

# User Manual

## Wide Tri Band Booster (23dBm)



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Information in this manual is subject to change without notice

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### NOTICE:

SWITCH **AC POWER OFF** BEFORE DONOR AND  
SERVICE ANTENNA CONNECTS TO REPEATER.

## 1 Description

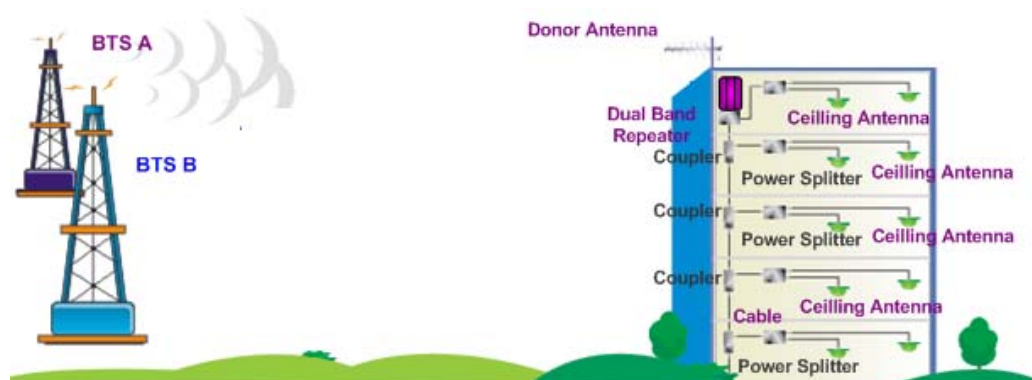
The wide triple band booster (POTRP23) is a bi-directional amplifier used to enhance signals between a mobile and a base station. This repeater type is used for digital telecommunication system:

- 1) -It picks up the strongest signal from BTS via the Donor Antenna,
- 2) -Linearly amplifies the signal and then retransmits it via the Indoor Signal Distribution System to the weak/blind coverage area.
- 3) -And the mobile signal is also amplified and retransmitted to the BTS via the opposite direction.



It is commonly used in the area there are three type of mobile network, such as GSM/ /DCS/UMTS. It will reduce site deployment cost by using one tri band donor antenna, one tri band service antenna, and tri band repeaters in one enclosure.

It is applied to small, medium-size areas such as corporation office, shop mall, bus station, factory etc.



This model booster is commonly used in situations where large numbers of frequency carriers are to be repeated or when base station synthesized frequency hopping is used.

This model booster does not separate out specific carriers but amplify and

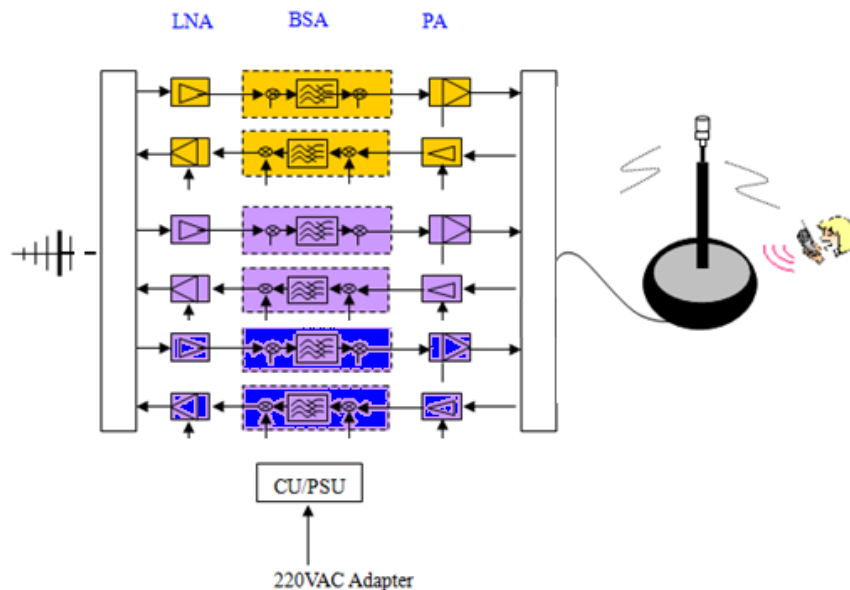
retransmit all signals within a defined frequency band. Inter-modulation distortion caused by band selective repeaters usually means that lower output power per carrier can be realized compared to channel selective repeaters.

## 2 Technical Specifications

		Band A	Band B	Band C
<b>Network(Customized)</b>		<b>GSM900</b>	<b>DCS1800</b>	<b>UMTS2100</b>
<b>Gain</b>	<b>Uplink</b>	65dB	65dB	65dB
	<b>Downlink</b>	70dB	70dB	70dB
<b>Output Power</b>	<b>Uplink</b>	17dBm	17dBm	17dBm
	<b>Downlink</b>	23dBm	23dBm	23dBm
<b>Gain Adjust Scope</b>		MGC≥30		
<b>Gain Adjust Step</b>		1dB		
<b>Gain Adjust precision</b>		0~10dB/±1dB#10~20dB/±1.5dB#20~31dB/±2dB		
<b>Band Ripple</b>		±4		
<b>ALC Scope</b>		20dB		
<b>Frequency Error</b>		≤±0.05		
<b>I/O Impedance</b>		50Ω/N connector		
<b>VSWR</b>		≤2		
<b>Noise figure</b>		≤5		
<b>Spurious Emission</b>		≤-36dBm@9KHz~1GHz/≤-30dBm@1~12.75GHz		
<b>IM3</b>		-40dBc		
<b>Delay</b>		≤0.5μs		
<b>Max Input Power Level(1minute)</b>		-10dBm		
<b>RF Connector</b>		N-Type (Female)		
<b>Temperature Range</b>		Operation: -25°C ~ + 55°C;Storage: -30°C ~ +60°C		
<b>Relative humidity</b>		5~95% RH		
<b>Power consumption</b>		30W		
<b>Power Supply</b>		AC220V		
<b>Power Supply(Customized)</b>		<b>AC220V±10% 60Hz</b>		
<b>Power Supply Socket(Customized)</b>		<b>Connector Type B</b>		
<b>Weight</b>		3.5kg		
<b>Shipment Dimensions</b>		250mm X 300mm X 30 mm		
<b>Shipment Weight</b>		5.0kg		
<b>Indicator</b>	<b>UL LED</b>	- Green flash @ AC power on - Red flash @ output power>25dBm		
	<b>DL LED</b>	- Green flash @ output power>5dBm - Red flash @ output power>15dBm		

### 3 System Diagram

The RF link (donor) towards the base station is typically fed from an outdoor antenna while the coverage area is fed by an indoor antenna

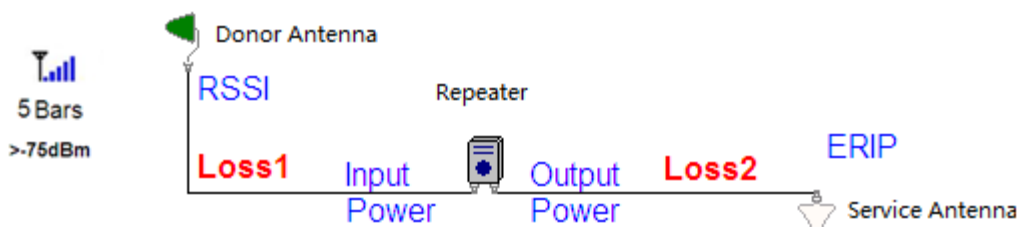


- The signal from the base station is received via the wide **band Donor antenna**, then forwarded through a **combiner filter (QPX)**, is amplified in a **low noise amplifier (LNA)**, and enters the **band selective amplifier board (BSA)**.
- The first mixer stage on the BSA amplifier board, which is controlled by a synthesizer, converts the received frequency down to the IF frequency. The signal is then filtered by an **IF SAW band-pass filter** and amplified before it is fed to the second mixer stage, controlled by the same synthesizer as the previous one, for converting back to the original frequency.
- The output signal from the mixer is then amplified in the power amplifier, which is controlled by the **CU**(Control Unit board).The output signal passes a **combiner filter (QPX)**, before it is fed to the wide **band MS antenna** which retransmits the signal at the same frequency to the aim areas.

#### 4 Product Features

- ❑ High **gain>70dB**, High output power 23dBm
- ❑ Light weight, small dimensions, easy to install
- ❑ Easy set DL/UL gain via local PIN switch manually, Gain adjustment of uplink and downlink; gain adjust step is 1dB and the adjust scope is 30dB.
- ❑ Smart Automatic Level Control (**ALC**) to reduce interference to BTS
- ❑ **Linear** power amplification to effectively suppress inter-modulation and spurious emission
- ❑ An alarm interface with unique **color LEDs** to indicate power supply and signal level of uplink and downlink
- ❑ Simple installation with external **AC/DC adapter**
- ❑ Dual ports and full duplex design

#### 5 Applications Example



$$\text{RSSI} = \text{Min Reception Signal Level} + \text{Donor Antenna Gain} \quad (1)$$

$$\text{Input Power} = \text{RSSI} - \text{Loss1} \quad (2)$$

$$\text{Output Power} = \text{Input Power} + \text{Repeater Gain} \quad (3)$$

$$\text{ERIP} = \text{Output Power} - \text{Loss2} + \text{Service Antenna Gain} \quad (4)$$

##### 5.1 Minimum Signal Levels

It requires a minimum signal level in the place where install the donor antenna. Failure to provide sufficient input signal will only result in a poor coverage inside the building for this repeater system.

To check signal levels, use the phones in the place where antenna be install (on the roof) and observe the signal bars on the phone. The Donor (outside) antenna should be placed in the location where you get the most signal.

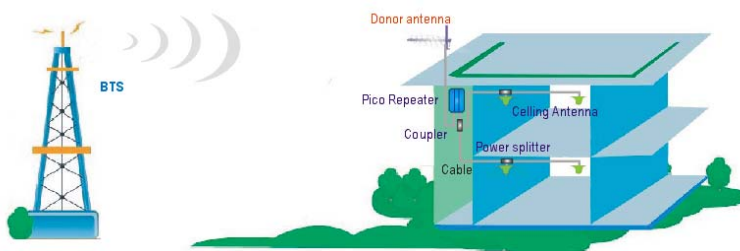


Notices:

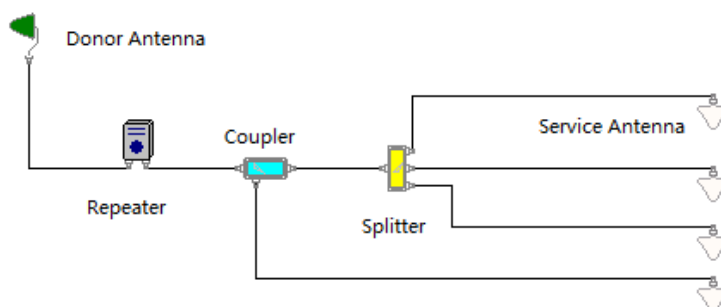
- 1) The donor antenna should have line of sight (LOS) with the BTS antenna. If the signal strength is adequate, LOS may in some cases not be necessary.
- 2) Donor antenna gains are typically 9 to 14 dB, and have a horizontal and vertical beam width of less than 30° to correctly select the donor BTS.

### 5.2 Custom Applications

If building is made of concrete, steel, steel roof, copper roof, brick, aluminum siding, concrete roofing tiles, metal roofing tiles or any other signal stopping material, a repeater is usually the ideal solution for your situation.



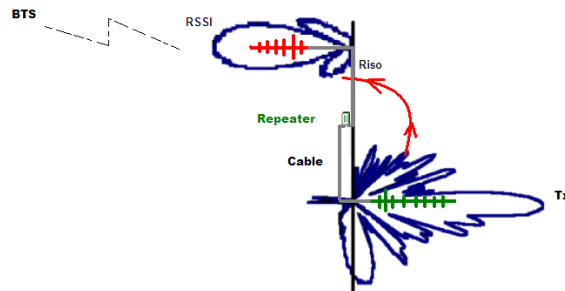
Most homes or buildings are easily covered by one repeater systems. Some buildings are larger or have multiple areas inside that need coverage.



It may need longer cables, more than 2 coverage antennas or other items in order to fully cover your building. We can make (almost) any cable length and can help design a system that fits your application.

### 5.3 Isolation and Separation

Isolation refers to the proper distance or separation needed to keep the Donor antenna signal pattern and the Coverage antenna signal pattern away from each other.



Isolation becomes particularly problematic when Omni-directional antennas are used for both the Donor and the Coverage antennas. Since these antennas transmit in a circle (or more accurately a sphere) it is very easy for these spheres to overlap and thus negate the repeater system.

## 6 Production Operation

### 6.1 Notices

Follow below safety items carefully before installation, implementation, maintenance and operation for this product

- ☞ BS and MS port must be connected to donor antenna and service antenna when powers supply on; otherwise the equipment will be damage for long term use.
- ☞ When use repeater for outdoor, the distance between donor antenna and service antenna must be >20metes, otherwise the repeater will be damage because isolation problem for long term use.
- ☞ Donor antenna need to be lighting proof and lighting rod need to be install for donor antenna installation pole outside
- ☞ Check input power, require input power less than maximum input power of repeater, otherwise the repeater cannot work well.
- ☞ Keep clear for label and indicator on surface of repeater to be identified.



## 6.2 Installation

**Step 1:** Start by taking phone up to the roof or other location outside to find where the signal is strongest.

**Step 2:** Temporarily mount the Donor (outside) antenna in that location. It may need to adjust and move the antenna later.

**Step 3:** Run coaxial cable into the building to a convenient location where you can also get standard 220VAC power for the repeater.

**Step 4:** Place the repeater in that location and connect the coaxial cable to the Donor Side of the repeater and the donor antenna.

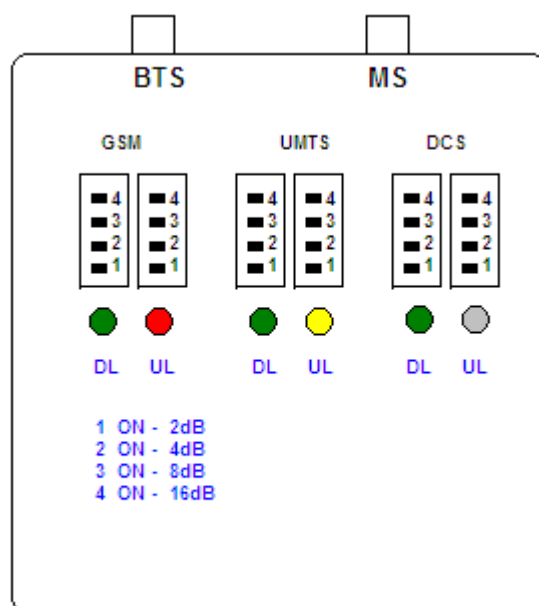
**Step 5:** Mount coverage (inside) antenna in a productive location. It may need to adjust or move the antenna later.

**Step 6:** Connect coaxial cable between the coverage antenna and the repeater output port.

**Step 7:** Power up the system and check for signal inside the building. If needed, tune system by moving and or pointing the Donor and Coverage antennas until get the most signal possible.

**Step 8:** Secure all antennas and cables, securely mount the repeater and clean up the installation

## 6.3 Commissioning



After switch on power supply, please check indication LED as following items.

- You can switch attenuation value by using repeater side switch, If you want to set attenuation 18, you push switch PIN 4 and switch PIN1 on.
- Make sure the repeater full output power LED (Downlink output power) is on when finishes commissioning.
- And set UL ATT> DL ATT+5dB to balance the downlink and uplink and limited the interference to BTS in uplink direction.
- You can change donor antenna direction or installation position to get bigger signal;
- You can set attenuation to add or reduce repeater gain; or you can check cable and connector link status to reduce cable loss and insert loss between repeater and antenna.