

USER MANUAL

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OPERATION

This manual covers operation, installation and troubleshooting procedures for the bi-directional amplifier **/Repeater Models**

➤ **PS23-B14-IoT**

The PS23-B14-IoT is designed to help wireless device users amplify weak signals of Band14 (700MHz), supporting the 4G LTE and 5G NR technology. These bi-directional amplifiers are used to boost uplink signals from the cellular device to the local cell site tower and simultaneously amplifying downlink signals transmitted from the tower to the cellular device. An antenna located outdoors (donor antenna) receives signals from the cell site tower, transmits them to the amplifier and then rebroadcasts them on antennas located indoors to the cellular device. The indoor antennas also received signals transmitted from the cellular device that are boosted in the amplifier and sent to the tower via the outdoor donor antenna. The PS23-B14-IoT works for all cellular devices, and all U.S. and Canada cell phone carriers using band 14 (700MHz).

PACKAGE CONTENTS



Booster



Power Supply



Other Accessories

ABOUT SIGNAL BOOSTER

Introduction

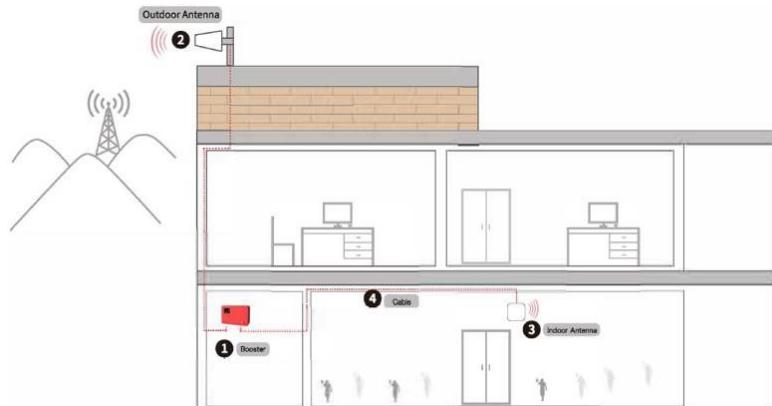
The HiBoost PS23-B14-IoT signal booster is designed to improve 4G and 5G of Band 14 (700MHz) signal for large commercial and industrial sites and other areas where cellular signal is weak or unreliable. The outdoor antenna receives the signal from the nearest cellular tower, amplifies it, and transmits to the signal booster. Then the indoor antenna will receive the signal and retransmit it to cellular terminal device. The signals produced by your cellular terminal device are also amplified by the indoor antenna via the booster and outdoor antenna.

The HiBoost PS23-B14-IoT industrial amplifier requires outside and inside antennas connected with appropriate coaxial cables and a splitter network. It typically powers 8-15 indoor antennas but the exact number of antennas, length of cable or other accessories needed can vary according to the size and construction materials used in the building, outdoor signal strength and layout of the structure. Please contact us for assistance in designing your system. Because the PS23-B14-IoT is an industrial class amplifier, local band 14 carrier approval must be obtained for every installation.

This manual provides simple installation instructions.

Industrial Signal Booster Installation Sample

PS23-B14-IoT Implementation Illustration



HOW TO INSTALL THE SIGNAL BOOSTER

1.1 Overview

This manual will help you properly install your signal booster. It is important to read through all of the installation steps before installing your equipment.

Thoroughly read through the instructions, visualize where all the equipment will need to be installed and do a soft installation by placing the devices where they need to be before mounting any equipment.

1.2 Installation Preparation

Before you install

- Make sure you have sufficient cable length between the proposed outdoor/indoor antennas and the amplifier.
- Make sure the mounting location is near an existing electrical outlet, well ventilated, away from excessive heat, moisture, and direct sunlight.

Tools Required



Phillips Screwdriver



Drill



Mobile Phone

No.	Name	Specification	Quantity	Remark
	Plastic Expansion Bolt	Φ8	5	Standard accessories
	Tapping Screws	M6*50	4	Standard accessories
	Electric Drill		1	
	Drill Bit		1	

Before you get started, you will need to plan the layout of your system. This involves finding the location with the strongest received signal from the cellular tower, as well as antenna, booster, and cable placement.

General installation steps:

- 1 Find the strongest received signal for the location of the outdoor antenna.
- 2 Install the outdoor antenna on the roof to obtain the strongest downlink signal from the local cellular towers. It should also be as far away as possible from where you plan to place the indoor antenna (vertical separation is more important than horizontal separation).

3. Install the indoor antennas where you want to improve the signal level.
4. Mount the booster, connect the cables from the outdoor antenna and indoor antenna at the designated ports, and connect the booster to the AC supply (make sure all the cables are connected before applying power).

1.3 How to find the location with the strongest received signal

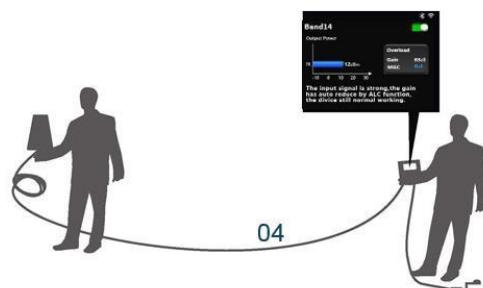
The outdoor signal strength the booster receives directly affects the efficiency of the indoor coverage. That is why it is crucially important to install the antenna at a good location and point it properly towards a tower where signal reception is the strongest.

There are many methods that can be used to find the strongest signal from the cellular towers. One is to use the LCD display on the booster that shows the downlink power output of the booster in each band, the other is to use a mobile phone or mobile phone app to test signal strength, and the third is to use a commercially available signal strength meter.

We highly recommend that you use the LCD display on the booster as this method is generally more convenient. However, in situations where the desired carrier's signal is much weaker than the other local signals, using a mobile phone, app or signal level meter can be a more accurate method of homing in on the best signal for installation.

LCD Display Method

Connect the outdoor antenna to the booster's outdoor port. Fix the outdoor antenna on the roof of the building and point it to the nearest cell tower. Then have a look at the gain and output power value displayed on the amplifier's LCD.



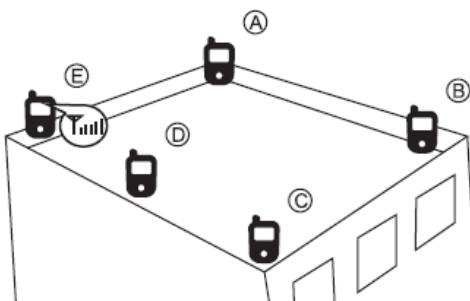
LCD Screen example for PS23-B14-IoT)

The outdoor antenna receives the strongest signal when the booster's downlink output power reaches its highest level in each band. If the LCD shows maximum gain and power, and there are not any alarms (The LCD display does not show red, yellow or gray, looking at LCD display value 17dBm to 23dBm is the best), it means the present location is the best for ensuring that the booster has maximized performance. The maximum downlink power is 23dBm, and the maximum downlink gain is 85dB.

Note: These showed values may vary dynamically at times between 1-3 dB which is normal due to outdoor signal conditions.

Mobile Phone Method

You can use a telephone to test signal strength on the top of the building. The number of bars on the 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 drawing below, you need to test the signal in the points from A to E, and select the location with the best signal strength for outdoor installation. It is recommended to use a mobile app that can display in a test mode the signal level in dBm units. It is more accurate than checking the signal bars. For more details, refer to <http://blog.hibostusa.com/signal-strength-measure-instructions/>.



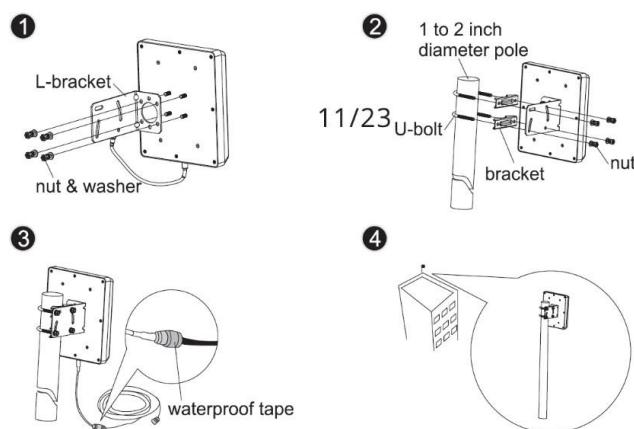
Note: Please try to receive a signal from cell towers that are not overloaded with multiple users. This can be estimated by the population density in the area served by the tower. For example, it is recommended to avoid cell towers near supermarkets, shopping malls, stadiums or any other public places visited by many people regularly. This will help maintain reliable phone call connections and higher speed data services.

Mark the strongest received signal as the installation location and direction for the outdoor antenna.

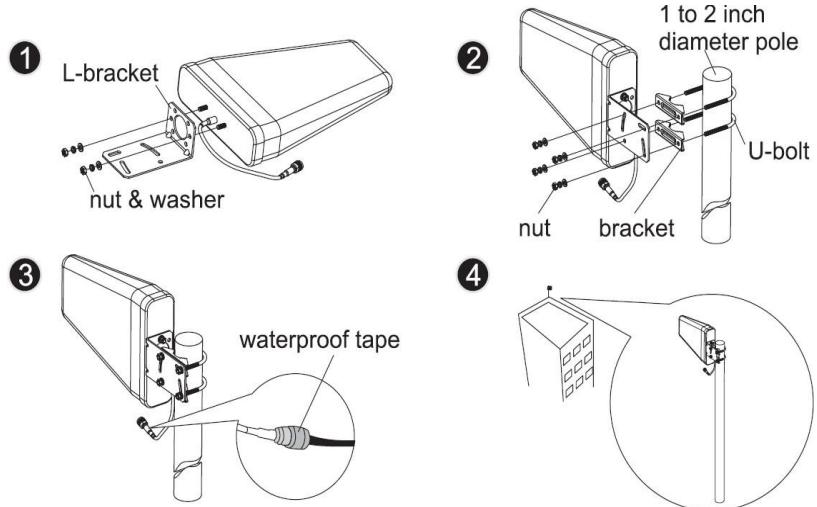
1.4 Install Outdoor Antenna

Install the outdoor antenna at the location with the strongest received signal. In most cases an outdoor wide band directional or panel antenna is the best outdoor antenna choice.

IMPORTANT: Testing the signal 3 times in the desired location before installing the outdoor antenna will help ensure the smoothest and stable phone calls and data transmission.



Outdoor wide band panel antenna installation for reference



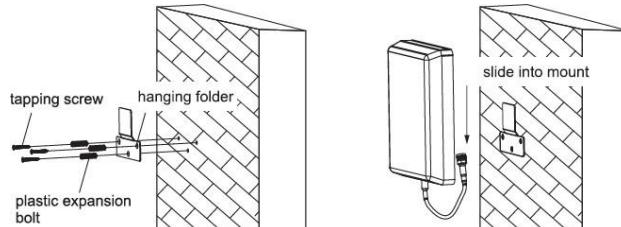
Outdoor wide band directional antenna installation for reference

Note: Be sure the cradle is at the desired height and rotated toward the strongest cellular signal before tightening the nuts. Do not over tighten. Wrap waterproof tape around the connectors between outdoor antenna and feeder line to avoid moisture ingress.

1.5 Install Indoor Antenna

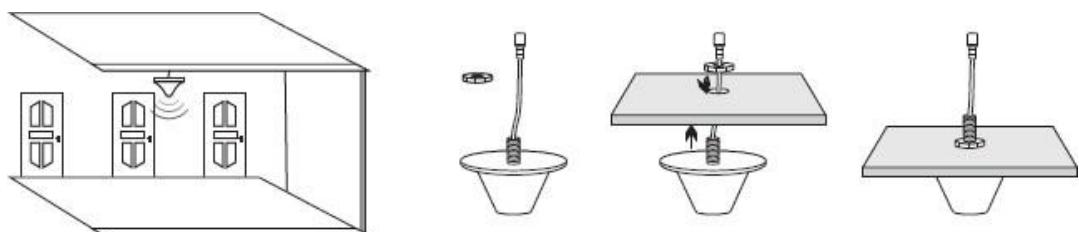
Select indoor wide band panel antenna or indoor wide band dome antenna as an indoor antenna according to your needs to provide indoor coverage. Select a place on a wall in the area where you need better reception.

Mount the indoor antenna with the included screws as shown in the figure below.



Indoor wideband panel antenna installation for reference

When choosing an indoor wide band dome antenna, the best place to install it is in the center of area that needs signal improvement. Install the dome antenna as shown on the figure below:

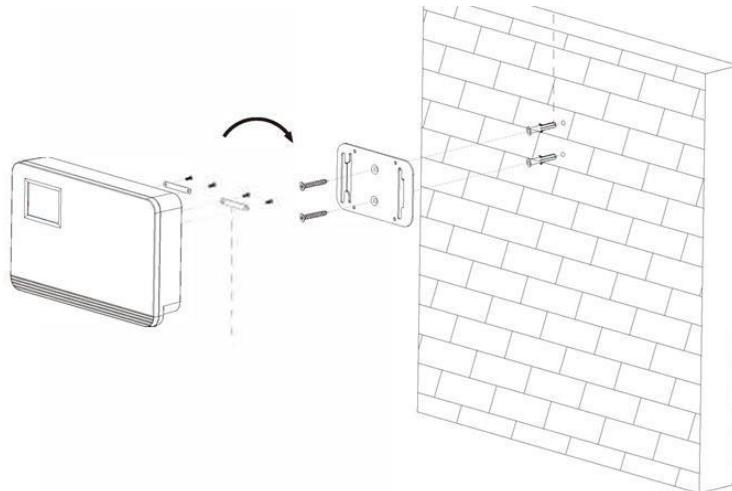


Indoor wide band dome antenna installation for reference

1.6 Install the signal booster

The signal booster should be mounted in an easily accessible area so it's easy to perform general maintenance. The area is properly ventilated and not exposed to excessive heat, moisture and/or direct sunlight. The optimal area would be on a wall located near a power outlet. Please use a surge protector rated at a minimum of 1000 Joules between the booster's power adaptor and the AC power outlet on the wall.

Mount the booster with the included screws as shown in the figure below.



1.7 Run coaxial cable

Loosely run the supplied coaxial cable from your outdoor antenna to your booster connector marked "Outdoor". We recommend applying waterproof tape to fully waterproof the connection.

Connect the indoor antenna cables from your indoor antenna to the booster connector marked "Indoor". Tighten the connection by hand. (After you have tested the system you can permanently secure the coaxial cable).

As you route and pull cabling, follow these general guidelines:

- ✓ Bend cables and route them smoothly, and protect the outer skin against any damage.
- ✓ Keep horizontal cables straight and fasten them with a tie every three to five feet.
- ✓ Bind and fasten vertical cables every six to eight feet.
- ✓ Waterproof all connectors between outdoor antenna and coaxial cables with waterproof tape to avoid water or other kinds of damage.
- ✓ Be careful when plugging the connector in so as not to damage the center pins on the connectors.

1.8 Power up your signal booster

Once all the following precautions have been taken, power on the signal booster.

1. Verify that you have left enough vertical separation space between the indoor and outdoor antennas.
2. Never point the front of outdoor antenna towards the inside of the indoor antenna.
3. Verify that the supplied coaxial cables from both the outdoor antenna and the indoor

antenna are properly connected to the signal booster before powering it up.

4. Carefully plug in the supplied power adaptor into the signal booster where it is marked 'DC 12V' and connect the other end to a power outlet.

The LED indicator marked power should light up green.

1.9 Booster Commissioning

Overview: The booster has a smart startup system. When you have finished the booster system installation and power on the booster, it will start its initialization process to check the received downlink signal from the cell site and the isolation status. This is an automatic process designed to ensure its best performance. This will take approximately 3-5 seconds.

After the booster starts up, please check if the coverage is good. If it is good, the booster system installation is complete. If the coverage is not adequate, please fully reread and understand the LCD, LED indications, control buttons and MGC function on your booster, as they will help you identify and solve any potential issues.

Check the downlink output power displayed by the LCD. It may vary dynamically at times between 1-3 dB which is normal due to outdoor signal conditions. It would be optimum that the output power reaches its maximum rated levels for the largest coverage; but you can always leave it set at lower levels if the coverage is adequate. Please bear in mind that it is nearly impossible to achieve 4 - 5 bars on every phone at all locations in a building. Cellular phones will operate just fine if they are showing 1-2 bars. Some phones by different manufacturers will often show widely different signal level results. Also, phones by the same manufacturer can show different results if they have different software versions. Because of very large indoor RF signal multipath effects moving a phone only a few feet can result in large changes in its received signal level.

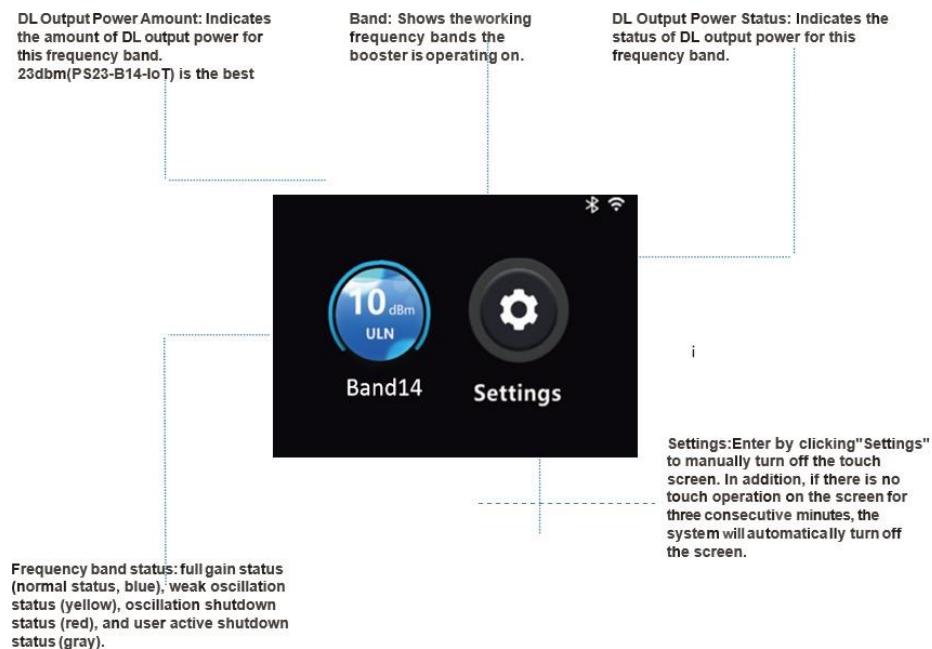
If the coverage is not adequate, please take the steps below as is appropriate for each situation:

- 1 The rated output power is reached, but the coverage is not enough or the signal in specific areas has not been improved.
 - Check whether the indoor antenna is installed correctly. You may try to move the antenna location to improve coverage.
 - If an indoor panel is used, check if adjusting the pointing direction of the indoor antenna makes any difference.
 - Check whether it is necessary to add more indoor antennas since barriers such as walls will block the signal penetration.
- 2 The rated downlink output power is not reached.
 - (1) Please adjust the outdoor antenna to get a stronger received signal from the tower to get higher downlink output power (not necessarily to reach rated value if the coverage is adequate). The max rated downlink power for this amplifier is 27 dBm.
 - (2) Please observe the LCD display. If the displayed gain is much less than the rated value and "ISO" is flashing, it means the gain is being reduced by the ISO function because there is not enough isolation between an indoor antenna and the outdoor antenna.

SIGNAL BOOSTER STATUS

Booster Working Status Expression

Working Status – PS23-B14-IoT



Band: Shows the working frequency bands where the booster is operating.

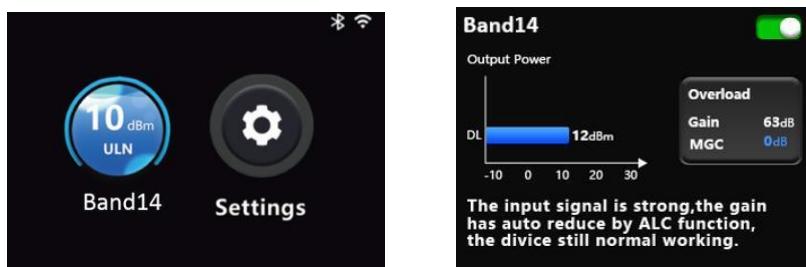
BLUE: Blue icon with ULN/AOL (Normal/Overload) indicates that a band is working correctly with maximum allowable gain.

YELLOW: Yellow icon with OSC (Oscillation) indicates band gain reduction because of a slight self-oscillation condition. Due to self-oscillation issue, please check the antenna system. Reinstall antennas and increase the isolation between outdoor and indoor antennas, and then turn the booster on to reactivate the band and maximize performance. After the proper isolation is done, the yellow icon will return to blue.

Note: when the icon is yellow, the band still works normally, but the gain is reduced.

RED: Red icon with SHDN (Shutdown) indicates a band has been shut down because of a strong self-oscillation condition or an over load condition (You could click the icon to see which condition now is). 1. For the strong self-oscillation condition, please check distance and direction of outdoor antenna and indoor antenna, increase the isolation of both antennas. After the isolation is enough, the red icon will return to blue upon reboot. 2. For the over load condition, It's because of that the input signal is too strong, please adjust outdoor antenna's direction to reduce the strength of the input signal, then turn the booster, on to reactivate the band. When the gain is reduced enough, the red icon will return to blue upon reboot.

GRAY: Gray icon with DIS (Disabled) indicates band has been disabled



If none of the keys are pushed within 5 minutes, the display will return to the fixed display mode. If none of the control keys are pushed within 5 minutes, the LCD screen will turn off. Pressing any key will return the display to the fixed mode.

SPECIFICATIONS

PS23-B14-IoT Signal Booster

Working Band	Band 14
UL frequency Range(MHz)	788-798
DL frequency Range(MHz)	758-768
Supported Standards	LTE,NR cellular standards
Max. Gain	85 dB
Max. output power	UL 20dBm DL 23 dBm
MGC (Step Attenuation)	31 dB / 1 dB step
I/ O Port	N-Female
Impedance	50 ohm
Environment Conditions	IP40
Dimensions	171* 266 *55mm / 6.7*10.5 * 2.2in
Weight	2.5KG /5.5 lbs
Power Supply	Input AC90- 264V,50 /60Hz,Output DC12V/3A

Authorized Accessories list

The following accessories are authorized by the FCC to be used with the PS23-B14-IoT Signal Booster.

Indoor antennas		
Antenna model	Antenna type	Band 14 Gain
HPTIDP-0727-06NF1	Indoor wide band panel antenna	6.5dBi

Outdoor antennas		
Antenna model	Antenna type	Band 14 Gain
HPTODL-0727-08NF1	Outdoor wide band Directional	7.5dBi

FCC AND ISEDC STATEMENT

FCC RF EXPOSURE STATEMENT

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instruction for satisfying RF exposure compliance. This transmitter must not be collocated or operating in conjunction with any other antenna or trans-mitter. His equipment should be installed and operated with minimum distance 20cm between the radiator& your body.

ISEDC RF EXPOSURE STATEMENT

This device is in compliance with RF exposure limits. The minimum distance from your body to the antennas used with this device should be 20cm.

Le present appareil est conforme aux conformite ou aux limites d'intensite de champ RF. La distance minimale du corps a utiliser le dispositif est de 20cm.

This device complies with part 90 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures :

Re-orient or relocate the receiving antenna.

Increase the separation between the equipment and receiver

Connect the equipment into an outlet on a circuit different from that to which the receiver is connected

Consult the dealer or an experienced radio/TV technician for help Changes or modifications not expressly approved by HiBoost could void the user's authority to operate the equipment. For a complete list of antennas and cables approved for use with these boosters see Authorized Kitting Options.

Part 90 signal booster

THIS IS A 90.219 CLASS B DEVICE

WARNING. This is NOT a CONSUMER device. Is is designed for installation by FCC LICENSEES and QUALIFIED INSTALLERS. You **MUST** have an FCC LICENSE or express consent of an FCC Licensee to operate this device. You must register Class B signal booster (as defined in 47 CRF 90.219) online at www.Fcc.gov/signal-boosters/registration. Unauthorized use may result in significant forfeiture penalties, including penalties in excess of \$100,000 for each continuing violation.

WARNING. This is NOT a CONSUMER device. It is designed for installation by an installer approved by an ISED licensee. You **MUST** have an ISED LICENCE or the express consent of an ISED licensee to operate this device.

AVERTISSEMENT: Ce n'est PAS un appareil CONSOMMATEUR. Il est conçu pour être installé par un installateur agréé par un licencié ISED. Vous DEVEZ détenir une LICENCE ISED ou le consentement exprès d'un titulaire de licence ISDE pour utiliser cet appareil.

FOR MORE INFORMATION ON REQUIREMENTS SET OUT IN ISED CPC-2-1-05, SEE BELOW:
<http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf08942.html>

PRODUCT WARRANTY

30-Day Money-Back: All HiBoost products are protected by a 30-day money back guarantee. If for any reason the performance of any product is not acceptable, the product may be returned to the reseller with a dated proof of purchase.

3-Year Warranty HiBoost Signal Boosters and kits are warranted for 3 years. Customers can choose to return the Signal Boosters and kits directly to the manufacturer at the purchaser's expense with a dated proof of purchase and a Returned Material Authorization (RMA) number supplied by HiBoost.

HiBoost will supply two options, repair or replace. HiBoost will cover the cost of delivery for the consumers located within the continental U.S.

This warranty does not apply to any Signal Boosters or kits determined by HiBoost to have been subjected to misuse, abuse, neglect, or mishandling that alters or damages physical or electronic properties. Failure to use a surge protected AC Power Strip with at least a 1000 Joule rating will void your warranty. Damage caused by lightning is not covered by this warranty.

All HiBoost products that are packaged with other HiBoost accessory products are intended for resale and used as a single integrated system. Such product kits are required to be sold to the end users or subsequent reseller as packaged. RMA numbers may be obtained by contacting Technical Support at (469) 871-2552.

