User Manual

HiBoost Hi13-23

Single band and dual band consumer boosters
10 - 27dBm power range

MADE IN HUAPTEC

Table of Content

Preface

This user manual describes design, installation, commissioning and maintenance of Hiboost wide band consumer single and dual band boosters.

Please, read user manual carefully before installing and maintaining the boosters. The information in this manual is subject to change without prior notice. Opinions are welcomed about the manual improvement.

Note: This User Manual is about standard Huaptec consumer booster selection. Other models can be obtained upon request.

Safety Warnings

Users must follow the principles stated below:

Booster should follow system requirements of mobile signal enhancement equipment, assure good grounding and lightning protection.

Booster's power supply voltage should meet the standards of security requirements; any operation should be carried out only after cutting off power in advance. Only the professional is authorized for the operation.

Do not dismantle machine, maintain or displace accessories by yourself. In this way the equipment can be damaged and you can even get an electric shock.

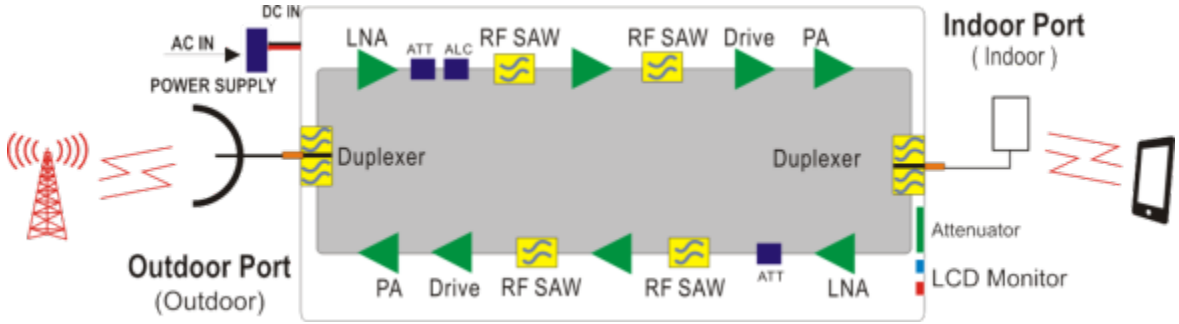
Do not open the booster, touch the module of booster, or open the cover of module to touch the electronic component. The components will be damaged due to electrostatic.

Keep away from heating equipment, because the booster will dissipate heat during working. And do not cover booster with anything that influences heat-dissipation.

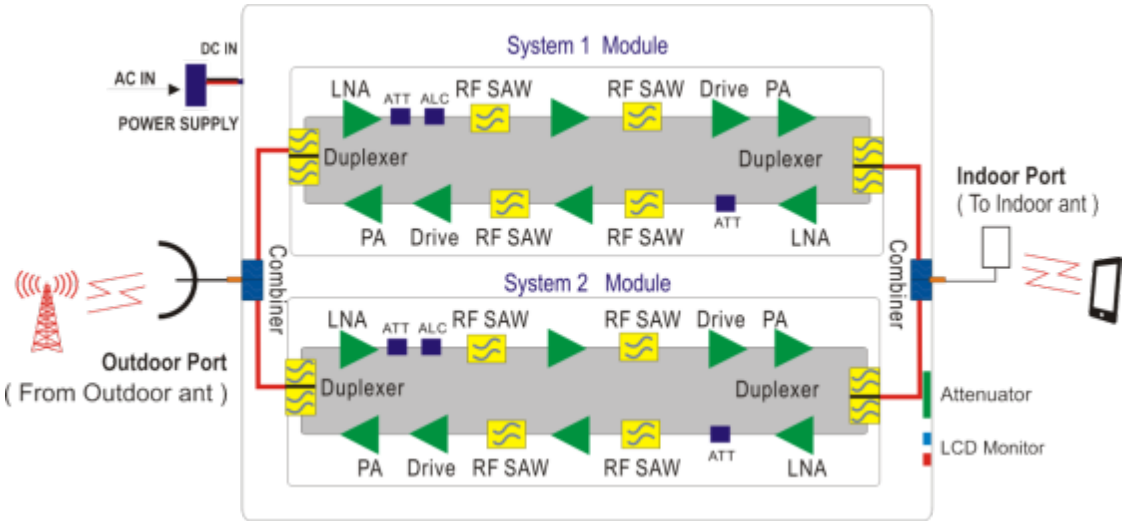
Overview

Hiboost single and dual band consumer boosters are designed to help mobile users to amplify weak cell phone signal.

The devices are bi-directional. The outdoor antenna receives the signal from the cell tower and transmits it to the signal booster, the booster amplifies the signal and the indoor antenna sends it to your mobile device. Visa versa, the signal produced by your phone is also received by the indoor antenna, amplified by the booster and then sent back to the cell tower through the outdoor antenna.



Single Band Booster Diagram



Dual Band Booster Diagram

Glossary of Terms

Item	Definition
800	Available on LTE800(832~862MHz/791~821MHz) network
900	Available on EGSM900(880~890MHz/925~935MHz) and PGSM900(890~915MHz/935~960MHz), WCDMA/UMTS900(880~915MHz/925~960MHz) networks
1800	Available on GSM/LTE1800(1710~1785MHz/1805~1880MHz) networks
2100	Available on 3G(WCDMA/UMTS2100) (1920~1980MHz/2110~2170MHz) networks
2600	Available on LTE2600(2500~2570MHz/2620~2690MHz) network
RF	Radio Frequency
ATT	Attenuation
ALC	Automatic Level Control
AGC	Automatic Gain Control
MGC	Manual Gain Control
LNA	Low Noise Amplifier
PA	Power Amplifier
dB	Decibel
dBm	Decibels relative to 1 milliwatt
UL	Uplink
DL	Downlink
Hz	Hertz
MHz	Megahertz
NF	Noise Figure

Package Contents

Single band packing list

No.	Name		Description	Quantity
1	Hiboost single band booster		N-female	1
2	Adapter		5V/3A	1
3	Plastic expansion bolt		Φ6	5
4	Tapping screw		M4*25	4
5	Hanging folder		51*68*1.5mm H5.5mm	1
6	User Manual			1
A booster kit includes the following kit accessories:				
7	Hi13 Kit	Outdoor panel antenna		1
		3D-FB Cable	50 feet, N-male	1
		Whip Antenna		1
	Hi17, 20, 23 Kit	Outdoor panel antenna		1
		5D-FB Cable	35 feet, N-male	1
		Indoor panel antenna		1
		5D-FB Cable	15 feet, N-male	1

Model	Standard Package Contents	Additional kit accessories
Hi13 Single Band Kit		
Hi17 Single Band Kit		
Hi20 and Hi23 Single Band Kits		

DualBand Packing List

No.	Name		Description	Quantity
1	Hiboost dual band consumer		N-female	1
2	Adapter		12V/3A	1
3	Plastic Expansion bolt		Φ6	5
4	Tapping Screw		M4*25	4
5	Hanging folder		51*68*1.5mm H5.5mm	1
6	User Manual			1
A booster kit includes the following kit accessories:				
7	Hi13 Kit	Outdoor panel antenna		1
		3D-FB Coaxial Cable	50 feet, N-male	1
		Whip Antenna		1
	Hi17, 20, 23 Kit	Outdoor panel antenna		1
		5D-FB Coaxial Cable	35 feet, N-male	1
		Indoor panel antenna		1
		5D-FB Coaxial Cable	15 feet, N-male	1

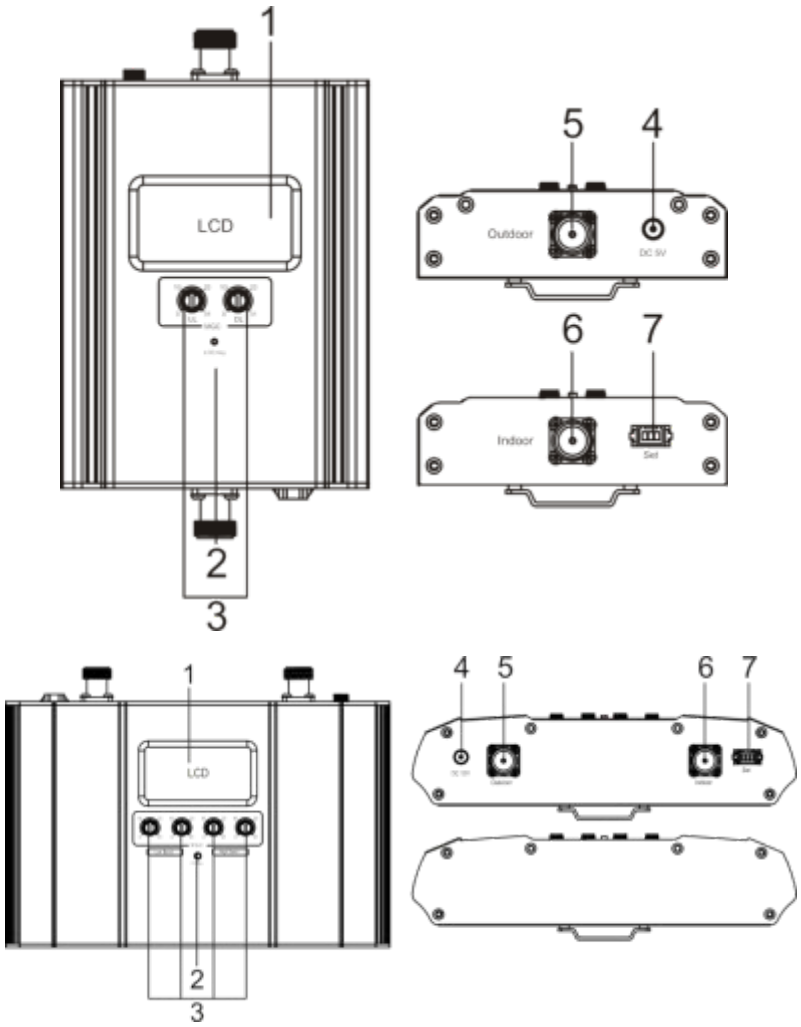
Model	Standard Package Contents	Additional kit accessories
Hi13 Single Band Kit		
Hi17 Single Band Kit		
Hi20 and Hi23 Single Band Kits		

If you need to add more indoor antennas or other accessories, please, contact Huaptec Support Team on the phone **044-20-32395808** or by e-mail **sales@huaptec.eu**.

Features

- Embedded CPU, self-adaptive intelligent system very easy to use and install, better performance is guaranteed even under complicated and constantly changing RF environment conditions.
- ISO: Intelligent isolation processing to avoid self-oscillation, quite wide adjusting range to stabilize the signal strength/quality for clearer voice/ higher data speed and avoid interference with mobile networks.
- ALC: Intelligent automatic level control, quite wide adjusting range to stabilize the output power and improve the signal quality for clearer voice and higher data download speed.
- LCD Display: Displays ISO status, ALC status, actual gain and downlink output power which makes booster installation and troubleshooting much easier.
- MGC: Knobs to adjust the gain for both uplink and downlink independently, 31dB range.
- Excellent RF performance, larger coverage area, clearer voice and higher data download speeds.
- Elegant design, compact size, very low power consumption to minimize cost during operation and low heat dissipation.

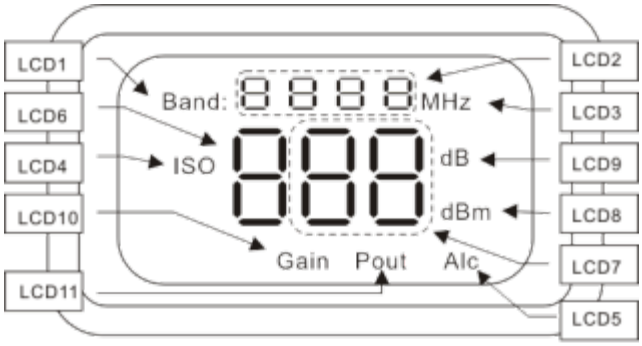
Booster's Port Description



1.LCD 2. Control button 3.Gain control knobs 4.Power connector

5. Outdoor antenna port6.Indoor antenna port 7.Set

LCD Introduction

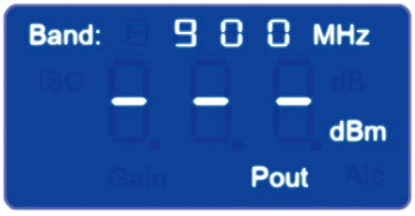


LCD1/LCD2/LCD3: Display area of working frequency.
After the repeater is on, LCD1 and LCD3 will light all the time.
LCD 2 displays the working frequency. Find below the list of frequencies displayed corresponding to the networks supported by the booster.

Frequency	LCD2 display
LTE800	800
EGSM&UMTS900	900
GSM&LTE1800	1800
WCDMA2100	2100
LTE2600	2600

LCD4: "ISO" isolation alarm indication.
When the repeater doesn't have enough isolation between the outdoor and indoor antennas, the "ISO" is flashing. When isolation is enough, the "ISO" is off.

LCD5:"Alc"strong receiving power alarm indication.
When the repeater's receiving too strong signal from outside, output power gets overrated and "Alc" starts flashing. When output power is balanced, the "Alc" is off.

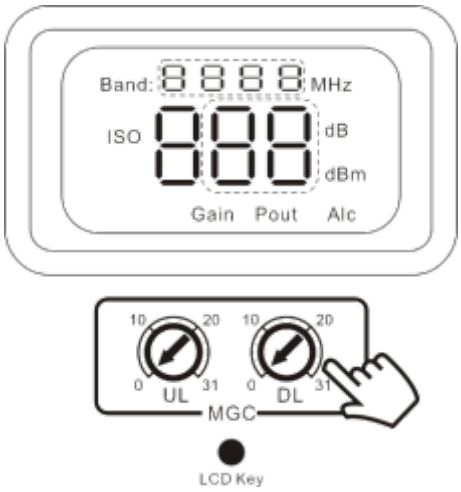


LCD6: Displays"-" if the output power is negative,
LCD7: Gain or power indication.
The displayed value shows real-time gain and power in turn. When repeater's output power is lower than-10dBm,LCD6 and LCD7 will display "---".

When LCD screen is in "OFF" state and the repeater shuts down, LCD screen will be flashing.

When LCD screen is "ON" and the repeater shuts down, LCD6 and LCD7 will display "OFF" under the current band.

Control Button Operation



To start the operation mode press ”LCD key” once.

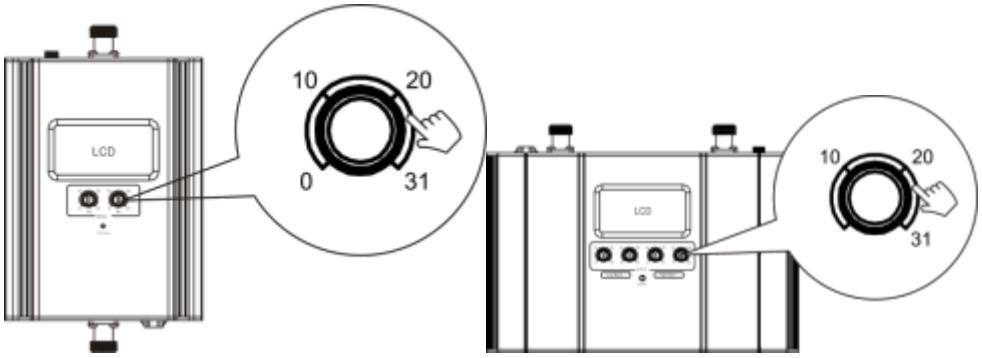
When LCD is in the circular display mode (displays gain and output power values in turn each 30 seconds), press ”LCD Key” shortly and it will stay in the current status. Press ”LCD Key” within 30 seconds and LCD will switch to the next status.

If you don’t operate LCD key within 30 seconds, LCD will return to the circular display mode.

If you don’t operate LCD key within 5minutes, LCD screen will go to ”OFF” state. Press any key and LCD will return to circular display mode.

Manual Gain Control (MGC)

Since the booster has intelligent software system, MGC attenuation is not needed, except for the cases when you don't feel comfortable about ISO or ALC flashing, or in some extreme cases you might need to attenuate gain value.



- 0~270 degree of MGC knob means 0~31dB
- Spin clockwise to reduce booster's gain, spin anticlockwise to increase booster's gain.

Note: In case you need to adjust gain, please ensure uplink gain to be equal or5dB less than downlink gain. Uplink gain shouldn’t be more than downlink gain in order to avoid interference with mobile network.

Install Hiboost Booster System

Before You Install

• Make sure you have sufficient cable length between the outdoor/indoor antennas and the booster in case you have not a standard kit

• Make sure the place where you install the booster is near to one existing electrical outlet. It should also be well ventilated, away from excessive heat, moisture, and direct sunlight.

Installation tools and accessories:

No.	Name	Specification	Quantity	Remark
1	Plastic expansion bolt	Ø6	5	Standard accessories
2	Tapping screw	M4*25	4	Standard accessories
3	Hanging folder	51*68*1.5mm H5.5mm	1	Standard accessories
4	Reciprocating drill		1	Provided by engineer
5	Shot bit	Ø6	1	Provided by engineer

Installation Overview

Installation is easy to perform even without professional assistance in 4 simple steps:

Step1. Fix the outdoor antenna in some high point outside your house where you can gain best signal reception (e.g. on the roof, outside the window, etc.).

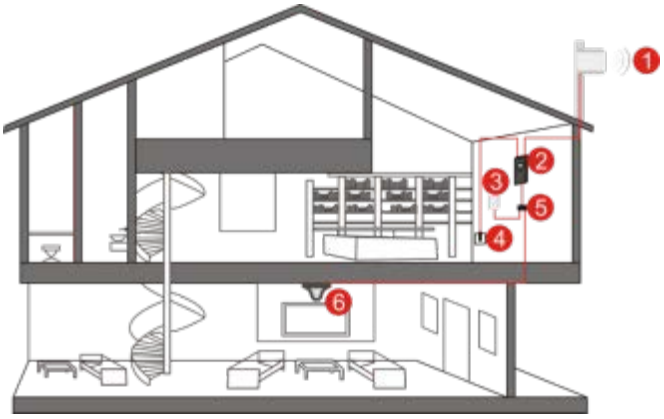
Step2. Mount the indoor antenna where you need to improve poor signal.

Step3. Install the booster inside your area and connect it to antennas through the cables.

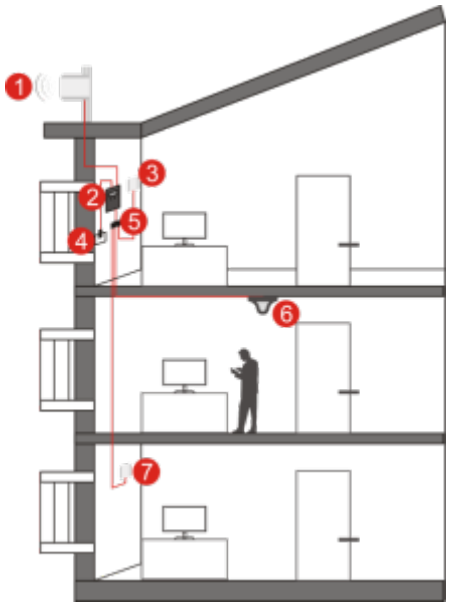
Step4. Plug in the booster to a power supply and self-adaptive system will automatically adjust best performance in 30 seconds. ***(NB! Before you plug it in, make sure all the cables are connected firmly!)***.For more details refer to "**Booster Commissioning**".

Booster System Installation Examples

Studio apartment



Duplex house



Multi-storey building

1. Outdoor Antenna 2.Booster 3.Indoor Panel Antenna 4.Power Supply

5. Splitter 6. Omni Ceiling Antenna 7.Indoor Panel Antenna

Step 1. Install Outdoor Antenna

1.1 How to find the place with the strongest receiving signal

The booster's main function is to improve weak RF signal inside a house, office or any other indoor area. The receiving strength of the outdoor antenna and the strength of the signal reception outdoors directly affect the efficiency of indoor coverage. That's why it's crucially important to install the outdoor antenna in the point where signal reception is the strongest.

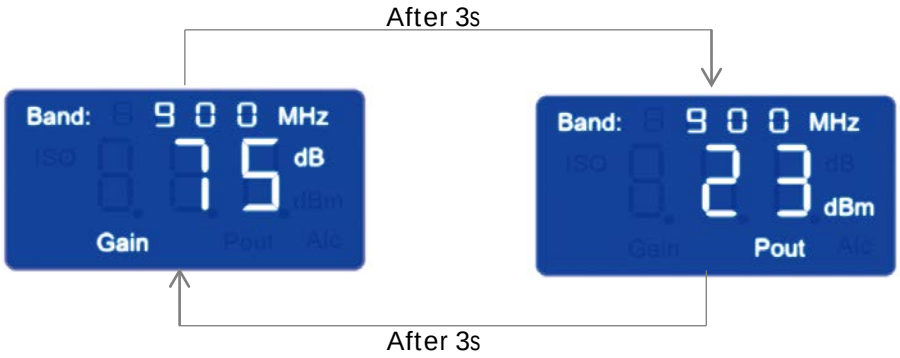
There are two methods to find the strongest receiving signal. One is to use booster's LCD display, the other is to use mobile phone to test signal bars. We'd highly recommend you to use LCD display as this method is more accurate.

- **LCD Display Method**

Connect the outdoor antenna to the booster's outdoor port with an original coaxial cable that comes in a kit and power on the booster. Fix the outdoor antenna outside the window or on the top of the building and point it to the nearest cell tower. Then have a look at output power value displayed on LCD.

The outdoor antenna receives the strongest signal when the booster's output power reaches it's full value. The place where you can reach it is the best to mount the outdoor antenna.

The booster's LCD display shows the gain and output power in turn every 3 seconds. The output power can be checked when "Pout" value in dBm is on LCD display. Please see the example below:

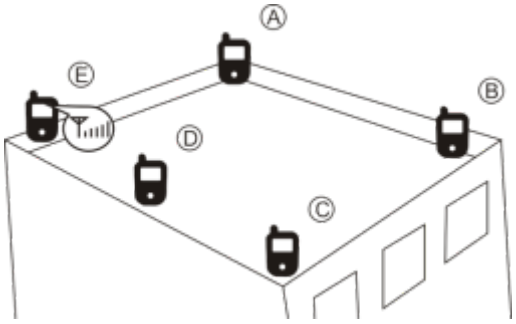


You can always press "LCD key" so that the LCD will stay in the output power mode, and in case it is dual band, you can press "LCD Key" to switch to another band's output power display.

Remark: when Alc shows up flashing, it means the receiving signal power is stronger than the system needs it. It is recommended to adjust outdoor antenna position unless Alc alarm disappears. Or you can leave it as it is to let the booster self-adjust automatically. However when Alc flashes, and the displayed gain is more than 30dB less than rated gain value, try to adjust outdoor antenna to decrease the receiving power.

- **Mobile Phone Method**

You can use telephone to test signal strength near the window or on the top of the building. The number of bars on network indicator will define approximate strength of the received signal. Normally the roof of the building is the best place to receive the strongest signal. As shown on the graph below, you need to test the signal in points from A to E, and select a place with best signal strength for outdoor installation. It is recommended to use mobile app that can display signal level, since it is more accurate than checking signal bars.



More tips: Please try to pick up signal from cell towers that are not so busy, which can be estimated by the population density in the area served by this tower. It's also recommended to avoid a cell tower near a supermarket, shopping mall, stadium and any other public place visited by many people regularly. It will facilitate successful phone call connections and higher data speed services.

1.2 Install Outdoor Antenna

In most cases panel antenna is the best choice. You can also choose a wide-band Yagi antenna as an option.

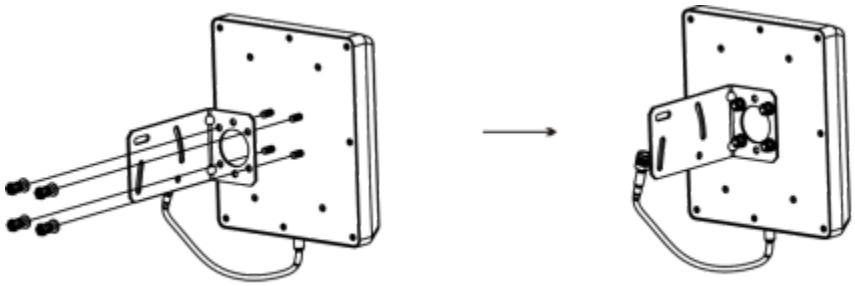
Pole mounting is recommended for your convenience:

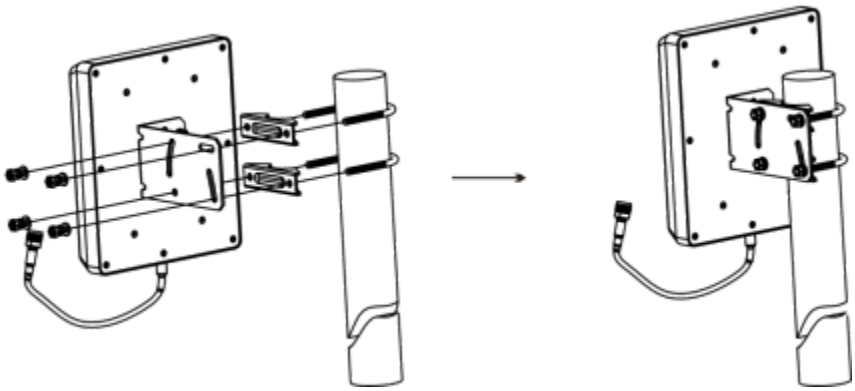
Step1: Use an existing pole or obtain a pole of 1 to 2 inches in diameter and install it in the desired location.

Step2: Unscrew nuts from the antenna base by hands or with a wrench, if needed. Fix horizontal plate of the L-bracket on the antenna base with screws.

Step3: Unscrew nuts and washers from U-bolt, slide both brackets onto U-bolts.

Step4: Fit the assembly on the pole in the desired location. Slide the vertical plate of the L-bracket onto the U-bolt and secure it with the washers and nuts provided. Before tightening the nuts be sure to fix the antenna at the necessary height and directed towards the nearest base tower. Do not over tighten.





Note: Wrap waterproof tape around the connectors between outdoor antenna and feeder line to avoid water or other kind of damage.

Step 2.Install Indoor Antenna

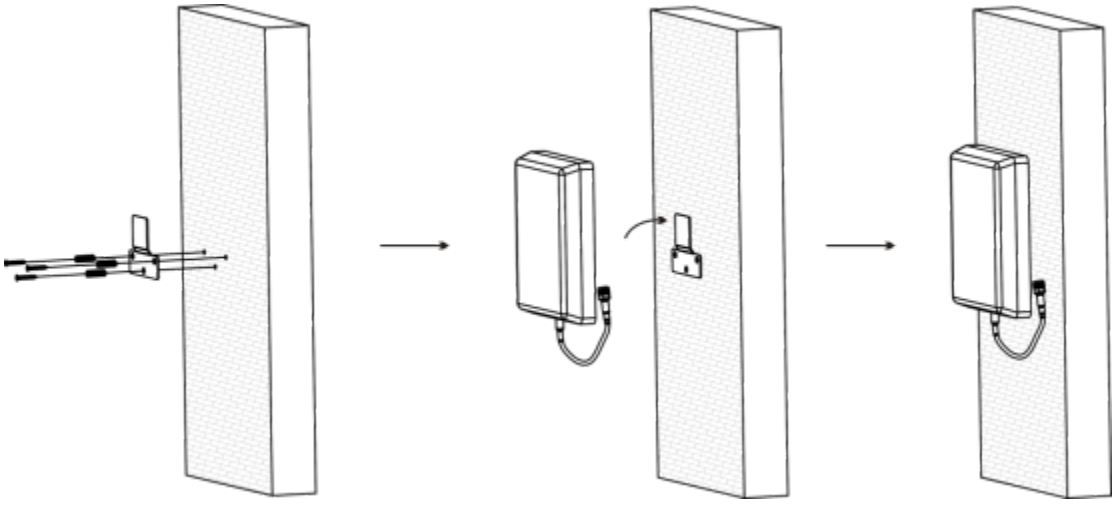
Select indoor panel antenna or omni-ceiling antenna as an indoor antenna according to your needs to provide indoor coverage.

Install the indoor panel antenna as shown on the graph below.

Step1: Select a place on a wall in the area where you need better reception.

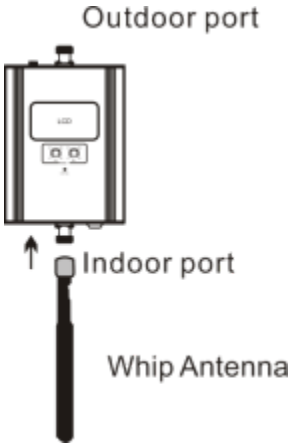
Step2: Drill the screw to the wall and mount the bracket on it.

Step3: Put the panel antenna on the bracket.



If you have an indoor omni ceiling antenna or whip antenna, the best place to install it is the center of your house.

Fix the whip antenna as shown on the graph below.



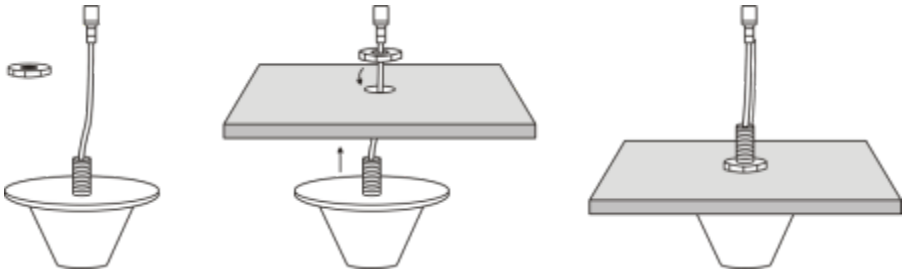
Install omni ceiling antenna as shown on the graph below.

Step 1: Drill a hole in the ceiling.

Step 2: Unscrew a fixing nut from the antenna. Pass the antenna cable through the hole. Screw the fixing nut back onto the antenna, leaving the cable in the ceiling crawl space, and fasten.

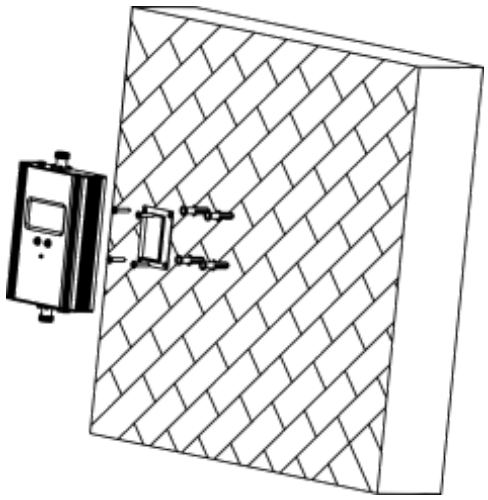
Step 3: Connect N-male cable to the cable connector on the omni ceiling antenna.

Step 4: Tighten the fixing nut to secure the antenna. Do not over tighten.



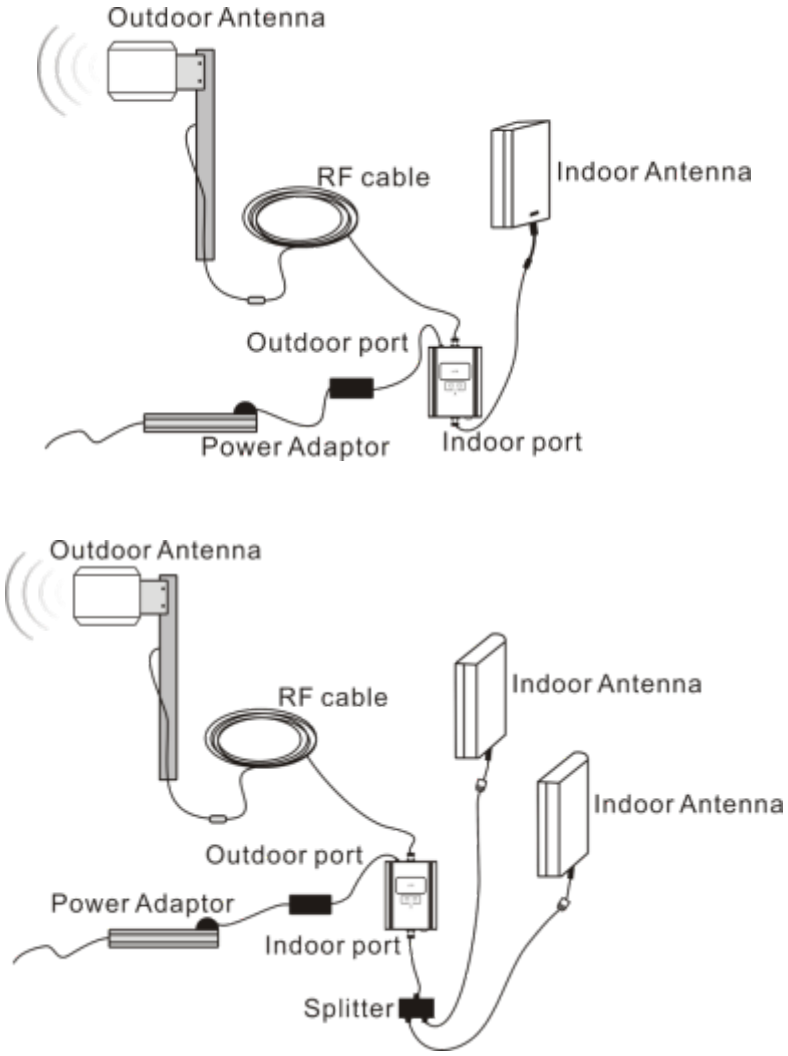
Step 3.Install Signal Booster

1. Select the location near a power supply on a wall.
2. Mount the booster with the screws included into the kit as shown on the graph below.



3. Connect the outdoor antenna cable to booster connector marked as “outdoor”. Tighten the connection by hand or with a wrench.
4. Connect the indoor antenna cables to booster connector marked as “indoor”. Tighten the connection by hand or with a wrench.

   (If it’s necessary to install multiple indoor antennas, connect the indoor antenna cables to the output connectors of the splitter. Then connect the input connector of the splitter and booster connector marked as “indoor” through a short jumper cable.)
5. Connect AC power cord to the signal booster, then connect the plug to the electrical outlet to power on the booster.



Step 4.Booster Commissioning

Overview: The booster has an intelligent startup system, booster commissioning is an automatic process able to guarantee system optimal performance.

As soon as you finish booster system installation, plug it in a power supply to power on the booster. It will start working and checking the receiving signal and the isolation to ensure best system performance. Automatic adjustment will take about 3-5 seconds.

After the booster starts, check whether the coverage is improved or not. If it is good, the booster commissioning is completed.

You can check the output power displayed on LCD. It may range within 1-3dBdifference which is normal due to outdoor signal conditions. It's perfect if the Output power reaches it's maximum rated value for largest coverage; but you can

always leave it as it is if the coverage is good enough for you.

In case the coverage is not enough, please take measures stated below on the following conditions.

1. The rated output power is reached, but the coverage is not enough or the signal in specific areas isn't improved:

- Check whether the indoor antenna is installed correctly or not, try to change the antenna position to improve coverage.
- Check if it is necessary to adjust the direction of the indoor antenna.
- Check whether it is necessary to add more indoor antennas since barriers block the signal.

2. The rated output power is not reached.

- Change the position or direction of the outdoor antenna to get a stronger receiving signal and higher output power (Not necessarily to reach rated value as long as the coverage is enough).
- Check LCD display, if the reading gain is less than rated value and "ISO" is flashing, it means the gain is reduced by **ISO function** for not having enough isolation.

Measures: The actions mentioned below are recommended to eliminate ISO problems and increase the gain:

- Adjust the antennas' direction or location or enlarge the distance between them.
- Add the vertical or horizontal distance between outdoor antenna and indoor antenna.
- Use some barrier like walls to increase the isolation.
- Change server antenna (indoor antenna can be changed to other antenna type which has better directional pattern), also you can point outdoor antenna and indoor antenna in the opposite direction.
- Reduce the booster's downlink gain with a knob. Keep the uplink and downlink attenuation value the same, then restart the booster.

More about "ISO" indication

ISO status indicates if the booster has enough isolation between outdoor and indoor antennas in order to avoid loop back or so-called self-oscillation. Thanks to intelligent software, HiBoost is fully protected from interference with operator mobile networks. "ISO" flashing on LCD display means that ISO function is working great and self-oscillation has been eliminated.

LED	Status	Meaning	SolutionMethods
ISO status	Remain still	No loop back or no self-oscillation	NO action is needed
	Flashing but actual gain is not more than 30dB and less than rated gain	Slight loop back or self-oscillation	NO action is needed
	Flashing but actual gain is more than 30dB	Deep loop back or self-oscillation	The actions mentioned below are recommended: 1. Adjust the antennas' directions or locations to enlarge the distance between them. 2. Enlarge the vertical or horizontal distance between outdoor and indoor antennas. 3. Use the barrier like walls to increase the isolation. 4. Reduce the booster's gain by external attenuator or replace with lower gain antenna if the methods listed above don't work.

More about "AlC" indication: Alc indicates the strength of input signal or receiving power of the booster. Flashing Alc means that the booster has strong receiving power.

LED	Status	Meaning	Solution Methods
ALC status	Remain still	Output power is not weak or just suitable	Check coverage, leave it as it is if it's good; take the actions mentioned below to increase signal if coverage is not good. 1. Adjust the antenna direction or location to get stronger receiving signal. 2. Replace current antenna with higher gain to get stronger receiving signal.
	Flashing but current gain is not more than 30dB and less than rated gain	Full output power	Working properly
	Flashing but current gain is more than 30 dB	Too strong receiving signal	Working properly, but the signal is too strong. Actions recommended: 1. Adjust the antennas' directions or locations to low down input power. 2. Reduce the booster's gain by external attenuator or replace with low gain antenna if the methods listed above don't work.

Note: The flashing ISO and Alc status indicate that ISO and Alc functions are working properly, and the problems of self-oscillation and strong signal are fixed. In most cases, there is no need to take any measures from your part, except for deep self-oscillation or too strong signals. However, your actions are not mandatory, since self-adaptive booster system automatically solves the problems.

More about LCD indication:

LCD	Status	Meaning	Solution Methods
"---" status		Output power is lower than -10dBm	Check coverage, leave it as it is if it's good; take the actions to increase signal if coverage is not good. 1. Adjust the antenna direction or location to get stronger receiving signal 2. Replace current antenna with higher gain to get stronger receiving signal.
"OFF" status	Actual gain is more than 51dB less than rated gain	Severe loop back or self-oscillation or output power is heavily over rated which leads to repeater break down.	Not working properly, below mentioned actions are recommended : 1. Adjust the antennas' directions or locations to decrease input power or enlarge the distance. 2. Add the vertical or horizontal distance between outdoor and indoor antennas. 3. Use the barrier like walls to increase the isolation. 4. Reduce booster's gain by external attenuator or replace with lower gain antenna if the above methods don't work.
Flashing LCD screen			

Main Specifications

RF Parameter		UL	DL
Frequency Range	900	880~915MHz	925~960MHz
	1800	1710~1785MHz	1805~1880MHz
	2100	1920~1980MHz	2110~2170MHz
	800	832~862MHz	791~821MHz
	2600	2500~2570MHz	2620~2690MHz
Max. Gain	Hi13	60dB	65dB
	Hi17	65dB	65dB
	Hi20	65 dB	70dB
	Hi23	70dB	75dB
Max. output power	Hi13	17dBm	13dBm
	Hi17	17dBm	17dBm
	Hi20	17dBm	20dBm
	Hi23	17dBm	23dBm
MGC (Step Attenuation)		≥31dB/1dB step	
Intelligent AGC*	ALC	≥51dB	
	ISO	≥51dB	
Gain Flatness	Typical	≤ 5dB(p-p)	
Noise Figure @ Max. System Gain		Typical≤ 5dB	
V.S.W.R		Typical≤ 2	
Group Delay		≤1μs	
Frequency Stability		≤0.01ppm	
Electrical Parameter			
Power Supply	Single band	Input AC100~240V.50/60Hz, Output DC5V/3A	
	Dual band	Input AC100~240V.50/60Hz, Output DC12V/3A	
Power Consumption	Single band	≤5W	
	Dual band	≤10W	
Input & Output Impedance		50 ohm	
Indicator			
LCD Display		Frequency, Gain, Output Power, ALC, ISO,etc.	
Mechanical Parameter			
I /O Port Type		N-Female	
Dimensions	Single band	120*155*34mm; 218*135*50mm	
	Dual band	120*198*34mm; 218*135*50mm	
Weights	Single band	≤0.7 Kg; ≤1 Kg	
	Dual band	≤1 Kg; ≤1.2 Kg	

Environment Parameter	
Operating Temperature	-10ºC~+55ºC
Storage Temperature	-10ºC~+80ºC
Relative Humidity	5% - 95%
Barometric Pressure	55 kPa -106 kPa
Environment Conditions	IP40

Troubleshooting

Problem	Solution
The signal booster has no power.	Check that the AC outlet is working.
The booster's power is on but the phone is not connected to the network and still cannot communicate with the signal.	Try to fasten the connections between the different parts of the system. Change the direction of the donor antenna or its installation position.
Good downlink signal with poor communication quality	Check whether there's interference. Consult the operator whether the signal source base station works well.
The power is on but the coverage is not good.	Firstly check "ISO", "Alc" and other LCD indications. Take actions mentioned in Booster Commissioning chapter (pages 21-24).

Product Warranty

30-Day Money-Back Guarantee

All Hiboost products are protected by 30-day money-back guarantee. If for any reason the performance of the received product is not acceptable, the client can return the product within 30-day period and get spent money back.

2-Year Warranty

Hiboost signal boosters are covered with2-year warranty. Huaptec offers two options for the products under warranty: repair or replace.

This warranty does not apply to HiBoost signal boosters or kits that have been subjected to misuse, abuse, neglect or mishandling and that have its physical or electronic properties altered or damaged. Failure to use surge protected AC power strip with at least a 1000 Joule rating will void your warranty.

All Hiboost products that are packaged with Hiboost accessory products are intended for use and resale as a single unit, and such product kits are required to be sold to the end users or subsequent reseller as packaged.

For any questions or suggestions do not hesitate to contact Huaptec Support Team on the phone**044-20-32395808** or by e-mail **sales@huaptec.eu**.

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