Preface

We appreciate you selecting the GSM800MHz series signal booster.

The detailed User Manual is attached to this machine so that you can get familiar to operate it as soon as possible, from which you will get the information of product introduction, operation instructions, system settings and safety precautions, etc.

This product is suitable for operation of mobile phones in a weak signal area!

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User Manual of Signal Booster

1. Purpose

As the domestic mobile communication industry develops rapidly, the amount of mobile communications users increases so steadily that the cell planning gets smaller and smaller while the base station positions get lower and lower. On the other hand, as city construction develops, more and more high-rise buildings are set up constantly, based on the shadow effect of the radio propagation, the mobile communications may get a signal blind spot behind or between the buildings. Moreover, in order to avoid interference from adjacent districts, the main lobe of the antenna radiation orientation of the cell mobile communication base station in construction has a bigger down-tilt obliquity, thus the signals usually can not be received effectively in the high and medium parts of the high rise buildings. Furthermore, due to the shield effect to electro-magnetic waves caused by buildings, the mobile communication signals cannot be received in tunnels, subways, underground stores, entertainment complex, parking fields, hotels, office buildings and other large-size and closed buildings.

Signal amplifier is an effective device that makes up the insufficient base station coverage in the mobile network, enlarges the coverage area of the base station and fills in the blind spots, which adopts double-ended duplex design and external power supply with advantages of convenient mounting and high reliability. The bandwidth of the signal amplifier may cover 800MHz with compatibility between digital system and analogue system.

2. Technical features

● High system gains

● Full duplex and double-end design, external power supply, and convenient installation

● ALC technology with auto-steady function adopted.

● Provide power indication and uplink and downlink indications.

● With the amplified linear power, the intermodulation and spuriousness are suppressed effectively.

● The reliability conforms to GB6993-86 standards.

● The electromagnetic compatibility conforms to ETS300 609-4 standards.

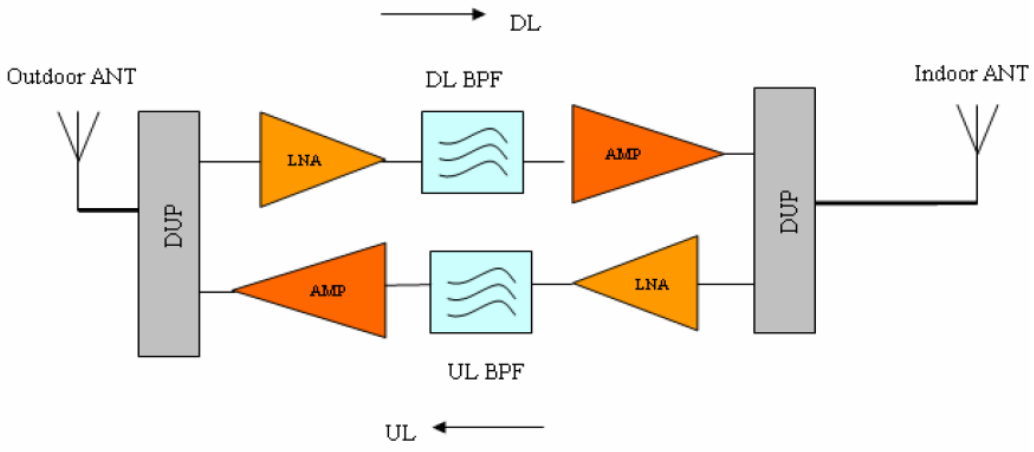
3. Technical specifications

Frequency Range	Uplink: 824 - 849MHz, Downlink: 869 -894MHz
Model	PS-170
Output Power	20±1dBm
Gain	UL: 65±2dB, DL: 70±2dB
Ripple Pass Band	≤6dB
Noise Figure	≤6dB
Group Delay	≤5μs
ALC Range	≥ 20dB
VSWR	≤1.8
Spurious Emission	9KHz--1GHz: ≤-36dBm/100KHz 1GHz--12.75GHz: ≤-30dBm/1MHz
Inter-modulation	≤-40dBc
Other Specification	
I/O Impedance	50Ω
RF Connector	N-Female
Operation Temp.	-10 - +50 ℃
Humidity	≤95%
Dimensions Approx.	200×120×30mm
Weight Approx.	1.5kg
Power Supply	AC:100V-240V, 50-60Hz DC：5V- 3A

4. System structure

A simple signal amplifier system is composed of a host signal amplifier,reverse antenna and in-door covering system. Reverse antenna aims at the reverse base station that requires for expanding the coverage, the BTS Port of the host signal amplifier is connected with reverse antenna and User's Port is connected with in-door covering system. As shown in the following diagram, firstly, the indoor signals introduced by the signal amplifier are divided into two-way signals by splitters, then each signal is distributed two antennas through a coupler with the power distribution ratio equal to circuit exhaust ratio so as to ensure both of the antennas to obtain equal power (splitter and coupler may can be configured flexibility). It shall be attached importance that at least 15dB of the isolation shall be bigger than the plus between reverse antenna and covering system for meeting the requirements of C/I≥15dB of the 800MHz system.

System structure diagram



5. Operation instructions

5.1. Descriptions of the overall dimension of the equipment

The whole-set shape is shown as follows:

Indication Specification:

A. OUTDOOR: to be connect outdoor antenna.

B. INDDOOR: to be connect indoor antenna.

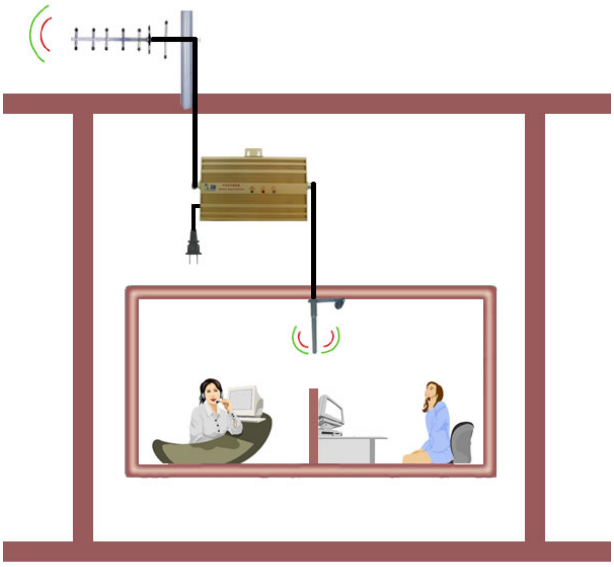
C. POWER: when normal working, power status is green.

D.UL / P: when normal working or calling, up link status is red.

E. DL / P: when normal working, down link status is red.

F. DC+5V: power supply

5.2 Instructions on installation



1. Firstly, select an appropriate position to mount. The signal booster is better to be mounted close to walls. At the position selected, punch a hole in the wall as shown in the diagram and aim the bolt at the hole. Then fasten and fix with expansion bolts.

2. Connect the Outdoor ANT Port with out door reverse antenna through radio frequency cable. In general, the reverse antenna is mounted at a higher position. Yagi antenna and panel antenna may be used. The main lobe of the antenna radiation is oriented towards the base station and the reverse antenna and base station antenna should be visible as possible.

3. Connect Indoor ANT Port with the ports of indoor covering system or indoor relay antenna. In general, the indoor covering system is composed of several splitters, couplers, expansion amplifiers and antennas and applied as per specific engineering design for the purpose of satisfying the signal covering demands in large area or complicated terrain indoor space. In the case of small area indoor space, the requirements for covering can be satisfied by using single relay antenna with the option of hanging antenna or ceiling antenna.

4. Finally, connect the power interface shown as in the diagram to 5V3A power adapter and power on the adapter with 110-220v AC. The signal amplifier installation is thus completed.

NOTE: The product needs to install in the room. It needs to fix by screw on the wall without covering, keep 1.5m from the floor; Keep 4m distance from the mini booster.

5.3. Debugging and commissioning

1. Power on with 110-220V AC at the premise of no fault being found in inspection. The glowing indicator light shown as in the above diagram is means the power supply works normally.

2. If the reverse antenna is mounted correctly, the Downlink power indicator light should be on. In this case, the covering area of the equipment shall be larger than that in the technical specifications.

3. If the required covering area is too large and the Downlink power indicator light is off after powering on, it means that the input power is not sufficient and the position of the reverse antenna should be adjusted to receive more strong downlink signals.

4. When the debug is completed, select more than 20 points in the covering area to test the signal level and talking effect of the mobile phone. It should be ensured that the signal bar shall be fully filled with strong signal in 90% of the covering area, and less than 5% of the covering area can have two signal bars. Meanwhile talking clearly and no interruption occurs.

5. Switch off and then power on, check whether it is normal. Then test with mobile phone, the working state shall remain same as the original. Keep it running for one to two hours around for further test.

6. Recheck the whole system and clean up the working site.

7. Record the work and fill in the Engineering Records Form in details and make the archives as well.

Notice:

1. The signal amplifier must be put into operation as per the above mentioned steps strictly.

2. Ensure safety of the equipment and personnel. Be sure that there is no connection fault before powering on.

3. Well Record the process and any fault shall be reported.

5.4 System maintenance

The strict power supply protection and power protection measures in the design of the signal amplifier assure high reliability of the equipment. When it is put into operation, rarely is manual maintenance required. But for assuring the high reliability of the communication in the covered area, it is recommended to check them half a year regularly, which shall include:

1. Check the reverse antenna system: find out if the antenna orientation or position is changed, or if the bolt is unfastened or loosened.

2. Check the indoor covering system: find out if the lines are removed or if the fixed devices are loose and if power is well connected. Remove the potential hazards as early as possible, if any.

3. Check transmitting power: find out if the panel indicator lights of the signal amplifier are working normally. The power indicator light should be on and the Uplink and Downlink power indicator lights should be on as well.

4. Timely remove the malfunction if any. Record the maintaining process and fill in related forms.

6. Descriptions on maintenance

6.1. Faults

1. When 110-220V AC is connected, the power indicator light is not on.

2. The power supply is normal, but the Uplink and Downlink power indicator lights are not on even with the signals received.

6.2. Troubleshooting

1. When the AC 110-220V is powered, the power indicator light is not on. Firstly, check if the AC socket is in good conditions and then check if the 110-220V power is in the normal state with a multimeter at the voltage of AC 220V.

2. If the power supply is confirmed to be normal and the signal is applicable, the Uplink and Downlink power indicator lights are not on, check if cables are correctly connected, and if the position and orientation of the antenna are appropriate.

3. The above-mentioned check methods are mainly applied for jobsite maintenance. In general, only a multimeter is used instead of large size instruments. Please contact the manufacturer if the malfunction still cannot be removed after implementing the above-mentioned methods of 1 and 2. HP8713C network analyzer may be used for testing in the process of maintaining in the labs or production plants. Different malfunctions shall adopt different methods

6.3 Optimization & troubleshooting

Question 1: Low Rxlev (Received Signal Level) in the coverage
Q: Rxlev of outdoor signal is low.
A: Use the testing mobile or spectrum analyzer to find a place and direction where Rxlev is strong. Outdoor antenna need be line-of- sight from outdoor antenna.

Q: Outdoor antenna or cable connecting outdoor antenna to booster is damaged.
A: Check VSWR of the antenna and cable. The standard is lower than 1.5. And then check the Rxlev of signal entering into the booster.

Q: Booster's gain setting is low.
A: Check and set the booster's gain through OMT. Or choose new one high gain booster.

Q: Booster's frequency has been changed.
A: Check and set booster's working frequency through OMT.

Q: Cable or passive components of the coverage system are damaged.
A: Check VSWR of the coverage system.

Question 2: Bad Rxqual (Received Signal Quality) in Coverage
Q: Rxqual of outdoor signal is bad.
A: Connect the outdoor antenna with testing mobile to find the suitable place and direction where Rxqual is better than 3.

Q: Pilot channel pollution, which means more than two outdoor signals with similar Rxlev exist inside the coverage.
A: Adjust outdoor antenna to make sure the Rxlev of primary BCCH is at least 6dB stronger than secondary BCCH. Make sure the outdoor antenna is installed lower

than 8F.

Q: Cable connecting with outdoor antenna and booster has been damaged.
A: Test the VSWR of that cable. The criteria of booster project is VSWR ≤ 1.5.

Q: Self-oscillation occurs. The AGC alarm of the booster will be flickering. It can be observed that the Rxlev is fluctuating, and Rxqual is deteriorated inside the coverage.
A: To solve this problem, test the isolation at first, and then set the gain to be at least 15dB lower than isolation value.

Q: Interference exists inside the coverage
A: Connect spectrum analyzer with 0dBi antenna to check the signal condition inside the coverage before and after coverage. Compare the test results to see whether interference exist or not.

Question 3: Low "make call" successful ratio inside the coverage.
Q: Outdoor BTS hasn't enough capacity.
A: Consult with the operator or re - select the outdoor signal.

Q: BTS noise floor is increased.
A: Test and set booster's UL gain properly. Make sure UL noise floor reaching BTS is lower than -121dBm.

Q: Unbalance between uplink and downlink.
A: Reset the gain, and make sure UL gain is lower than DL gain no more than 10dB for indoor coverage, and 5dB for outdoor coverage.

Q: Interference exist inside the coverage.
A: Check the signal inside the coverage by spectrum analyzer.

Q: Self-oscillation occurs. In this condition, the Rxlev fluctuates while the Rxqual is deteriorated.
A: Test isolation, and set the gain to be 15dB lower than isolation.

Question 4: Call drop occurs rapidly in coverage area
Q: Self-oscillation occurs
A: Test isolation, and set the gain to be 15dB lower than isolation.

Q: outdoor signal handover frequently
A: Use the mobile phone to re-select the outdoor signal: make sure that primary BCCH must be 6dB higher than secondary BCCH.

Q: Outdoor BTS problem
A: Re-select the outdoor BTS.

Question 5: Low handover successful rate in coverage
Q: Handover hasn't been defined between outdoor cell and neighboring cell.
A: Consult with operator to define handover between outdoor cell and neighboring cell.

Q: Interferences exist.
A: Check the outdoor signal, to see whether outdoor signal has been interfered or not. And then check whether interference exists inside the coverage or not.

Question 6: Signal Leak in coverage area
Q: Unreasonable design.
A: Take the method,more antennas with lower output power , to make the coverage. In indoor coverage, make sure each antenna's input power is less than 15dBm.

Q: Indoor service antenna is close to the window.
A: Move the Indoor service antenna away from the coverage edge. Another solution is use the directional antenna to send the signal from outside to inside to make coverage.

Q: Service antenna's output power is stronger than required value.
A: Decrease the service antenna's output power to be as low as possible when coverage requirement is enough.

Q: Surrounding has been changed.
A: Make site survey and re-design the project.

Service is forever

This User Manual concerns the signal amplifier product series of our company. Some omissions are inevitable due to insufficient preparing time. For any question, please contact us for correction. We are ready for reply and serve you wholeheartedly.

We sincerely hope that this User's Manual will bring you convenience, the changes of the standards, technical requirements or varieties of product dimensions involved in this User Manual may result in revision without notification to you as technology develops and time goes by.

Packing list

Materiel	Quantity	Confirm
Signal Booster	1	
Power Supply	1	
User Manual	1	

FCC Caution:

This equipment complies with FCC radiation exposure limits set forth for uncontrolled environment .This equipment should be installed and operated with minimum distance 20cm between the radiator& your body.

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.