Booster Installation Guide

Version 1.2

KBEST Technology

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About This Manual

The purpose of this manual is for the setup of Booster & DC Injector. This manual, revised as version 1.2 in 2003, includes the procedures to assist you in avoiding unforeseen problems.

Technical Support

If you have difficulty resolving the problem while installing or using the Booster & DC Injector, please contact the supplier for support.

FCC Notice

Reminder:

To comply with FCC part 15 rules, the Booster must only be used as a system as FCC certified. The system must also be professionally installed to ensure compliance with the Part 15 certification. It is the responsibility of the operator and professional installer to ensure that only certified systems are deployed in where FCC rules apply. Further, according to FCC Part 15 regulations, Section 15.247(b)(3)(iii), the installer must ensure that the high-gain directional antenna used in this system is used exclusively for fixed, point-to-point operations and that multiple co-located intentional radiators transmitting the same information are not used. For further information, please see Appendix B.

FCC Certified Declaration:

This device complies with part 15 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.

Notice:

To comply with the FCC RF exposure compliance requirements, the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. No change to the antenna or the device is permitted. Any change to the antenna or the device could result in the device exceeding the RF exposure requirements and void user's authority to operate the device.

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Chapter 1 Introduction

K-Best's Booster, operating on the 2.4GHz ISM band, is a high performance two-way amplifier using Time Division Duplex (TDD) technology. It is used outdoor to extend the range of wireless radio communication.

K-Best's DC injector (KBDC24E) functions as a provider of DC power to the outdoor booster or transponder through the feed cable without an additional power cord. The DC injector comes with different types of connector upon custom's request . The standard product of KBDC24E-2N is equipped with female N type at both side, and KBDC24E-AN with female N type at one side and female SMA at another side.

1-1 Product Kit

Before installation, make sure that you the following items:

- Booster
- DC Injector
- Jumper Cable
- Power Adapter
- Installation Guide
- NDC Access Point and adapter cable

1-2 Features and Benefits

- 2400~2500 MHz unlicensed ISM Band
- Provides DC Power to the booster without an additional Power cord
- Booster has 1W output power levels.
- 20dB(1W) receive gain for the booster
- Bi-directional TDD technology
- Transmitter and receiver LED indicator
- Waterproof housing
- Compatible with IEEE 802.11b
- Extending transmission distance
- Enhance signal strength

1-3 Specifications

Specifications for DC Injector

Operating Frequency Range
2400~2500MHz
Bias Current / DC Voltage / Insertion Loss
1.5A (max.) / 15V (max.) / 1dB
Connector / DC Jack
N type female for both side / φ 6 mm, center pin φ 2.0 mm
Dimensions / Weight
99.1(H)x53.5(W)x21.2(H)mm / 165g

Specifications for Booster

Operating Frequency Range /
2400~2500MHz
Operating Mode
Bi-directional TDD
Transmitter Output Power / Transmitter Gain
30 dBm Typical / automatically adjusts to 1W power output
Transmitter Input Power
Max: 13 dBm
Min: 3 dBm
Receiver Input Power
Max: -16 dBm
Receiver Gain
20dB
Frequency Response Flatness
± 1dB over operating range
Noise Figure
< 4 dB
Switch Time
< 1.5 μs
Connector
N-type Female (50Ω);
SMA connector available for custom design
Operating Temperature
-30~60℃

Power Consumption

1watt, 950mA @ 9VDC

LED Indication

Transmit: Green; Receive: Red

Dimensions / Weight

120(L)x72(W)x17.5(H) mm / 380g

1-4 Calculate Transmit Power

In order to obtain the best performance of booster and system, user must calculate the transmission power to meet the booster technical requirement and FCC regulations(See Appendix B). It is advised that the user follows the calculation below:

1. Converter power of the access point from milliwatts to dBm.

Note: dBm = 10 * Log(milliwatts)

2. Determine the attenuation of cable(please refer to manufacturer's specifications)

Note: Suggest the cable loss between booster and DC injector should not exceed 10 dBm generally.

Table A – Typical Cable Attenuation Values

Cable Type	Attenuation dB/100ft @2.4GHz
RG-142	21
LMR200	16.5
LMR400	6.6
LMR600	4.4
LMR900	2.92
Belden 9913	7.1

Note: Values are approximate.

3. Calculate the actual power of booster in the pole as follow:

   Access point Power(dBm) – Cable Loss(dBm) – Misc. Loss = Input Signal Level(dBm)

Note: Misc. Loss means loss of connector, adapter and DC injector and estimates to be around 2 dB.

4. If the input signal level exceeds the max. Transmitter Input Power or fails to meet the min. Transmitter Input Power of booster, the booster can't identify the input signal. Under this circumstance, user should adjust the input signal level to fit the requirement such as using an attenuation pad or a higher loss cable and vice versa.

1-5 Installing the Booster Kit

Once input signal level is determined to be in conjunction with the technical requirement of booster, please proceed to install the booster kit with following procedures:

1. Connect the booster RF output directly to the antenna with appropriate cable.

2. Attach the booster RF input to the DC Injector with coaxial cable.

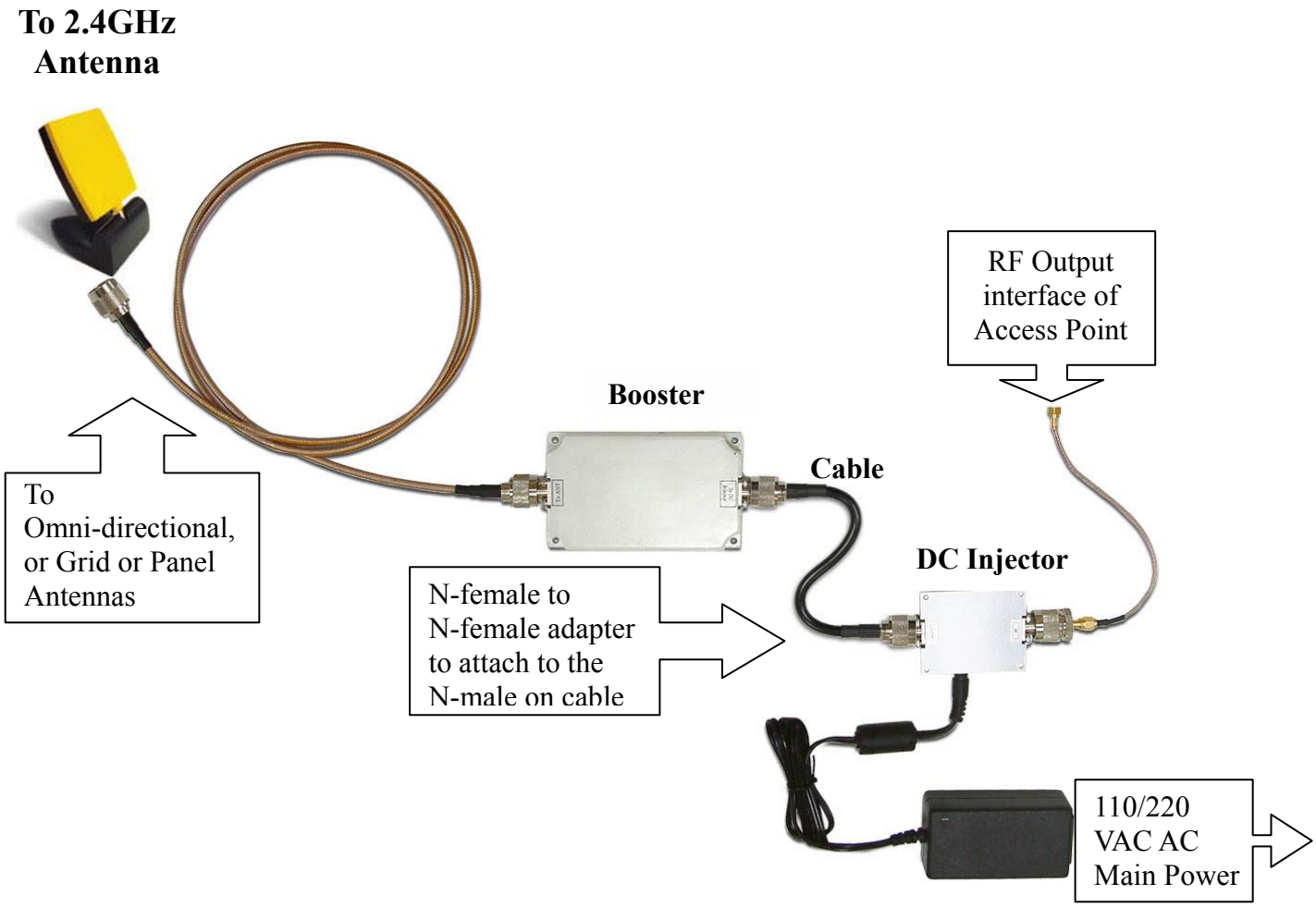
Note: The type and gain of antenna or type and length of cable depend on your purpose of using booster. Please contact manufacturer for further information.

Warning: The cable between DC injector and booster carries the DC voltage and should not be connected to devices other than booster.

3. Connect the coaxial cable leading from the DC Injector to the antenna on the access point.

4. Plug the power cable leading from the DC Injector into any available 110/220 V electrical outlet.

5. Check the LED indicator of the DC injector. If the LED is on, it means the booster kit is operating.



KBW24 Installation Details

Appendix A: Channel Plans

Table A – Channels Table

802.11b Channel	2.4 GHz Frequency(MHz)
1	2412
2	2417
3	2422
4	2427
5	2432
6	2437
7	2442
8	2447
9	2452
10	2457
11	2462

Appendix B: FCC Certified Systems

FCC ID#: QZGKBW24-001

FCC Certified Systems consist of:

- KBW24-100 Booster，DC Injector，Power Adapter
- NDC WLAN Access Point
- Outdoor Antenna
- Coaxial Cable

The Booster has passed the FCC regulations:

FCC part 15, subpart C(2002)

Table A – Authorized Antennas

Model	Antenna Type	Antenna Gain(dBi)	Max EIRP(dBm)
KBNT2406-01	Flat Panel	6	36

Note: Cable calculation must be performed using 2.4GHz attenuation values because all signals pass between the Access point and Booster are at a frequency of 2.4GHz.

Appendix B (Continued)

Table B – Authorized Cables with Minimum Length

Cable Type	Minimum Length	Maximum Recommended Length
RG6/U	35 feet	75 feet
RG142	27 feet	60 feet
LMR400	100 feet	250 feet
LMR500	125 feet	300 feet
LMR600	150 feet	370 feet
LMR900	230 feet	560 feet
LMR1200	300 feet	700 feet
LMR1700	410 feet	950 feet

Note: This table is for reference only.

Notice:

This device complies with part 15 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.

Appendix C: Troubleshooting

If there is no signal output, please check the following item:

1. Check whether the LED indicator on the DC injector is on. If not, it means there is problem with the power component.
   (1) Check if the power cord is correctly connected with the power adapter and the power outlet.
   (2) Check if there is electricity on power outlet.
2. Check if the access point is working properly.
3. Check if the connection between booster and DC injector is correct, or whether the connector is loose or not.
4. Verify if the transmit power which calculated before is correct.
5. If none of the above measures could solve troubleshooting, please contact the supplier for further support.