



3G UMTS WCDMA

CDMA

GSM

DCS

PCS



# *AnyTone*®

CDMA/GSM/DCS/PCS/3G UMTS WCDMA  
Mini Repeater

## USER'S MANUAL

FC CE ①



*Let Communication Easy!*

## Preface

Thank you for choosing *AnyTone*® series CDMA GSM DCS PCS WCDMA wide band mini repeater. *AnyTone*® series repeater can amplify the signal for the mobile phone, make you keep in touch with others freely even in the places with very weak signal.

As soon as possible for you to manipulate the machine, we were equipped with the detailed user's manual, which you can obtain information about the product introduction, usage, system settings, and security considerations and other aspects of knowledge.

During the writing of this manual, we are very careful and rigorous, but inevitably there will be errors and omissions, please bear with us and welcome your corrections.



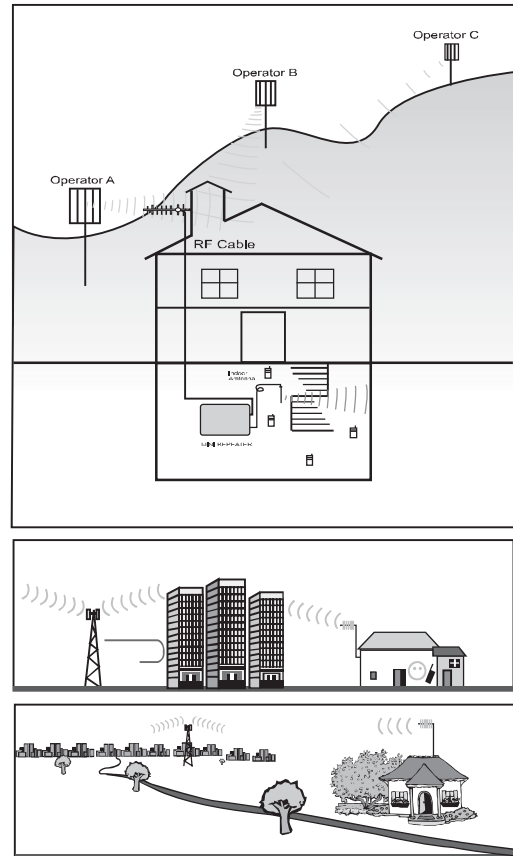
### NOTE

The product meets uplink and down link isolation degree index. Since link isolation degree is influenced by the isolation degree of antenna feeding system (between indoor antenna and outdoor antenna). It requests that antenna feeding system isolation degree should be more than 10dB of mini repeater gain, otherwise it will cause mini repeater internal self-excitation that leads to interfere base station or to destroy mini repeater under serious self-excited conditions.

That is why you should ensure the isolation degree between indoor antenna and outdoor antenna is larger than 80dB when installing the mini repeater, otherwise our company will take no responsibility for any effect caused by improper installation.

■ System Working Sketch	1
■ Summary	2
■ Features	2
■ Standard Accessories	3
■ Optional Accessories	3
■ Working Principle	4
■ Technical Specification	5
■ Getting Acquainted	6
● AT-600Turbo GSM function introduction	6
● AT-6000W 3G/WCDMA/UMTS function introduction	7
■ Installation and Debugging	9
● Preparation before Installation	9
● Installation Process	9
● System Debugging	11
● Attention Items of Installation	11
■ Frequently Asked Questions	12
● Mini Repeater System Self-excitation	12
● Frequent Soft Hand-off ("ping-pong" phenomenon)	12

## System Working Sketch



1

## Summary

With the improvement of people's consumption level, increasing demand and requirement for mobile communications, which requires operators improve the quality of the mobile communication network and expanding coverage.

How to improve the quality of the mobile communication network and expanding coverage, which has become an important issue for operator. Electromagnetic wave sent by mobile telecommunication base station is affected by all kinds of objective factor, such as landform, building, so it could not cover each corner where people may reach. If it only depends on increasing the quantity of expensive base station to solve the problem, it will surely increase enormous operating cost of the operator, especially for areas with little traffic, it also will exert adverse influences on operator's competitiveness. AnyTone mini repeater is used for making up base station coverage area failures, amplifying base station coverage area, filling blind zones. It is mostly fitted for installing in residence community, underground shopping malls, parking lot, supermarkets, hotels, office buildings, subways, tunnels, high buildings, etc. to amplify indoor cell phone signal amplifier. It is the most economical and effective method, which allows your mobile phone call smoothly.

## Features

- Auto night lighting, brings more convenience for people.
- Beautiful, easy to install and cost-effective.
- High Q medium duplexer, medium filter and SAW filter, ensure system isolation.
- With ALC automatic control and reflection protection circuit, avoid accidentally damage.
- MLC output be adjusted to meet different situation's application.
- Full-duplex, double-ports design, internal power supply, safe and reliable.
- Output level display, status clear, operation & maintenance convenient.

## Standard Accessories



A. Mini Repeater



QOAC-02  
B. Outdoor antenna (including 10 meter standard cable, 13dBi high gain Yagi antenna)



QIA-02  
C. Indoor omnidirectional antenna (2.5dB)



QRA-03  
D. Mounting plate

## Optional Accessories



A. 2 way power splitter



B. Combiner



C. Microstrip coupling



D. QX-007B  
5-Meter cable (SYWV-50-5)



E.QX-002B  
ST-XG-9-300/2500/VB  
Gain 7 dBi (824-960MHz)  
9 dBi (1710-2500MHz)



F.QX-003B  
ST-XD-3-600/2500/VB-2  
Gain 3 dBi



G.QX-004B  
ST-XG-9-600/2500/VB  
Gain 7 dBi (824-960MHz)  
9 dBi (1710-2500MHz)



H.QX-001B  
ST-XD-2-600/2500/V4  
Gain 3 dBi



I.QX-001W  
ST-TQWTP-13-08/V8SV  
824-960MHz 890-960MHz  
Gain 13dBi



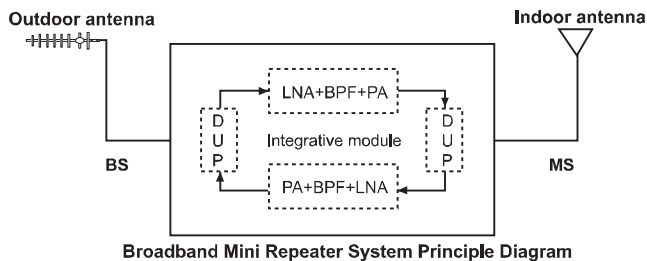
J.QX-002W  
ST-PS-17-900V 824-960MHz  
ST-PS-20-1500V 1.4-1.6GHz  
ST-PS-22-1800V 1.71-1.9GHz

Note: Choose to buy low-waste cable and high gain indoor antenna to strengthen the signal.

## Working Principle

The fundamental of Mini repeater is that outdoor antenna receive the downlink signal from mobile communication base station, through high selective band pass filter to well isolate the out-of-passband signal, after amplifying by integrative power amplifier, then transferred by indoor antenna; meanwhile, on the way of uplink path, signal of mobile phone in the coverage area is transmitted to the relevant base station after disposing by uplink amplifying link path by same working mode. It achieves seamless connection between mobile telecommunication base stations and mobile phone, thus extends the covering range.

sketch map as below :



## Technical Specification

### Mini Repeater specification

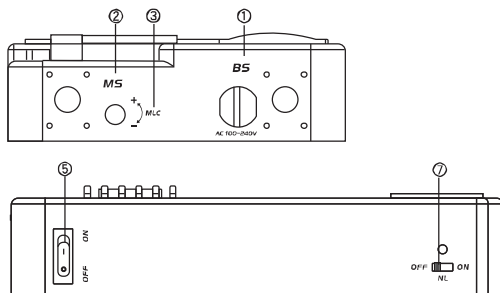
testing items	Up link	Down link
Frequency Range	824-849MHZ	869-894MHZ
	890-815MHZ	935-960MHZ
	1710-1785MHZ	1805-1880MHZ
	1850-1910MHZ	1930-1990MHZ
	1920-1980MHZ	2110-2170MHZ
Output Level	15dBm	15dBm
Gain	50dBm	60dBm
Pass Band Ripple	<5dB	<5dB
Group Delay	1.5 μs	1.5 μs
Out-band Spurious Emission	≤-40dBm	≤-40dBm
Impedance	50 Ω	
Input Voltage	AC 110V~240V	
Rated input current	0.7A max	
Temperature Range	-20℃~55℃	
Working Humidity	5%~95%	
RF Connector	N-50-K	
Dimension	20cm(L)X11.8cm(W)X4.2cm(H)	

4

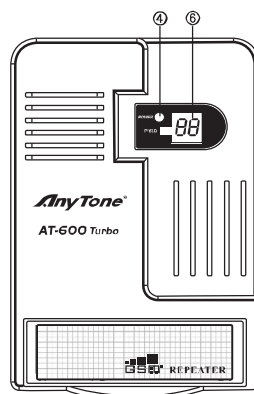
5

## Getting Acquainted

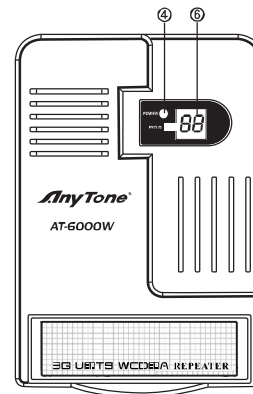
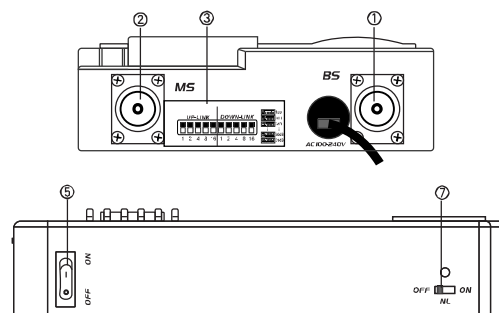
### 1. AT-600Turbo GSM function introduction



- ① **BS**: Connect the outdoor antenna.
- ② **MS**: Connect the indoor antenna.
- ③ **MLC**: Manually level adjustment, the output level is maximum as factory default, adjust clockwise to reduce output level. See details in the common questions.
- ④ **POWER**: Power indicator, lights on when power is on and lights off when power is off.
- ⑤ **Power switch**: turn "ON" to power on and turn "OFF" to power off.
- ⑥ **Output level display**: display the transmitting power in real time. See details in the system debugging.
- ⑦ **Auto Night Lighting**: Switched into "ON" position indicates the light lightens all the time. Switch into "OFF" position indicates it goes out. Switch into "NL" position indicates it stays in auto position, powering on in insufficient light at night and powering off in the daytime.



### 2. AT-6000W 3G/WCDMA/UMTS function introduction



6

7

- ①BS: connect the outdoor antenna  
 ②MS: connect the indoor antenna  
 ③ATT: Dip gain adjustment switch, Switch up to "0", Gain is not attenuate; Switch down to "1", Gain is attenuate. Factory default setting: All switch up, (eg, when switch "1" and switch "4" all down, the corresponding truth table attenuates 5dB)

AT-6000W Gain Regulation Truth Table

Attenuation (dB)	1	2	4	8	16	Attenuation (dB)	1	2	4	8	16	Attenuation (dB)	1	2	4	8	16
1dB	1	0	0	0	0	12dB	0	0	1	1	0	23dB	1	1	1	0	1
2dB	0	1	0	0	0	13dB	1	0	1	1	0	24dB	0	0	0	1	1
3dB	1	1	0	0	0	14dB	0	1	1	1	0	25dB	1	0	0	1	1
4dB	0	0	1	0	0	15dB	1	1	1	1	0	26dB	0	1	0	1	1
5dB	1	0	1	0	0	16dB	0	0	0	0	1	27dB	1	1	0	1	1
6dB	0	1	1	0	0	17dB	1	0	0	0	1	28dB	0	0	1	1	1
7dB	1	1	1	0	0	18dB	0	1	0	0	1	29dB	1	0	1	1	1
8dB	0	0	0	1	0	19dB	1	1	0	0	1	30dB	0	1	1	1	1
9dB	1	0	0	1	0	20dB	0	0	1	0	1	31dB	1	1	1	1	1
10dB	0	1	0	1	0	21dB	1	0	1	0	1						
11dB	1	1	0	1	0	22dB	0	1	1	0	1						

- ④Power: Power Indicator, lights on when power is on and lights off when power is off  
 ⑤power switch: turn "on" to power on, turn "off" to power off  
 ⑥output level display: display the transmitting power in real time, see the details in the system debugging  
 ⑦Auto night lighting: switch into "ON" position indicates the light lighten all the time. Switch into "off" position indicates it goes out. Switch into "NL" position indicates it stays in auto position, powering on insufficient light at night and powering off in the day time

## Installation and Debugging

### Preparation before Installation

#### •Project Reconnaissance Design

- a. Determine mini repeater coverage.

Firstly, locate the outdoor antenna after site reconnaissance. Then install the indoor antenna in the center of the indoor coverage. To achieve better performance, you are suggest to do field intensity prediction, test the gain, output power and antenna model of the repeater. These can support system debugging.

### Installation Process

#### ◆ Design, install and debug antenna feeding system

Antenna, Feeding system and installation are very important parts of mini repeater project, it relates directly to using outcome from broadband repeater. When installation, please pay attention to the distance between outdoor and indoor antenna, installation degree and port VSWR. Cable jamming network should be connected into grounding system.

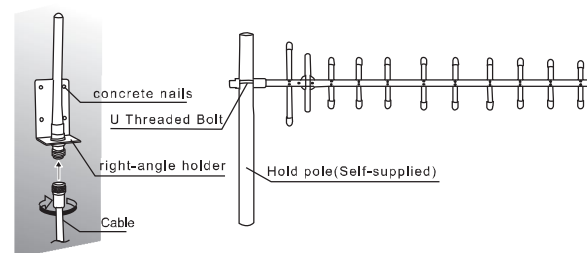
##### a. Indoor Antenna Installation: (Picture 1)

Indoor antenna tight up with the supplied right-angle holder, and fix on the wall with concrete nails.

**Notes: Indoor antenna must be installed in the centre of the coverage.**

Picture 1:

Picture 2:



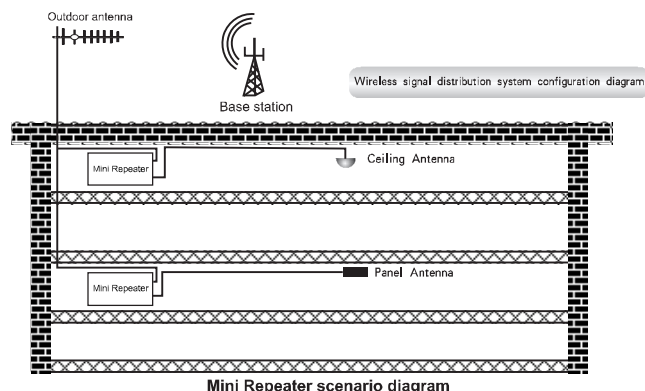
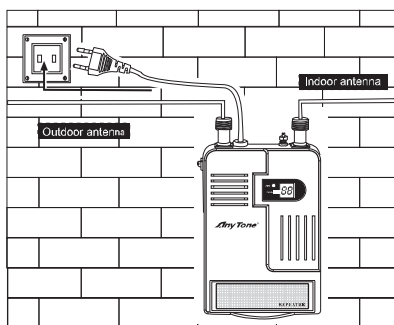
##### b. Outdoor Antenna Installation: (Picture 2)

Install the U Threaded Bolt as shown in the desired location, and then fix tightly.

**Notes: The straight-line distance between indoor antenna and outdoor antenna should be over 10 meter.**

#### ◆ Installation of Mini Repeater

Mini Repeater is easy to install, just fix the mounting plate on the wall with F4 concrete nails, then the device can be hang on the hook.



Connect RF cable and power supply as per the remarks on mini repeater panel, at the same time earth the case of repeater. Connect indoor antenna to MS port, outdoor antenna to BS port. Seal the RF cable joint to avoid rust caused by water

leakage, which resulted VSWR in bad and influence using. Note whether any foreign matter falling into mini repeater or not before powering on repeater.

### System Debugging

- a. Before switching on the power supply, please confirm the AC power input is in standard value. Antenna cable and mini repeater are connected well. Indoor antenna keeps more 10 meters on horizon with outdoor antenna.  
 b. Switching on the power to start the device, the red indicator of power supply on the panel lightening indicates the power has been connected and the repeater has begun working. Outdoor antenna receive signal from the base station, amplified by mini repeater and booster mobile phone signal by indoor antenna, while the output level start real-time detect output signal.  
 c. Output level displayed -20—15dB is normal value, you can adjust the outdoor antenna location, direction, pitch angle, etc. to reach maximum level. In this way the outdoor antenna is in the best condition, then fixed outdoor antenna (Notes: Due to the impact of the antenna by the direction, You have to stay 1-2 minutes on each direction, the repeater can detect the precise parameters.)  
 d. You can use mobile phone to check signal in around of coverage of outdoor antenna. If mobile phone field strength display over three-bar and communicate with outside, it is in good condition, the blind area be solved.

### Attention Items of Installation

- a. Indoor antenna should be installed away from outdoor antenna, at least 10 meters; And the position where is 2m higher than the ground.  
 b. For indoor antenna is omni-directional antenna which can be installed in ceiling and directed the axis vertically to the ground. Please select the proper position to make the signals distributed equally to every corner. If you choose directional flatpanel antenna install in ceiling or wall, put antenna panel directly point to coverage area.  
 c. After all the RF cable has been installed, you should have an overall inspection to prevent open-circuit and short-circuit. Because if the cable happens open-circuit or short-circuit, one part will not be able to work normally under slight damage conditions, but it will destroy main device under worse conditions.  
 d. To prevent affecting signal coverage range caused by oxygenation resulting from moisture, all joints should be sealed by water-resistant adhesive tape, avoiding water leakage into mini repeater through cable causing short-circuit.

## Frequently Asked Questions

### Mini Repeater System Self-excitation

a. The reason of self-excitation phenomena: the isolation degree of antenna is not enough.

b. There are two methods to overcome the self-excitation phenomenon. One is to enlarge the isolation degree between indoor and outdoor antenna, the engineering mainly has the following methods to increase the isolation;

- 1) Enlarge the horizontal and vertical distance of indoor / outdoor antenna
- 2) Add barriers for indoor / outdoor antenna, such as the shielding net.
- 3) Enhance the direction of outdoor antenna, such as paraboloid antenna.
- 4) Utilize landform and building to enhance isolation degree.

The second is to reduce the gain of the repeater

If you can't use above methods to solve self-excitation, you can reduce repeater gain.

1) AT-600Turbo. customers can remove the MLC nut, then adjust with a flat screwdriver. Factory default of gain is maximum, adjust clockwise to reduce gain, there are 270° / 10dB gain to adjust, each 27° adjustment is 1dB reduction. After adjustment, nut must be fixed tightly again.

2) AT-6000W. user can reduce repeater gain by switch of uplink and downlink gain. Adjustment of uplink and downlink should be at the same time, for example: attenuate 5dB in uplink, attenuate 5dB in downlink too.

In addition, equipment failure, poor connection of cable joints which cause high SWR, it also will cause self-excitation. But generally situation occurs rarely. In the installation project, self-excitation is mainly caused by small isolation degree of antenna and feeding system. The simple way to judge whether the device has self-excitation: connect 50Ω load to MS and BS port of repeater. It is OK that level displayed -28dB, or else the repeater exists self-excitation.

### Frequently Soft Hand-off("ping-pong" phenomenon)

It mainly indicates that in the mini repeater coverage area, mobile phone users have been switched repeatedly among two or more pilot frequencies of base station, and usually connect into many base stations at the same time. The reason is the mini repeater antenna are installed improperly; indoor antenna has been installed in the area where the coverage of base stations overlaps, and receives pilot frequency signals from many base stations, the signals have similar intensity and alternately reign. The signal intensities of pilot frequency are still similar after relayed by mini repeater; and it causes mobile phone to frequently switch among many base stations in the coverage areas, it named "Ping-Pong" phenomena.

When the difference of signal intensity of each pilot frequency is less than 3dB, mobile phone connects to two or more base stations at the same time, which makes system

control load to excess or cause over loading. It will increase the possibility of communication cutting and decrease the capacity of base station system. This kind of situation usually presents in mountainous areas, highlands and the city zone with buildings crowded. In order to avoid the "Ping-Pong" phenomena, mainly adopt the following measures in project.

- a. Change the installation location of outdoor antenna and direct outdoor antenna at a base station until get a stable pilot frequency with strong field intensity;
- b. Change the installation position of mini repeater; Don't select the spot in coverage boundary of a certain base station to avoid interference from the adjacent base station;
- c. Select strong directional outdoor antenna, such as high gain & big caliber paraboloid antenna.

The serial number of this product can be found on its body.

You should note this serial number in the space provided below and retain this book plus your purchase receipt as a permanent record of your purchase to aid an identification in the event of theft or loss, and for warranty service purposes.

MODEL NUMBER: \_\_\_\_\_

SERIAL NUMBER: \_\_\_\_\_

We sincerely hope that this manual can bring you convenience! With the development of the technology and the lapse of time, we reserve the right of revision in terms of the standard, technical requirement and all kinds of product specifications referred to in this manual. Please understand if not keeping you informed of the new information.



*Your need  
is our service purpose!*