

# OPISYS

## USHR-800

### Installation and Operations Manual

03/2003



OPISYS, INC.

9201 Irvine blvd  
Irvine, California  
Tel: (949) 916 5283  
Fax: (949) 916 5285  
Email: [koo@opisys.com](mailto:koo@opisys.com)  
Web: [www.opisys.com](http://www.opisys.com)



## Table of Contents

### 1. General Information

1.1 Introduction

1.2 Specifications

1.3 Description

### 2 Installation

2.1 Introduction

2.2 Unpacking and Inspection

2.3 Preparation for Use

2.4 Before Installation

2.5 Antenna Installation

2.6 Bi-directional amplifier Installation

2.7 Connectors

2.8 Installation Example

### 3 Operation

3.1 Introduction

3.2 Operating Instructions

### 4 Trouble Shooting

### 5 Drawings



## 1. General Information

### 1.1 Introduction

This manual provides information pertaining to the installation and operation of OPISYS's USHR-800 "Ultra Slim Home" bi-directional amplifiers. This unit is for CDMA, GSM, and TDMA modulations in the PMS frequencies as shown in Table 1-1.

<**Table 1-1:** USHR-800 Bi-directional amplifier >

Model Number	Down Link* Frequencies	Up Link** Frequencies	Modulation
USHR-800	869 ~ 894 MHz	824 ~ 849 MHz	CDMA,GSM,TDMA

\*: Down Link (= Forward Path) is from base station to mobile

\*\*: Up Link (= Reverse Path) is from mobile to base station

This device complies with Part22 and 2 of the FCC rules.

## 1.2 Specifications

<Table 1-2: USHR-800 Specifications>

PARAMETER		SPECIFICATION
Frequency	Down Link	869 ~ 894 MHz
	Up Link	824 ~ 849 MHz
Output Power		+ 7 dBm ( 5 mW )
Input Power		- 43 dBm max
Linear Gain		50 dB
Gain Flatness		7 dB max
1 dB Compression		+ 14 dBm
3 <sup>rd</sup> Order Intercept		+ 24 dBm
Forward/ Reverse Shutdown		+10 dBm ( ±1dB)
Noise Figure		8 dB max
Propagation Delay		1 μs max
VSWR		2 :1 max
Impedance		50 Ω
Status LED		GREEN ON : Power Normal RED ON : Forward or Reverse Fail
Power Consumption		5.2 V / 500 mA
Input Voltage		AC/DC Adaptor, DC 5.2 V / 1A, 5.2 W
RF Connectors		Type SMA Female
Temperature	Operating	-20 °C to 50 °C
	Storage	-30 °C to 60 °C
Dimensions( W x H x D , inch)		3.10" x 3.80" x 1.54"



## 1.3 Description

This product is designed for offices, hotel rooms, small parking lots, garages or small buildings, helping to improve communications signal and coverage by extending the coverage of a base station.

Outdoor antenna receives from a base station, then USHR 800 bi-directional amplifier amplifies the signal. After amplification, the signal is passed through to the indoor antennas. Conversely, signals from handsets are amplified and retransmitted to the base station.

## 2. Installation

### 2.1 Introduction

This section provides information for the installation and setup of the USHR-800 bi-directional amplifier. The information consists of procedures for unpacking, inspection and preparation for the installation, as well as the actual installation and the setup.

### 2.2 Unpacking and Inspection

Examine the shipping carton for damage before unpacking the unit. If the shipping carton is damaged, try to have the carrier's agent present when the equipment is unpacked. If visual inspection reveals physical damage(s) to the equipment, you should send it back for replacement.

Verify that the equipment is complete, as listed under packing slip. Contact OPISYS with any missing component.

### 2.3 Preparation for Use

#### 2.3.1 Power Requirements

The power supply of the USHR-800 accepts 5.1 VDC. Power consumption of the USHR-800 is approximately 2.6 Watts.

#### 2.3.2 Operating Environment

The USHR-800 is intended for indoor use only. Do not install it where it might be exposed to the outside elements as this could result in destruction of the unit and other hazards.

For normal operations, the environmental conditions should be as follow:

Temperature range: -20 °C to 50 °C, Maximum Humidity: 95 %

## 2.4 Before Installation

You will need to determine the following before beginning the USHR-800 installation:

- a. Base station location
- b. Location where the outdoor antenna is to be installed
- c. Location where the indoor antenna is to be installed
- d. Location where the USHR-800 is to be installed
- e. Length and type of coaxial cable needed to connect from the outdoor antenna to the bi-directional amplifier unit
- f. Length and type of coaxial cable needed to connect from the bi-directional amplifier unit to the indoor antenna

## 2.5 Antenna Installation

### 2.5.1 Outdoor Antenna

Select a site for your outdoor antenna, making sure you have enough signal strength at that location. Using coax cable, connect the antenna to the bi-directional amplifier. If you are using a directional antenna such as a Yagi type, the antenna should be installed so that it is in line of sight of the base station. Then, align the directional antenna toward that direction, and secure the antenna using provided mounting hardware.

Use of a lightning arrester is highly recommended. By installing a lightning arrester between the outside antenna and the bi-directional amplifier, you can protect the bi-directional amplifier unit from electrical surge from lightning.

### 2.5.2 Indoor Antenna

Install the indoor antenna at a convenient location. It should be free of metallic obstruction in order to have an effective coverage. Depending on the circumstance of the installation, either one or a combination of following antennas can be used: Ceiling mount patch antenna, Wall mount patch antenna, Corner reflector

## 2.6 Bi-directional amplifier Installation

USHR-800 is an indoor bi-directional amplifier. Accordingly, the environment of the intended installation site needs to be considered. The bi-directional amplifier



must be shielded from moisture, such as rain, and excessive temperatures. The operating temperatures should be between -20 °C and 50 °C.

### 2.6.1 Turn-On Procedure

Verify all RF connectors are tightened and cables and antennas are secured. Connect AC/DC Adaptor on the bi-directional amplifier's DC IN connector. The Power indicator LED should be green. Make sure that no other LED is illuminated. If any other LED is lit, consult the trouble shooting page of this manual, or “2.6.2 Antenna Isolation and Alignment” section.

### 2.6.2 Antenna Isolation and Alignment

USHR-800 is equipped with an over drive protection circuit. If the output power level of reverse path(=Up Link) exceeds prescribed limit, then reverse path is disconnected and the FAIL LED (RED) is on. Bi-directional amplifier automatically checks output power level every 1 minute of a 5 minute cycle when reverse path has over power . If reverse path still exceeds level then shut down mode continues for another 10 minutes. After 10 minutes, reverse path is switched on again and it checks output power level again. (Repeats the process)

#### A. Antenna Alignment

If you are triggering the overdrive alarms at any point, try to increase the isolation between the antennas by relocating them. The indoor antenna should be placed physically as far away from the outdoor antenna as practical. If the geometry of the intended coverage area allows it, you should also try the indoor antenna in such way that interference between the antennas is at the minimum. If you are using directional antennas, try to find a location for the indoor antenna where it can cover the needed area and oriented back to back with respect to the outdoor antenna.

## 2.7 Connectors

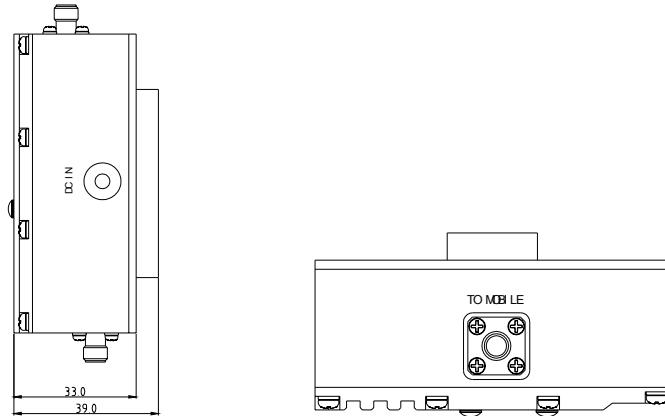
Figure 2-7 shows the connectors and Table 2-7 provides a description of each connector on the USHR-800 unit

<Table 2-7: UHSR-800 Connectors>

<b>Label</b>	<b>Description</b>
DC IN	Connect AC/DC Adaptor for supplying DC power to the unit
TO BASE	SMA-type female connector transmits base station RF, receives mobile RF, and connects to the outdoor antenna
TO MOBILE	SMA-type female connector transmits mobile RF,

	receives base station RF, and connects to the indoor antenna
--	--

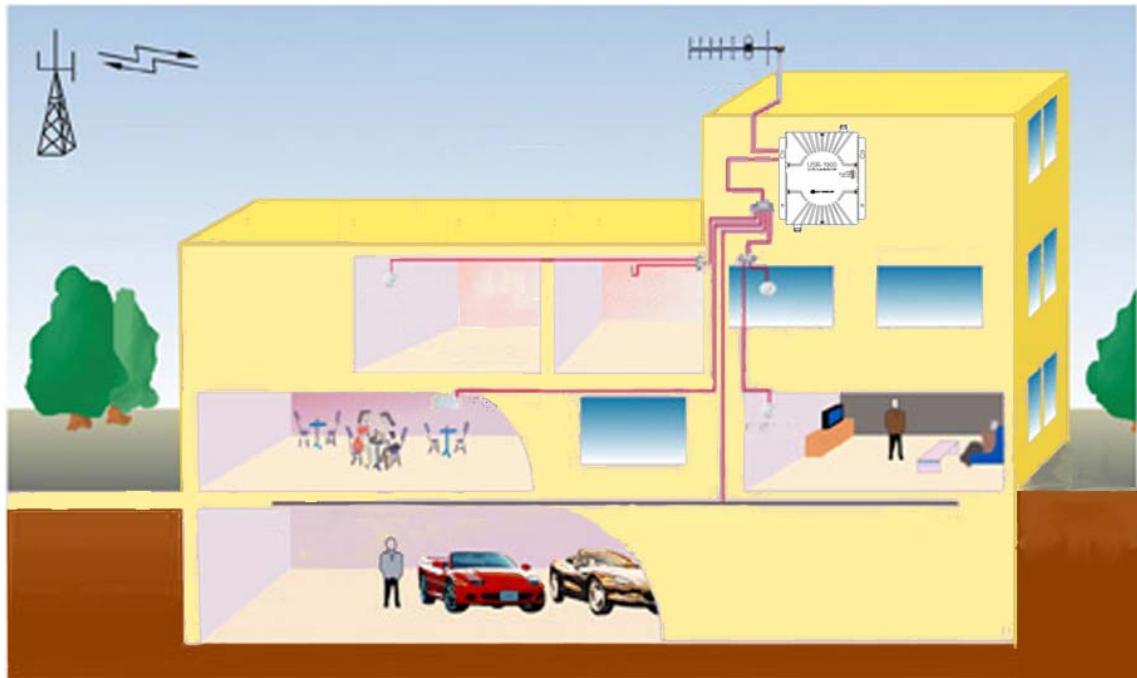
<Figure 2-7: USHR-800 Connectors>



## 2.8 Installation Example

USHR-800 can be installed with multiple indoor antennas as shown in Figure 2-8. In this example, a 6-way power splitter was used to split the signal to and from the indoor antennas.

<Figure 2-8: USHR-800 Installation Example>



### 3. Operation

#### 3.1 Introduction

This section provides information for operating the USHR-800 bi-directional amplifier.

#### 3.2 Operating Instruction

##### 3.2.1 Power-up

Connect the bi-directional amplifier to AC/DC Adaptor. If no FAIL condition is present, only the “POWER” LED will remain lit. The bi-directional amplifier is then operating properly.

##### 3.2.2 Fail Status

###### 3.2.2.1 Overdrive Fail

There is one overdrive fail on the unit, for the up link. Over driving occurs when the RF output power of the bi-directional amplifier exceeds a prescribed limit. This means that the input RF power level is too high, or the bi-directional amplifier is oscillating. The condition may be transient, caused by a passing emergency vehicle emitting a strong signal for example, or permanent, due to a nearby base station. It may also indicate low isolation between the antennas, which causes the unit to oscillate (please refer to the section 2.6.2 of this manual for antenna alignment and isolation.)



The overdrive fail on the USHR-800 bi-directional amplifier is design to detect whether the over driving is transient or permanent. If the output power level of reverse path(=Up Link) exceeds prescribed limit, then reverse path is disconnected and the FAIL LED (RED) is on. Bi-directional amplifier automatically checks output power level every 1 minute of a 5 minute cycle when reverse path has over power . If reverse path still exceeds level then shut down mode continues for another 10 minutes. After 10 minutes, reverse path is switched on again and it checks output power level again. (Repeats the process)

## 4. Trouble Shooting

If the bi-directional amplifier does not operate properly after installation, first make sure that the installation procedures as described in section 2 of this manual were followed correctly. Inspect each connection, both RF and AC, and connectors for a secure fit, checking to see if all the connections are made to the proper ports of the unit and the antennas.

If the malfunction is due to an alarm condition, refer to the appropriate part of the section 3.2 of this manual. Corrective actions may be taken for the overdrive alarms.

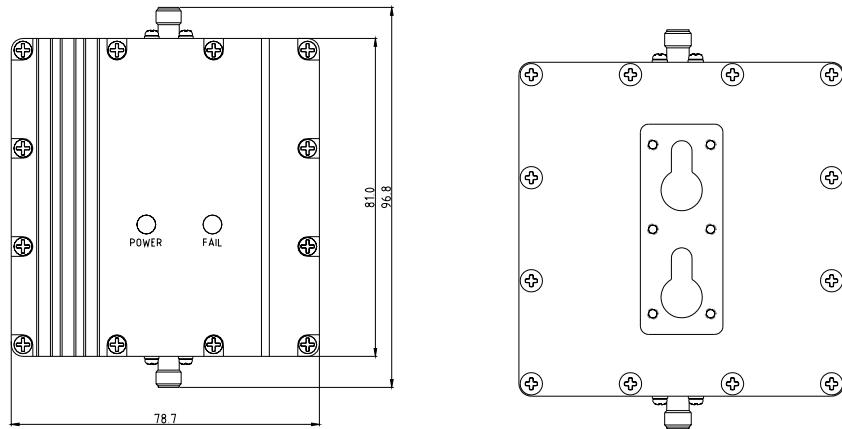
### CAUTION!

There are no user serviceable parts in the USHR-800. DO NOT OPEN the unit. There is a danger of an electric shock. Opening the covers of the unit will void all warranties.

## 5. Drawings

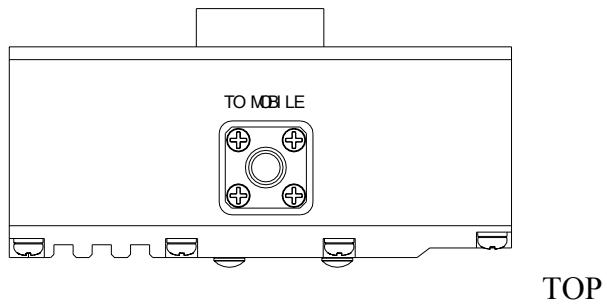
### 5.1 Front and Back views

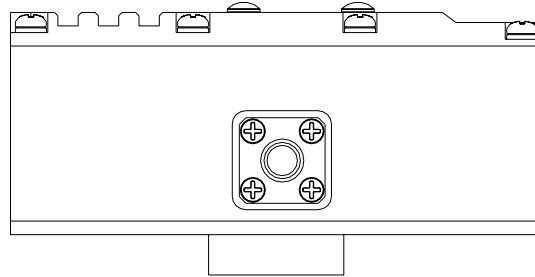
<Figure 5-1: USHR-800 Front and Back views>



### 5.2 Top and Bottom views

<Figure 5-2: USHR-800 Top and Bottom views>

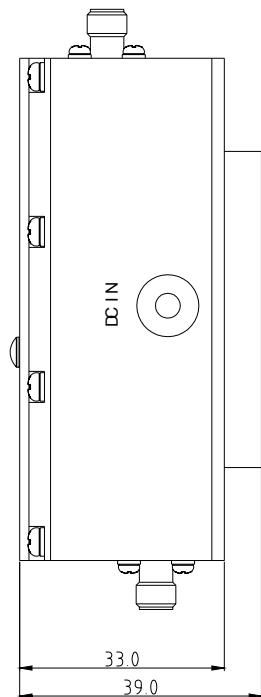




BOTTOM

### 5.3 Side views

<Figure 5-3: USHR-800 Side views>





**For OUTDOOR use, an Omni-Directional Antenna with a maximum gain of 34dBi is authorized for use with this unit.**

**Outside antennas must be positioned to observe minimum separation of 20cm. (~ 8 in.) from all users and bystanders. For the protection of personnel working in the vicinity of outside (uplink) antennas, the following guidelines for minimum distances between the human body and the antenna must be observed.**

**The installation of an OUTDOOR antenna must be such that, under normal conditions, all personnel cannot come within 20 cm. (~ 8 in.) from the outside antenna. Exceeding this minimum separation will ensure that the worker or bystander does not receive RF-exposure beyond the Maximum Permissible Exposure according to section 1.1310 i.e. limits for General Population/Uncontrolled Exposure.**