User Manual

LTE 4G 850/2600

Wide Dual Band Repeater

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Information in this manual is subject to change without notice

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1 Description

The dual band selective repeater 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 two type of mobile network,. It will reduce site deployment cost by using one dual band donor antenna, one dual band service antenna, and dual 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.

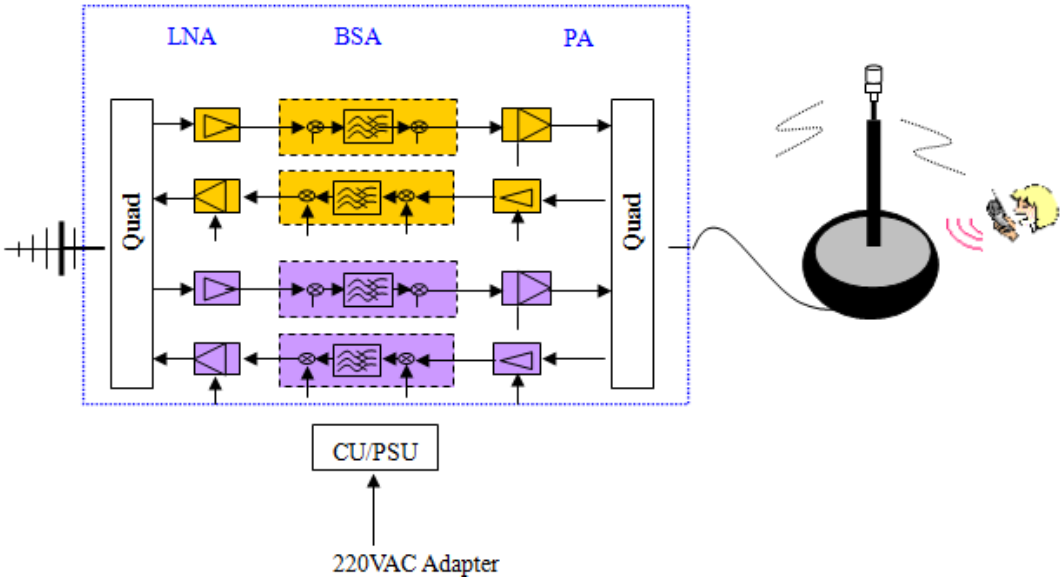
This model booster does not separate out specific carriers but amplify and retransmit all signals within a defined frequency band. Inter-modulation distortion caused by band selective repeaters usually means that lower output power per carrier can be realized compared to channel selective repeaters.

2 Technical Specifications

		Band A	Band B
Frequency		824-849MHz 2600-2570 MHz	869-894MHZ 2620-2690 MHz
Gain	**Uplink**	70±2dB	70±2dB
	Downlink	75±2dB	75±2dB
Output Power	**Uplink**	23±2dBm	27±2dBm
	Downlink	23±2dBm	27±2dBm
Gain Adjust Scope		MGC≥30	
Gain Adjust Step		1dB	
Gain Adjust precision		0～10dB/±1dB#10～20dB/±1.5dB#20～31dB/±2dB	
Band Ripple		±4	
ALC Scope		20dB	
Frequency Error		≤±0.05	
I/O Impedance		50Ω/N connector	
VSWR		≤1.5	
Noise figure		≤8	
Spurious Emission		≤-36dBm@9KHz～1GHz/≤-30dBm@1～12.75GHz	
IM3		-40dBc	
Delay		≤0.5μs	
Max Input Power Level(1minute)		-10dBm	
RF Connector		N-Type (Female)	
Temperature Range		Operation: -25°C ~ + 55°C;Storage: -30°C ~ +60°C	
Relative humidity		5~95% RH	
Power consumption		50W	
Power Supply		AC220V	
Power Supply		AC220/110V±10%　60Hz	
Dimensions		340×220×100mm	
Weight		4.5kg	
Shipment Dimensions		460×280×150mm	
Shipment Weight		5.5kg	
Indicator	**Power Run**	- Green Light on	
	RF Output Power	GRAY @ output power<17 GREEN @ working RED @output power >full output power	

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

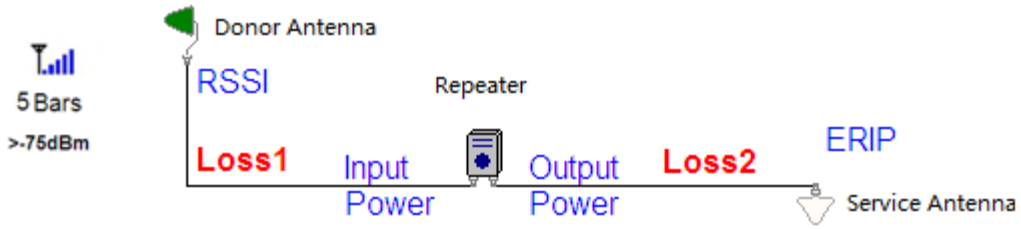


- The signal from the base station is received via the **Dual band Donor antenna**, then forwarded through a **Quad filter (QPX)**, is amplified in a **low noise amplifier (LNA),** and enters the **band selective amplifier board** (BSA).
- The first mixer stage on the BSA amplifier board, which is controlled by a synthesizer, converts the received frequency down to the IF frequency. The signal is then filtered by an **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 **Quad filter** (QPX), before it is fed to the **Dual 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 p**ower 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



RSSI = Min Reception Signal Level + Donor Antenna Gain (1)
Input Power= RSSI - Loss1 (2)
Output Power= Input Power + Repeater Gain (3)
ERIP= Output Power - Loss2 + Service Antenna Gain (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.

5 Bars	4 Bars	3 Bars	2 Bars	1 Bars
>-75dBm	>-80dBm	>-85dBm	>-90dBm	>-95dBm

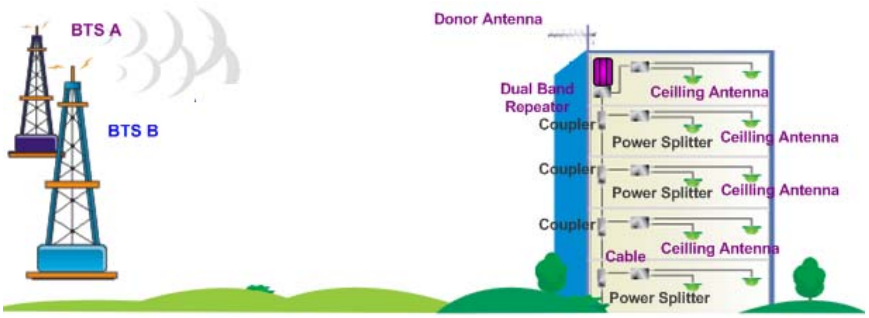
Notices:

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.

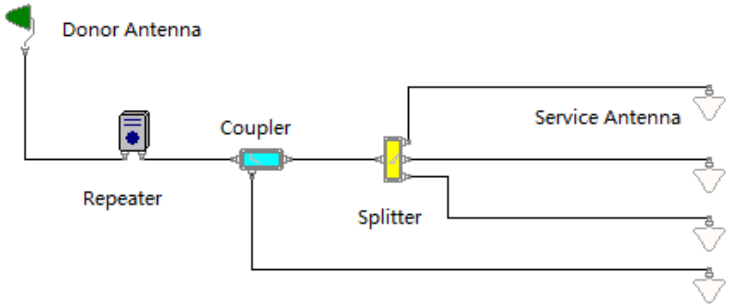
2) Donor antenna gains are typically 9 to 14 dB, and have a horizontal and vertical beam width of less than 30° to correctly select the donor BTS.

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.



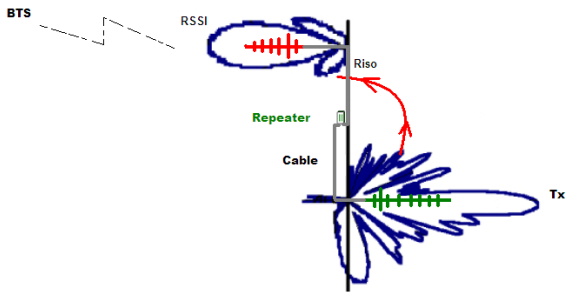
Most homes or buildings are easily covered by one repeater systems. Some buildings are larger or have multiple areas inside that need coverage.



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.

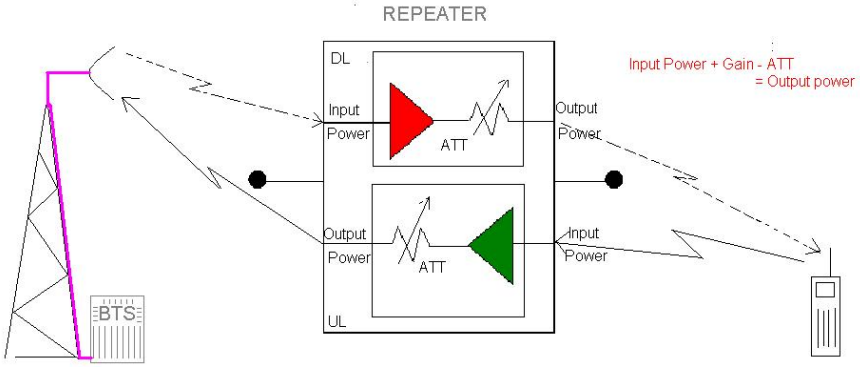
6.3 Commissioning

Item	*Description*	*Usage*
BTS	Connect to Donor antenna	Receive BTS signal source
MS	Connect to Service antenna	Retransmitted signal to target coverage area

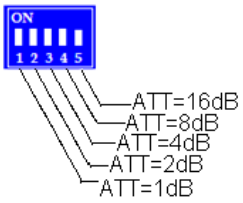
Band A	Left of BTS Side : 850M	Set repeater Uplink attenuation(Low Band)	
BAND B	Right of BTS Side: 2600M	Set repeater Uplink attenuation(High Band)	
DC	Power Supply indicator	LEN ON when DC on(9V~12V)	
DL ATT	Band A/B downlink attenuation	Set Downlink attenuation when DL LED @RED light for each band	
UL ATT	Band A/B uplink attenuation	Set Uplink attenuation when UL LED @RED light for each band	
DL LED	Downlink output indicator	Gray	output<20dBm (lower input signal)
		Green	output >20dBm and output <23Bm
		RED	output >20dBm (in this case , must set attenuation)
UL LED	Uplink output indicator	Gray	output<15dBm (lower input signal)
		Green	output >15dBm and output <23dBm
		RED	output >17dBm (in this case , must set attenuation)

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 switch16 and switch 2 on.
- Make sure the repeater full output power LED (Downlink output power) is on when finishes commissioning. (**For each band : Set DL PIN switches ON until No RED light (only GREEN)**)
- 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.
- For 850/1900 dual band repeater, the donor antenna direction must be adjustment angle by angle, so the dual band input power require good signal at the same time , then 850 and 1900 can work with maximum coverage area and distance.



6.4 DIP SWITCHES

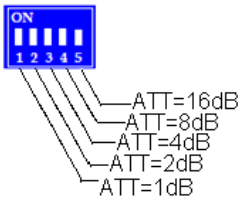


Example:

1 and 2 ON	ATT= 1+2 =3dB
1 and 3 ON	ATT= 1+4 =5dB
1, 4 and 5ON	ATT=1+8+16=25dB
2, 3 and 4 ON	ATT=2+4+8=14dB
1,2,3,4 and 5 ON	ATT=1+2+4+8+16=31dB

There are downlink (BTS site to)DIP Switches (Hi ATT) and uplink DIP Switches (Lo ATT) for single band.

- ON- means Attenuation
- OFF- means no attenuation.



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1, 4 and 5ON	ATT=1+8+16=25dB
2, 3 and 4 ON	ATT=2+4+8=14dB
1,2,3,4 and 5 ON	ATT=1+2+4+8+16=31dB

- Hi ATT are used when BTS signal is acquired is too strong via donor antenna (external antenna), which usual are set to lower gain (higher attenuation), and protect repeater to work at good signal situation (NOT Over-power state).This simply setting way is:
  - Set ALL DIP switch off.
  - Check signal bar of mobile phone in edge of coverage area.
  - Set Attenuation as following table until cell phone make calling is well.

No.	PIN1	PIN2	PIN3	PIN4	PIN15	Att Value
1	ON	ON	ON	ON	ON	31
2	off	ON	ON	ON	ON	30
3	ON	off	ON	ON	ON	29
4	off	off	ON	ON	ON	28
5	ON	ON	off	ON	ON	27
6	off	ON	off	ON	ON	26
7	ON	off	off	ON	ON	25
8	off	off	off	ON	ON	24
9	ON	ON	ON	off	ON	23
10	off	ON	ON	off	ON	22
11	ON	off	ON	off	ON	21
12	off	off	ON	off	ON	20
13	ON	ON	off	off	ON	19
14	off	ON	off	off	ON	18
15	ON	off	off	off	ON	17
16	off	off	off	off	ON	16
17	ON	ON	ON	ON	off	15
18	off	ON	ON	ON	off	14
19	ON	off	ON	ON	off	13
20	off	off	ON	ON	off	12
21	ON	ON	off	ON	off	11
22	off	ON	off	ON	off	10
23	ON	off	off	ON	off	9
24	off	off	off	ON	off	8
25	ON	ON	ON	off	off	7
26	off	ON	ON	off	off	6
27	ON	off	ON	off	off	5
28	off	off	ON	off	off	4
29	ON	ON	off	off	off	3
30	off	ON	off	off	off	2
31	ON	off	off	off	off	1
32	off	off	off	off	off	0

- Lo ATT are used to control interference to BTS network. It is usually set UL ATT= DL ATT+5dB to balance the downlink and uplink.

