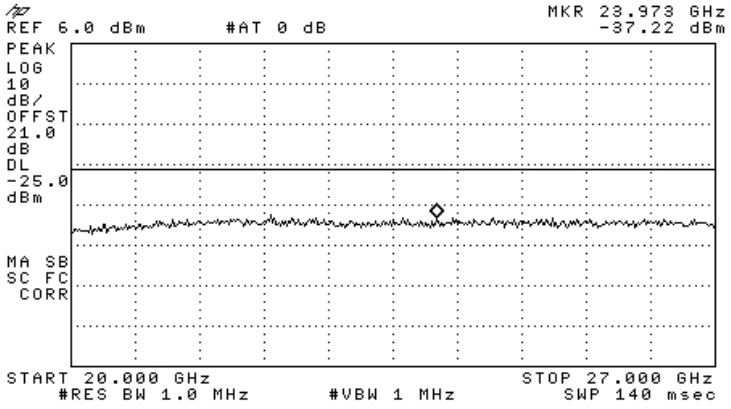


**Figure 35.— 2683.50 MHz**

### 5.3 Results table

E.U.T. Description: EnCOVER 1000 WiMAX Distributed Antenna System
Model No.: 1. WiMax Remote Hub Unit (WIMAX-RU-IS)
2. WiMax Remote Antenna Interface (WIMAX-RAI)
3. WiMax Remote Antenna (WIMAX-RA-BRS)
Serial Number: 1. 0827FE8 2. 08481ED 3. 083569E
Specification: FCC Part 27, Sub-part C, Section 27.53 (m)

| | Operation Frequency (MHz) | Reading (dBm) | Specification (dBm) | Margin (dB) |
|---|---|---|---|---|
| OFDMA | 2508.50 | -22.76 | -25.0 | -2.24 |
| OFDMA | 2630.00 | -8.94 | -25.0 | -16.06 |
| OFDMA | 2683.50 | -12.22 | -25.0 | -12.78 |

**Figure 36 Conducted Spurious Emission Results**

JUDGEMENT: Passed by 2.24 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 09 July 2009

Typed/Printed Name: A. Sharabi

### *5.4 Test Equipment Used.*

Spurious Emissions at Antenna Terminals

| Instrument | Manufacturer | Model | Serial Number | Calibration | |
|---|---|---|---|---|---|
| | | | | Last Calibr. | Period |
| Spectrum Analyzer | HP | 8592L | 3826A01204 | March 17, 2009 | 1 year |
| Signal Generator | HP | E4432B ESG-D | GB38450502 | 28 May 2008 | 1 year |
| Attenuator | HP | 8491A | 58267 | 30 June 2008 | 1 year |
| Cable | Rhophase | KPS-5000-KPS | A1675 | 23 April 2009 | 1 year |

**Figure 37 Test Equipment Used**

# 6. Band Edge Measurements

## 6.1 Test Specification

FCC Part 27, Sub-part C, Section 27.53 (m )

## 6.2 Test procedure

Enclosed are spectrum analyzer plots for the lowest operation frequency and the highest operation frequency in which the E.U.T. is planned to be used.

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 + log (P) dB, yielding –13dBm.
The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator and an appropriate coaxial cable (21.0 dB).
The spectrum analyzer was set to 30kHz R.B.W.

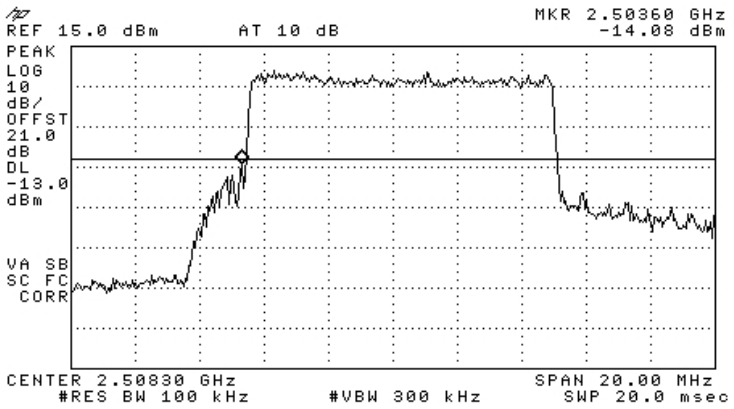


**Figure 38.— 2508.50 MHz**

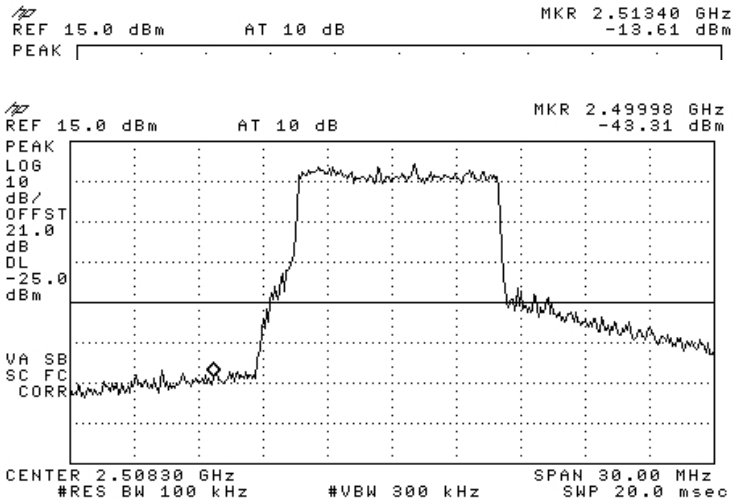


**Figure 39.— 2508.30 MHz**

**Figure 40.— 2508.30 MHz**

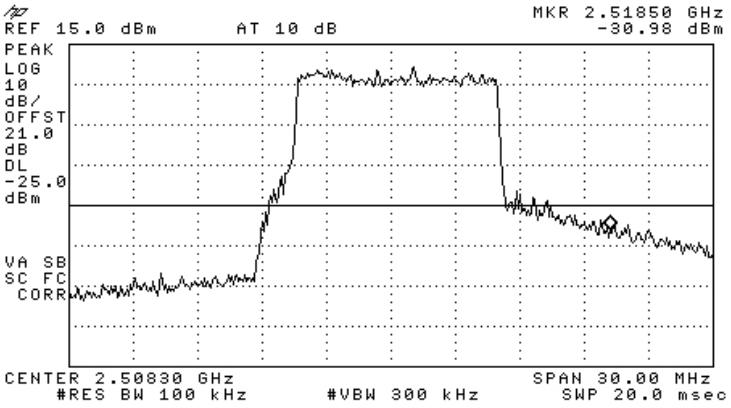


**Figure 41.— 2508.30 MHz**

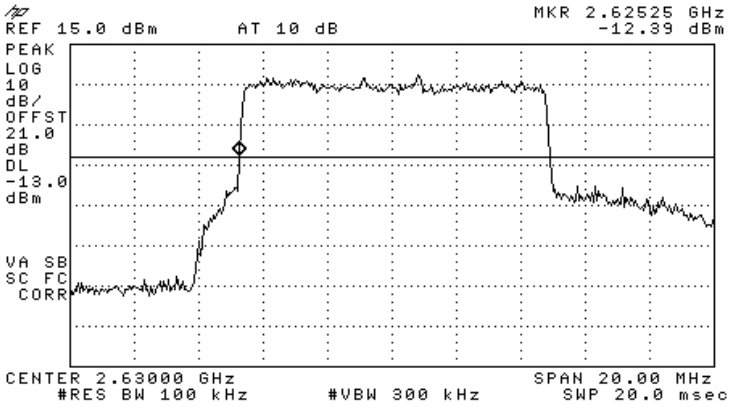


**Figure 42.— 2630.00 MHz**

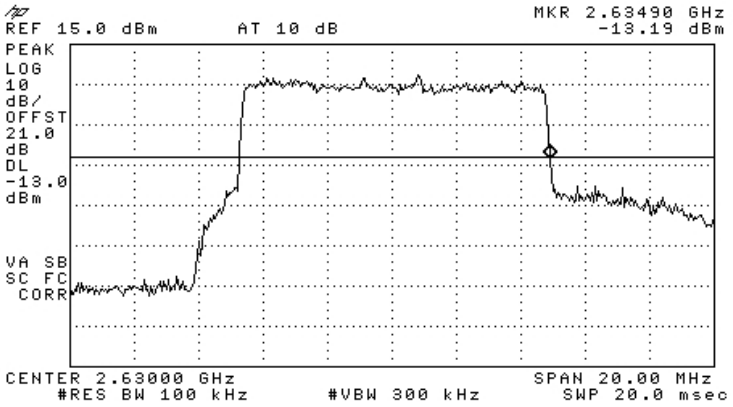


**Figure 43.— 2630.00 MHz**

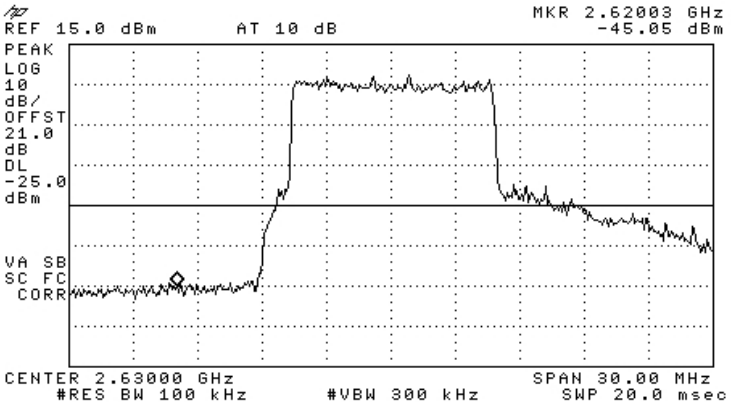


**Figure 44.— 2630.00 MHz**

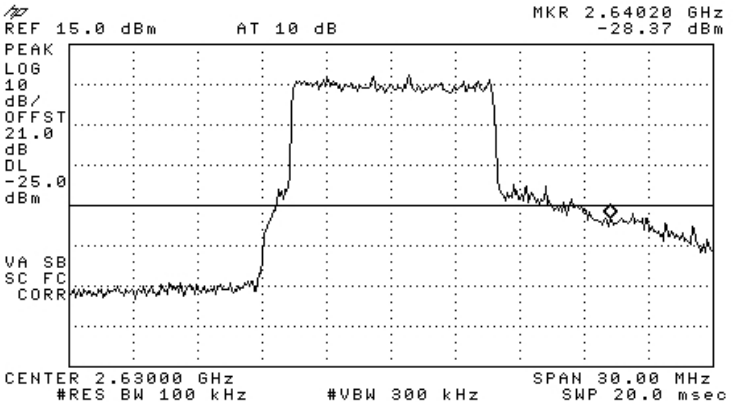


**Figure 45.— 2630.00 MHz**

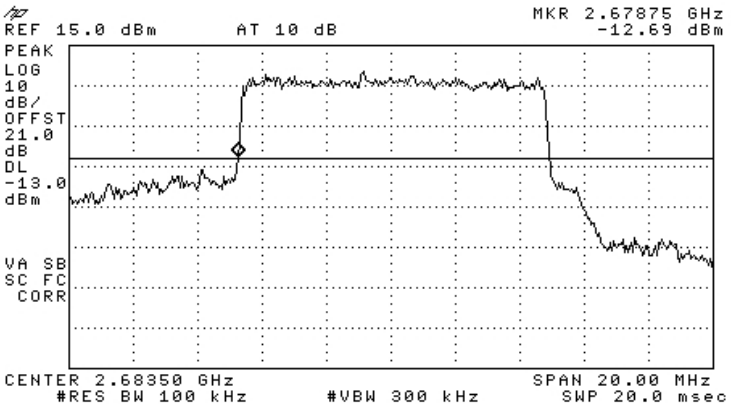


**Figure 46.— 2683.50 MHz**

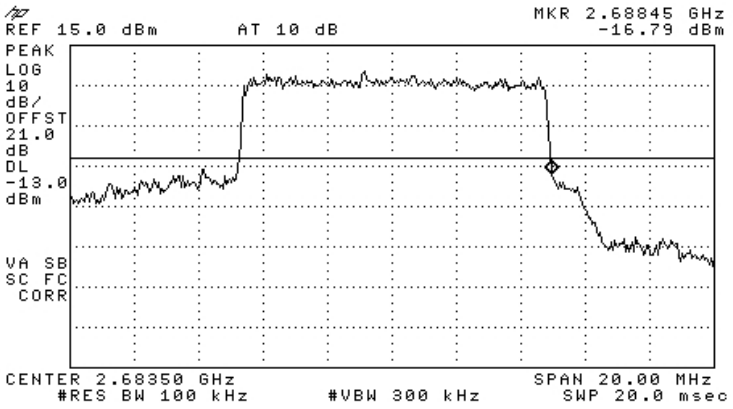


**Figure 47.— 2683.50 MHz**

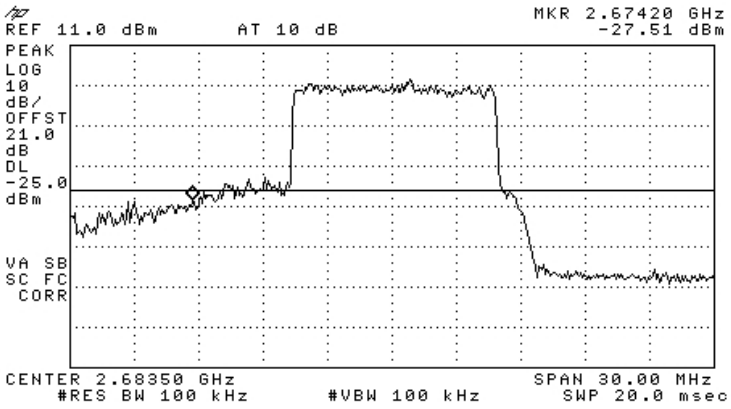


**Figure 48.— 2683.50 MHz**

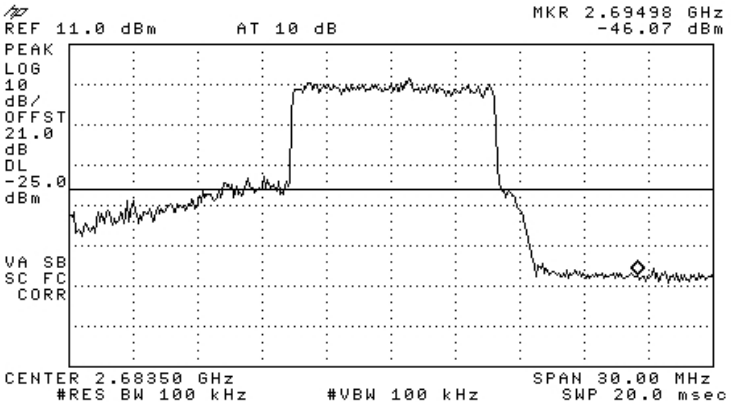


**Figure 49.— 2683.50 MHz**

### 6.3 Results table

E.U.T. Description: EnCOVER 1000 WiMAX Distributed Antenna System
Model No.: 1. WiMax Remote Hub Unit (WIMAX-RU-IS)
2. WiMax Remote Antenna Interface (WIMAX-RAI)
3. WiMax Remote Antenna (WIMAX-RA-BRS)
Serial Number: 1. 0827FE8 2. 08481ED 3. 083569E
Specification: FCC Part 27, Sub-part C, Section 27.53 (m)

| Operation Frequency | Reading for -13dBm [MHz] | | Reading for -25dBm [MHz] | | Spec for -13dBm [MHz] | | Spec for –25dBm [MHz] | |
|---|---|---|---|---|---|---|---|---|
| (MHz) | Down | Up | Down | Up | Down | Up | Down | Up |
| 2508.50 | 2503.60 | 2513.40 | 2499.98 | 2518.50 | >2503.5 | <2513.5 | >2498.0 | <2519.0 |
| 2630.00 | 2625.25 | 2634.90 | 2620.03 | 2640.20 | >2625 | <2635 | >2619.5 | <2640.5 |
| 2683.50 | 2678.75 | 2688.45 | 2674.20 | 2694.98* | >2678.5 | <2688.5 | >2673.0 | <2694.0 |

** Due to an error, the marker in plot was placed 900kHz above the specification although the plot shows compliance with the specification.*

**Figure 50 Band Edge Measurements Results**

JUDGEMENT: Passed

TEST PERSONNEL:
Tester Signature: _____ Date: 09 July 2009
Typed/Printed Name: A. Sharabi

### *6.4 Test Equipment Used.*

Band Edge Measurements

| Instrument | Manufacturer | Model | Serial Number | Calibration | |
|---|---|---|---|---|---|
| | | | | Last Calibr. | Period |
| Spectrum Analyzer | HP | 8592L | 3826A01204 | March 17, 2009 | 1 year |
| Signal Generator | HP | E4432B ESG-D | GB38450502 | 28 May 2008 | 1 year |
| Attenuator | HP | 8491A | 58267 | 30 June 2008 | 1 year |
| Cable | Rhophase | KPS-5000-KPS | A1674 | 23 April 2009 | 1 year |

**Figure 51 Test Equipment Used**

# 7. Spurious Radiated Emission

## 7.1 Test Specification

FCC, Part 27, Sub-part C Section 27.53 (m)

## 7.2 Test Procedure

The test method was based on ANSI/TIA-603-B: 2002, Section 2.2.12 Unwanted Emissions: Radiated Spurious.
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 (P) dB, yielding –13dBm.

(a) The E.U.T. operation mode and test set-up are as described in Section 3.
A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The configuration tested is shown in Figure 1.
The frequency range 9 kHz-20 GHz was scanned, and the list of the highest emissions was verified and updated accordingly.
The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization.
The emissions were measured at a distance of 3 meters.

(b) The E.U.T. was replaced by a substitution antenna (dipole 30MHz-1GHz, Horn Antenna above 1GHz) driven by a signal generator. The height was readjusted for maximum reading. The signal generator level was adjusted to obtain the same reading on the EMI receiver as in step (a).
The signals observed in step (a) were converted to radiated power using:
$P_d$(dBm) = $P_g$(dBm) – Cable Loss (dB) + Substitution Antenna Gain (dB)
$P_d$ = Dipole equivalent power (result).
$P_g$ = Signal generator output level.

The E.U.T. was operated at the frequency of 2508.50, 263.00, and 2683.50 MHz with OFDMA modulation (10 MHz).

2nd Harmonic CW:

| Carrier Channel (MHz) | Freq. (MHz) | Antenna Pol. | Maximum Peak Level (dBµV/m) | Signal Generator RF Output (dBm) | Cable Loss (dB) | Antenna Gain (dBi) | Effective Radiated Power Level (dBm) | Spec. (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 2508.5 | 5017.00 | V | 54.51 | -40.7 | 10.0 | 10.0 | -40.7 | -25 | -15.7 |
| 2508.5 | 5017.00 | H | 57.70 | -37.5 | 10.0 | 10.0 | -37.5 | -25 | -12.5 |
| 2630.0 | 5260.00 | V | 58.35 | -36.4 | 10.0 | 10.0 | -36.4 | -25 | -11.4 |
| 2630.0 | 5260.00 | H | 58.20 | -36.4 | 10.0 | 10.0 | -36.4 | -25 | -11.4 |
| 2683.5 | 5367.00 | V | 54.69 | -40.7 | 10.0 | 10.0 | -40.7 | -25 | -15.7 |
| 2683.5 | 5367.00 | H | 58.36 | -36.4 | 10.0 | 10.0 | -36.4 | -25 | -11.4 |

3rd Harmonic CW

| Carrier Channel (MHz) | Freq. (MHz) | Antenna Pol. | Maximum Peak Level (dBµV/m) | Signal Generator RF Output (dBm) | Cable Loss (dB) | Antenna Gain (dBi) | Effective Radiated Power Level (dBm) | Spec. (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 2508.5 | 7525.50 | V | 54.36 | -35.5 | 17.2 | 10.7 | -42 | -25 | -17.0 |
| 2508.5 | 7525.50 | H | 55.25 | -34.3 | 17.2 | 10.7 | -40.8 | -25 | -15.8 |
| 2630.0 | 7890.00 | V | 55.25 | -34.3 | 17.2 | 10.7 | -40.8 | -25 | -15.8 |
| 2630.0 | 7890.00 | H | 56.56 | -33.7 | 17.2 | 10.7 | -40.2 | -25 | -15.2 |
| 2683.5 | 8050.50 | V | 54.80 | -35.5 | 17.2 | 10.7 | -42 | -25 | -17.0 |
| 2683.5 | 8050.50 | H | 56.00 | -34.8 | 17.2 | 10.7 | -41.3 | -25 | -16.3 |

### *7.3 Test Results*

JUDGEMENT: Passed by 11.4 dB

The E.U.T met the requirements of the FCC, Part 27, Sub-part C, Section 27.53 specifications.

TEST PERSONNEL:

Tester Signature:  Date: 09 July 2009

Typed/Printed Name: A. Sharabi

## 7.4 Test Instrumentation Used, Radiated Measurements

| Instrument | Manufacturer | Model | Serial Number | Calibration | Period |
|---|---|---|---|---|---|
| EMI Receiver | HP | 85422E | 3411A00102 | November 17, 2008 | 1 year |
| RF Section | HP | 85420E | 3427A00103 | November 16, 2008 | 1 year |
| Antenna Log Periodic | A.H. Systems | SAS-200/511 | 253 | January 29, 2009 | 2 year |
| Antenna Mast | ARA | AAM-4A | 1001 | N/A | N/A |
| Turntable | ARA | ART-1001/4 | 1001 | N/A | N/A |
| Mast & Table Controller | ARA | ACU-2/5 | 1001 | N/A | N/A |
| Printer | HP | ThinkJet 2225 | 2738508357.0 | N/A | N/A |
| Spectrum Analyzer | HP | 8592L | 3826A01204 | March 17, 2009 | 1 year |
| Low Noise Amplifier | DBS MICROWAVE | LNA-DBS-0411N313 | 013 | November 3, 2008 | 1 year |
| Low Noise Amplifier | Sophia Wireless | LNA 28-B | 232 | January 8, 2009 | 1 year |
| Signal Generator | HP | E4432B ESG-D | GB38450502 | 28 May 2008 | 1 year |
| Double Ridged Waveguide Horn Antenna | EMCO | 3115 | 29845 | March 16, 2008 | 2 year |

# 8. APPENDIX A - CORRECTION FACTORS

## *8.1 Correction factors for CABLE*

**from EMI receiver to test antenna at 3 meter range.**

| FREQUENCY (MHz) | CORRECTION FACTOR (dB) |
|---|---|
| 10.0 | 0.3 |
| 20.0 | 0.6 |
| 30.0 | 0.8 |
| 40.0 | 0.9 |
| 50.0 | 1.1 |
| 60.0 | 1.2 |
| 70.0 | 1.3 |
| 80.0 | 1.4 |
| 90.0 | 1.6 |
| 100.0 | 1.7 |
| 150.0 | 2.0 |
| 200.0 | 2.3 |
| 250.0 | 2.7 |
| 300.0 | 3.1 |
| 350.0 | 3.4 |
| 400.0 | 3.7 |
| 450.0 | 4.0 |
| 500.0 | 4.3 |
| 600.0 | 4.7 |
| 700.0 | 5.3 |
| 800.0 | 5.9 |
| 900.0 | 6.3 |
| 1000.0 | 6.7 |

| FREQUENCY (MHz) | CORRECTION FACTOR (dB) |
|---|---|
| 1200.0 | 7.3 |
| 1400.0 | 7.8 |
| 1600.0 | 8.4 |
| 1800.0 | 9.1 |
| 2000.0 | 9.9 |
| 2300.0 | 11.2 |
| 2600.0 | 12.2 |
| 2900.0 | 13.0 |

*NOTES:*

*1. The cable type is RG-214.*

*2. The overall length of the cable is 27 meters.*

*3. The above data is located in file 27MO3MO.CBL on the disk marked "Radiated Emission Tests EMI Receiver".*

## *8.2 Correction factors for CABLE*

**from EMI receiver to test antenna at 3 meter range.**

| FREQUENCY (GHz) | CORRECTION FACTOR (dB) |
|---|---|
| 1.0 | 1.2 |
| 2.0 | 1.6 |
| 3.0 | 2.0 |
| 4.0 | 2.4 |
| 5.0 | 3.0 |
| 6.0 | 3.4 |
| 7.0 | 3.8 |
| 8.0 | 4.2 |
| 9.0 | 4.6 |
| 10.0 | 5.0 |
| 12.0 | 5.8 |

*NOTES:*

*1. The cable type is RG-8.*

*2. The overall length of the cable is 10 meters.*

### *8.3 Correction factors for CABLE*

**from spectrum analyzer to test antenna above 2.9 GHz**

| FREQUENCY (GHz) | CORRECTION FACTOR (dB) | FREQUENCY (GHz) | CORRECTION FACTOR (dB) |
|---|---|---|---|
| 1.0 | 1.9 | 14.0 | 9.1 |
| 2.0 | 2.7 | 15.0 | 9.5 |
| 3.0 | 3.5 | 16.0 | 9.9 |
| 4.0 | 4.2 | 17.0 | 10.2 |
| 5.0 | 4.9 | 18.0 | 10.4 |
| 6.0 | 5.5 | 19.0 | 10.7 |
| 7.0 | 6.0 | 20.0 | 10.9 |
| 8.0 | 6.5 | 21.0 | 11.2 |
| 9.0 | 7.0 | 22.0 | 11.6 |
| 10.0 | 7.5 | 23.0 | 11.9 |
| 11.0 | 7.9 | 24.0 | 12.3 |
| 12.0 | 8.3 | 25.0 | 12.6 |
| 13.0 | 8.7 | 26.0 | 13.0 |

*NOTES:*

*1. The cable type is SUCOFLEX 104 E manufactured by SUHNER.*

*2. The cable is used for measurements above 2.9 GHz.*

*3. The overall length of the cable is 10 meters.*

## *8.4 Correction factors for LOG PERIODIC ANTENNA*

**Type SAS-200/511**
**at 3 meter range.**

| FREQUENCY (GHz) | ANTENNA FACTOR (dB) |
|---|---|
| 1.0 | 24.9 |
| 1.5 | 27.8 |
| 2.0 | 29.9 |
| 2.5 | 31.2 |
| 3.0 | 32.8 |
| 3.5 | 33.6 |
| 4.0 | 34.3 |
| 4.5 | 35.2 |
| 5.0 | 36.2 |
| 5.5 | 36.7 |
| 6.0 | 37.2 |
| 6.5 | 38.1 |

| FREQUENCY (GHz) | ANTENNA FACTOR (dB) |
|---|---|
| 7.0 | 38.6 |
| 7.5 | 39.2 |
| 8.0 | 39.9 |
| 8.5 | 40.4 |
| 9.0 | 40.8 |
| 9.5 | 41.1 |
| 10.0 | 41.7 |
| 10.5 | 42.4 |
| 11.0 | 42.5 |
| 11.5 | 43.1 |
| 12.0 | 43.4 |
| 12.5 | 44.4 |
| 13.0 | 44.6 |

*NOTES:*

1. *Antenna serial number is 253.*
2. *The above lists are located in file number SAS3M0.ANT for a 3 meter range.*
3. *The files mentioned above are located on the disk marked "Antenna Factors".*

### *8.5 Correction factors for Double-Ridged Waveguide Horn*

**Model: 3115, S/N 29845**
**at 3 meter range.**

| FREQUENCY (GHz) | ANTENNA FACTOR (dB 1/m) | ANTENNA Gain (dBi) | FREQUENCY (GHz) | ANTENNA FACTOR (dB 1/m) | ANTENNA Gain (dBi) |
|---|---|---|---|---|---|
| 1.0 | 24.8 | 5.4 | 10.0 | 38.8 | 11.4 |
| 1.5 | 26.1 | 7.6 | 10.5 | 38.9 | 11.8 |
| 2.0 | 28.6 | 7.7 | 11.0 | 39.0 | 12.1 |
| 2.5 | 29.8 | 8.4 | 11.5 | 39.6 | 11.8 |
| 3.0 | 31.4 | 8.4 | 12.0 | 39.8 | 12.0 |
| 3.5 | 32.4 | 8.7 | 12.5 | 39.6 | 12.5 |
| 4.0 | 33.7 | 8.6 | 13.0 | 40.0 | 12.5 |
| 4.5 | 33.4 | 9.9 | 13.5 | 39.8 | 13.0 |
| 5.0 | 34.5 | 9.7 | 14.0 | 40.2 | 13.0 |
| 5.5 | 35.1 | 9.9 | 14.5 | 40.6 | 12.9 |
| 6.0 | 35.4 | 10.4 | 15.0 | 41.3 | 12.4 |
| 6.5 | 35.6 | 10.8 | 15.5 | 39.5 | 14.6 |
| 7.0 | 36.2 | 10.9 | 16.0 | 38.8 | 15.5 |
| 7.5 | 37.3 | 10.4 | 16.5 | 40.0 | 14.6 |
| 8.0 | 37.7 | 10.6 | 17.0 | 41.4 | 13.4 |
| 8.5 | 38.3 | 10.5 | 17.5 | 44.8 | 10.3 |
| 9.0 | 38.5 | 10.8 | 18.0 | 47.2 | 8.1 |
| 9.5 | 38.7 | 11.1 | | | |