



Shireen Inc Dual Band Repeater Amplifier

Wireless Repeater Installation Manual v 1.0  
Dual Band Repeater Amplifier

Model : Item #18-850

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## **SAFETY FIRST**

For your safety and to prevent injury to the installer or the operator, it is essential to read this manual carefully before your new unit is installed and operated.

### Personal safety

- 1) This unit is powered by small AC adaptor unit. Turn off the electric supply if you have to do any rewiring or if you are making alterations to wall sockets.
- 2) The equipment should be used only for amplifying mobile (cellular) phone signals and not for any other purpose.
- 3) Should the unit fail to operate, repairs should be carried out by qualified personnel ONLY.
- 4) Before drilling make sure you know the location of existing electrical wiring to avoid contact with the wiring which could cause an electrical shock and severe the wiring.
- 5) If a ladder is required for installation, make sure that the ladder is placed on a flat surface and that it is securely fixed. It is highly recommended that you have someone to assist you while you are on a ladder.



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## **1. General**

The Item#18-850 dual band cellular repeater will improve RF coverage for areas with low signal strength or where there is patchy Indoor from the cell phone Indoor provider.

### **1.1 Purpose**

The purpose of this document is to provide specific In-door Solutions methods and procedures for Field RF Engineering.

### **1.2 Scope**

This document covers four (4) main areas:

- 1) Preparing to install the wireless repeater
- 2) Installing the wireless repeater
- 3) Operating the wireless repeater
- 4) Maintenance and Troubleshooting

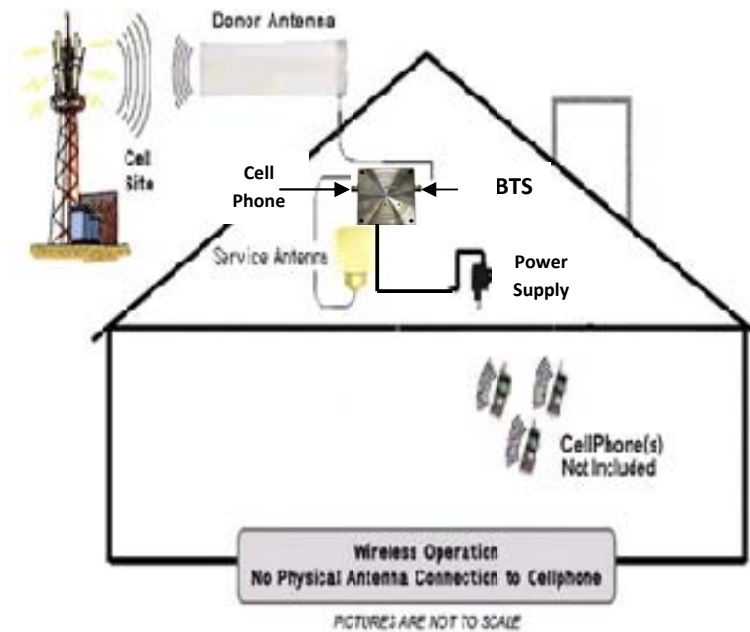
### **1.3 Responsibility**

Field RF Engineering shall be responsible for the subject matter contained here in. The document shall be reviewed on a regular basis to ensure accuracy.

## 2. Preparing to install Item # 18-850

### 2.1 Overview

The first thing you need to do before installing wireless repeater is to find out where you want to install the repeater. Look at the diagram below for an idea of how the Cellular Repeater works.



- 1) The cellular signal is broadcasted to and from the cell site.
- 2) The Outdoor Antenna collects the signal from the cell site.
- 3) The wireless repeater (Item#18-850) amplifies the signal and re-broadcasts it to your home/office.
- 4) Ideally, the Item#18-850 and Indoor Antenna should be placed centralized inside your home/office in order to maximize coverage. The outdoor Antenna should be outside your home/office, facing towards the closest cellular site having the least obstructions (buildings, cars, trees etc), or it should have line of sight towards the cell site – an elevated position often helps this.



## 2.2 Check for signal strength

Before installing *the* Item#18-850 in your home/office, make sure that you can place calls on the outside of your home/office or in the attic or at roof level where you install the Outdoor Antenna. The Item#18-850 can only bring cell phone signals into your home/office if cell phone signals are reaching the outside of your home/office, your attic or at roof level. The best way to find the cellular signal around your home/office is simply to walk around with your cell phone ON. You should use a cell phone on the network/band whose signal you are trying to improve. The “Signal Strength” meter on your cell phone will tell you where the signal is strongest. The Cell Phone “Signal Strength” meter takes up to 6~10 seconds to update as you move from location to location, so make sure to take a nice long pause in every location you test. The place you choose should either be outside, or in the very least by a window. If you can reliably make and receive calls outside your home/office, then Item#18-850 can bring the signal into your home/office. If only one signal bar is displayed on your cell phone, indoor coverage will be limited to one small room or area.

Caution: Cell Phone Signal bars are approximate and vary for each model of phone. The number of bars can fluctuate widely, depending on the exact location of the phone, position or angle of the phone, weather, etc. Most cell phone signal meters update every 6 to 10 seconds. An increase of only one bar typically indicates a 4x to 10x signal increase. The best indicator of coverage area is your ability to reliably place and receive calls.

## 2.3 Determine the Needed Coverage Area

Identify the location in your home/office where you need signal coverage Item#18-850 can cover approximately 2000 ft. the type of antennas used will dictate the exact coverage area. Coverage varies based on outdoor signal level, building construction, and general installation. Walls, ceilings or floors will reduce the coverage area.

## 2.4 Location of Outdoor Antenna and Indoor Antenna

It is recommended that the Outdoor Antenna and Indoor Antenna have approximately 15 feet of vertical separation. If the antennas are too close together, the LED's will turn RED indicating Oscillations. Place the Outdoor Antenna as high as possible to capture the best signal.



## 2.5 Cable Requirements

Coaxial cable is needed to connect the Item#18-850 with the antennas. For the best performance, cables must be low loss. Shireen Inc is a leader in the RF cable Industry, please contact us for any custom lengths or specialized cable requirements.

## 2.6 Power Requirements

The Item#18-850 can be plugged into a standard 2-prong 100~240VAC receptacle using the included AC/DC Power Adaptor. The Power Adaptor consumes less than 15W. The DC power supported is 5Vdc with a max. current draw of 2A.

The Item#18-850 MUST only be used with the provided  
WARNING power adaptor. Use of other power adaptors will void the  
warranty and may damage the repeater.

## 2.7 Installing Tools Needed

The following tools are needed to install Item#18-850:

1. #2 screwdriver
2. Cellular phone operating in the band supported by the Item#18-850
3. Drill for wall mounting purposes.



### 3. Installing Item#18-850

#### 3.1 Package Contents

Before you begin, make sure all of the following parts included in the box.

No	Quantity	Description
1	1	Dual Band Repeater (Cellular)
2	1	AC/DC Power Adaptor
3	1	Quick Installation Guide

**CAUTION** The Outdoor Antenna, Indoor Antenna, Feeder Cables and Bracket for antenna mounting should be previously prepared by regional RF Field Engineer for installing the Item#18-850.





### **3.2 Installing the Outdoor Antenna**

Follow the antenna installation procedures provided by SHIREEN INC

### **3.3 Installing the Indoor Antenna**

Follow the antenna installation procedures provided by SHIREEN INC

### **3.4 Running the feeder cables to the Item#18-850**

Follow the antenna installation procedures provided by SHIREEN INC

### **3.5 Mounting the Item#18-850**

The wireless repeater can be installed on a flat surface or wall at the location designated for installation.

#### **1) General Installation Guidelines**

- The installation location should be within 3m of an AC power outlet
- The location should not be easily accessible; this will help prevent any changes in performance of the repeater.
- The power adaptor should be fixed harder and tighter in order to prevent loose connections to the socket.
- The antenna port location should have enough space so that the feeder line can be connected easily.
- Locations where wall's surface is fragile and can be easily broken should be avoided.
- Outdoor coaxial antenna cable should be properly ground for lightning protection.



### 3.6 Operating the repeater

#### **Basic Concepts: RF Isolation Check**

RF isolation is defined by the path loss or attenuation, between the Outdoor and Indoor antenna. It is important to ensure that the two antennas are sufficiently separated, such that the signal transmitted by one antenna is not received by the other. For optimal performance, the separation of the two antennas must provide a path loss of at least 12 dB greater than the gain of the repeater. Therefore, the Item#18-850 requires at least 57~ 72dB of attenuation between the antennas.

In most cases, isolation will be achieved by properly locating the Outdoor and interior coverage antennas (Indoor antenna), respectively. The optimal location for the Outdoor antenna is high above the roof line, and exterior to the building.

The interior coverage antenna (Indoor antenna) should be installed inside, near or below the ceiling. Following these guidelines should ensure adequate isolation between antennas.

- Never mount the Outdoor or coverage antenna near a window, where Signal can easily pass through the glass
- Mount the Outdoor antenna as high as physically possible to the exterior of the building, maximizing the vertical separation between antennas and pointing away from the building, toward the base station site.
- Install the antennas taking advantage of any existing building structure. Such as brick walls, metal roofs, or multiple wall structures to additionally attenuate the path between them.
- When using directional antennas inside the building to cover corridors and hallways, point the interior antenna away from the Outdoor antenna location.
- In extreme cases, the building configuration may not allow for such separation and isolation. If additional isolation is required, coaxial attenuation may be inserted between the Outdoor antenna and the repeater, with the potential compromise to the coverage within the building
- The flow of the isolation check functionality for the Item#18-850 is as follows.



## Shireen Inc Dual Band Repeater Amplifier

### Step 1) Isolation Check Start

After “POWER ON”, the repeater is checking the status automatically. The Isolation Checking time is a Max. of 10secs and LED’s turn ON/OFF repeatedly.

### Step 2) Internal Parameter Setup

It will be check the controller and set up initial parameters. Both LEDs green

### Step 3) Isolation Value Check between Outdoor and Indoor antennas.

If in step one the Isolation was found to be insufficient the LEDs will turn RED indicating oscillations and the internal amplifiers will be turned off, so the current draw will be reduced.

### Step 4) High power input Checking during operation

When the repeater is working, the signal coming into the unit is being constantly monitored, if the signal is strong the Green LED will start to blink, indicating that the Signal is strong, but if the signal is excessively high then the LED will turn into Blinking RED.



#### **4. Maintenance and Troubleshooting**

In most cases, problems with the Item#18-850 can be diagnosed using the Repeater Unit LED indicators

##### **4.1 Normal Repeater Operation**

The Repeater Unit has two LEDs, marked as D1 and D2 respectively, after the power on self test both the LEDs become GREEN. This indicates normal operation.

If the input signal is strong then the LEDs will start blinking Green. The operation of the unit will not be affected and will be considered normal. Blinking green LED is only an indicator that the signal coming into the amplifier is strong.

##### **4.2 Abnormal Repeater Operation and Troubleshooting**

When the Repeater is powered ON, it runs a self test program. If there are any oscillations on the board the LEDs will stay RED and the amplifier section of the repeater will be turned off to avoid damage to the hardware.

During normal operation the LEDs are either green or Blinking green. If the input to the repeater is very high the LED will start to Blink RED. This indicates that the signal coming into the repeater is too high.

In such a case the repeater location should be changed or the cable length between the antenna and the repeater should be extended in order to decrease the input to the repeater.



**Appendix A**

**Electrical Specifications:**

- Frequency : Uplink: 824-849 MHz and 1850-1910 MHz  
Downlink: 869-894 MHz and 1930-1990 MHz
- Technology : CDMA/GSM
- Max Output Power : 824-849 MHz : +29 dBm  
1850-1910 MHz : +25 dBm
- Dynamic Variable Gain : 824-849 MHz : 50 dB (min) thru 55 dB (max)  
1850-1910 MHz : 45 dB (min) thru 55 dB (max)
- Average Gain : 50 dB
- Absolute Max RF Input : 824-849 MHz : -20 dBm  
1850-1910 MHz : -20 dBm
- Impedance : 50 ohms
- Power Consumption : Standby = 1A @ 5Vdc :: Max 2A @ 5Vdc

**General Specifications:**

- Power Supply : 5 VDC, 3A
- RF Connections : Outside Antenna Port: Type-N  
Inside Antenna Port: Type-N
- Indicator : LEDs shows normal operation and some troubleshooting indications

<b>Shireen Inc Dual Band Repeater LED Functions</b>	
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<b>D1</b>	<b>1900MHz band</b>
<b>D2</b>	<b>850MHz band</b>



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	D1	D2
<b>Red</b>	Oscillations - Unit will turn off	Oscillations - Unit will turn off
<b>Blinking Red</b>	Strong signal coming from Base station: Operation will be unaffected: In order to avoid saturation of the repeater, the Installer can increase the cable length between antenna and dual band repeater, such that the LED indicator on the repeater shows a Green light. It should be noted that the amplifier functionality will not be affected by this and the signal coming in will get amplified. Please see datasheet for max. input and output power settings.	Strong signal coming from Base station: Operation will be unaffected: In order to avoid saturation of the repeater, the Installer can increase the cable length between antenna and dual band repeater, such that the LED indicator on the repeater shows a Green light. It should be noted that the amplifier functionality will not be affected by this and the signal coming in will get amplified. Please see datasheet for max. input and output power settings.
<b>Green</b>	Normal Operation	Normal Operation
<b>Blinking Green</b>	Strong signal coming from the cell phone into the Dual band repeater. This signal also comes up when multiple users are talking over the cell phone; this indication shows activity in the respective band. Cell phone users change their position and talk for a limited time no action is required when such an indication is shown.	Strong signal coming from the cell phone into the Dual band repeater. This signal also comes up when multiple users are talking over the cell phone; this indication shows activity in the respective band. Cell phone users change their position and talk for a limited time no action is required when such an indication is shown.

**Internal LED Software settings\*\***

	1900MHz band	850MHz Band
<b>Blinking Red</b>	When the amplified output of the dual band repeater for the signal coming from the BTS reaches <b>12dBm</b> the Red LED starts to blink indicating a strong BTS signal coming into the dual band repeater.	When the amplified output of the dual band repeater for the signal coming from the BTS reaches <b>20dBm</b> the Red LED starts to blink indicating a strong BTS signal coming into the dual band repeater.
<b>Blinking Green</b>	When the amplified output of the dual band repeater for the signal coming from the cell phone is high the Green LED starts to blink indicating cell phone activity	When the amplified output of the dual band repeater for the signal coming from the cell phone is high the Green LED starts to blink indicating cell phone activity

\*\*these settings can be modified by rewriting the software in the dual band repeater unit. The thresholds used to trigger the LED response are as per common knowledge of cell phone and BTS signal strengths. It is assumed that a high BTS signal indicates possibility that the cell phones will directly communicate with the BTS and hence, a repeater will not be required for that particular location. This will enable the Installer to choose a proper location for the installation of the repeater and provide optimum Indoor to the customer.

**Appendix B**

Block Diagram



# Shireen Inc Dual Band Repeater Amplifier

