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Notice

This document describes the specifications, installation, and operation of the Tri MINI.

Hardware and software mentioned in this document are subject to continuous development and improvement. Consequently, there may be minor discrepancies between the information in the document, performance, and design of the product.

Specifications, dimensions, and other statements mentioned in this document are subject to change without notice.

Questions or Comments

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Warning ⚠

Opening the Tri MINI could result in electric shock and may cause severe injury.

Warning ⚠

Connect the equipment frame ground to building ground.

Warning ⚠

Operating the Tri MINI with antennas in very close proximity facing each other could lead to severe damage to the repeater.

Caution ⚠

RF EXPOSURE INFORMATION

A minimum separation distance of 7.9 inches (20cm) must be maintained between the user and the external antenna of repeater to satisfy FCC RF exposure requirements. For more information about RF exposure, please visit the FCC website at www.fcc.gov

Caution ⚠

This equipment is for indoor use and enables the communication wiring to communicate only inside the building.

Contents

The following is a list of abbreviations and terms used in this manual.

Abbreviation	Definition
AC	Alternating Current
ALC	Automatic Level Control
ANT	Antenna
ASD	Automatic Shutdown
DC	Direct Current
GND	Grounding
GUI	Graphic User Interface
iDEN	Integrated Digital Enhanced Network
LED	Light Emitting Diode
PSU	Power Supply Unit
RF	Radio Frequency
TEMP	Temperature
VSWR	Voltage Standing Wave Ratio

ALC (Automatic Level Control)
ALC feature prevents the repeater from exceeding its maximum output power by reducing the gain automatically. ALC is used to adjust the gain to an appropriate level for a range of input signal levels.

ASD (Automatic Shutdown)
Automatic shut down protects the repeater from the oscillation or excessive input signal and eliminates any degradation to the network.

There are three parameters: ASD LEVEL, ASD TIME and ASD COUNT.

If the output power gets higher than “ASD LEVEL”, the repeater will shut down for “ASD TIME” seconds and then it will turn the amp back on to measure the output power again. If this repeats at “ASD COUNT” times, the repeater will shut down completely.

1. Introduction

Tri MINI repeater is used to fill out areas in iDEN and CDMA mobile systems, such as base station fringe areas, business and industrial building, etc.

Tri MINI receives signals from a base station, amplifies and retransmits the signals to mobile stations. Also it receives, amplifies and retransmits signals in the opposite direction. Both directions are served simultaneously with the following features:

a. iDEN

- 7MHz or 18MHz-bandwidth service @ 800MHz's
- 5MHz-bandwidth service @ 900MHz's
- Adjustable Band Edge @ 800MHz's and 900MHz's
- Roll Offs: 65dBc at 0.5MHz outside pass-band
- Remote Access and Control
- Easy and Quick Installation
  - Web-based GUI
  - Plug and Play – DHCP Server @ Local Port an DHCP Client @ Remote Port
  - Easy Setup(Automatic)
  - Isolation Detection
- Auto Level Control & Auto Shut Down

b. CDMA

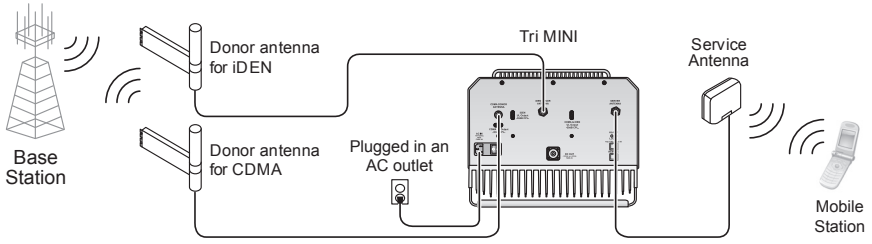
- Programmable Bandwidth and Band
  - 5, 10, 15, and 20MHz contiguous and non-contiguous segments
  - Any Band Combination within 65MHz PCS Band [A, D, B, E, F, C, G]
  - Three(3) 5MHz segments
- Remote Access and Control
- Easy and Quick Installation
  - Web-based GUI
  - Plug and Play – DHCP Server @ Local Port an DHCP Client @ Remote Port
  - Easy Setup(Automatic)
  - Isolation Detection
- Auto Level Control & Auto Shut Down

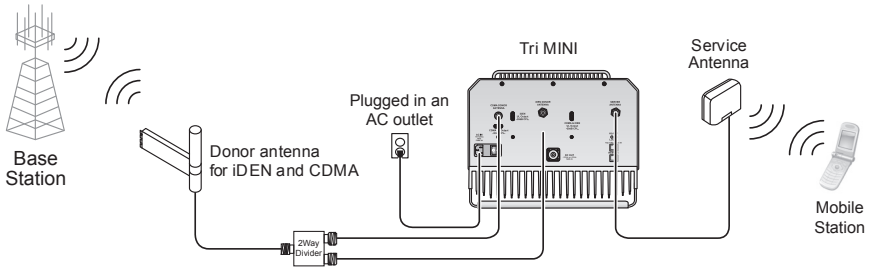
- TRI MINI utilizes the web-based user interface and web server to support the remote access and control through an external monitoring device with wireless modem. There are two physical RJ-45 ports:
  - The Local port provides the on-site access to the repeater.
  - The remote port allows remote users to access the repeater through an external monitoring device.

The two ports allow local remote users to access the repeater simultaneously.

- DHCP server at the Local port enables Plug and Play by automatically assigning the IP address to the user's computer.

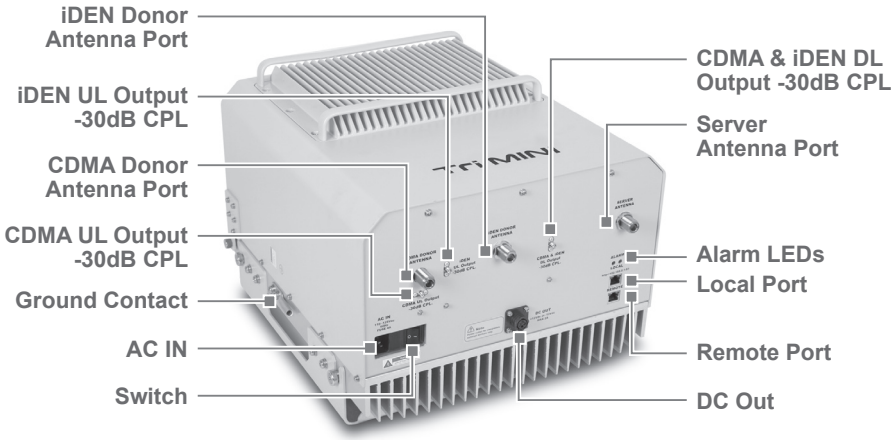
- Parameter setup is only one click away
  - Easy setup feature will measure the isolation and limit the maximum gain accordingly. This will also enable Auto Level Control as well as Auto Shut Down. These two features are strongly recommended to prevent the uncontrolled power output, which could have an adverse impact on the RF network and the repeater. For example, ALC will automatically apply attenuation when the input signal strength is increased due to the new base station deployment near the repeater site.





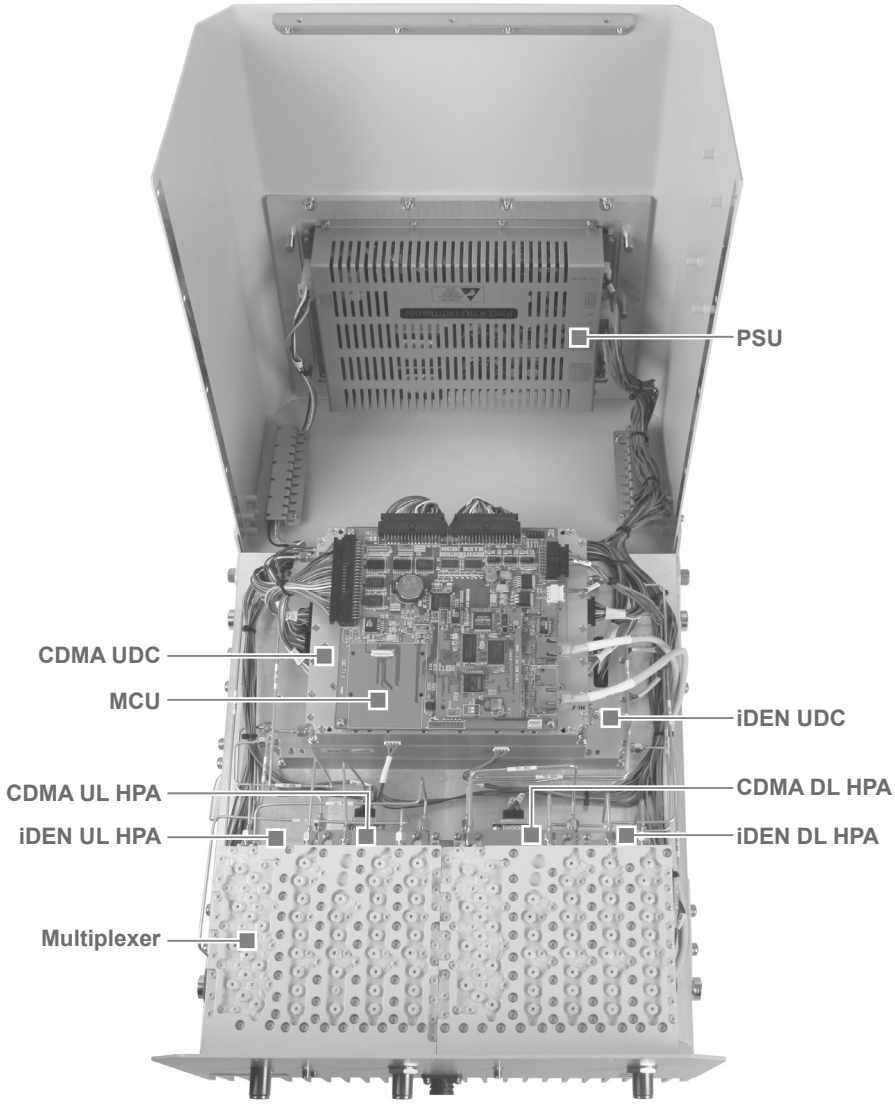
2. Description

2.1 Main Unit Overview



1. **Ground Contact** : Connects the repeater frame ground to the building ground.
2. **AC In** : AC power socket.
3. **Switch** : AC power switch.
4. **CDMA Donor Antenna Port** : Connects the donor antenna for CDMA.
5. **iDEN Donor Antenna Port** : Connects the donor antenna for iDEN.
6. **Server Antenna Port** : Connects the server antenna.
7. **CDMA UL Output -30dB CPL** : -30dB coupling port for UL output of CDMA.
8. **iDEN UL Output -30dB CPL** : -30dB coupling port for UL output of iDEN.
9. **CDMA & iDEN DL Output -30dB CPL** : -30dB coupling port for DL output.
10. **Alarm LEDs** : When the On site Alarm occurs, the red LED turns on. When it operates normally, the green LED turns on. When it operates without any problems, the green LED turns on.
11. • **Local** : This port provides on-site access to the repeater.
    • **Remote** : This port allows remote users to access the repeater through an external monitoring device.
    The two ports allow local and remote users to access the repeater simultaneously.
12. **DC Out** : Power outlet for compatible external devices only.

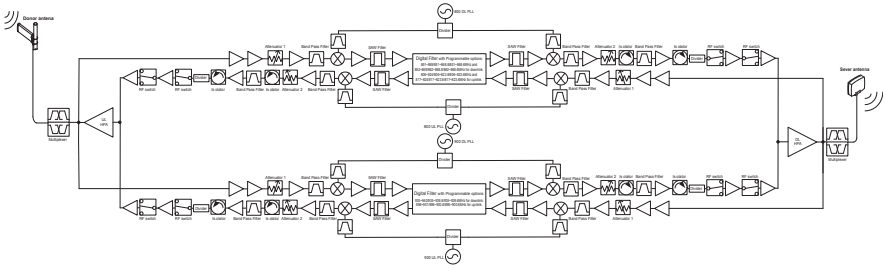
2.2 Sub Unit Overview



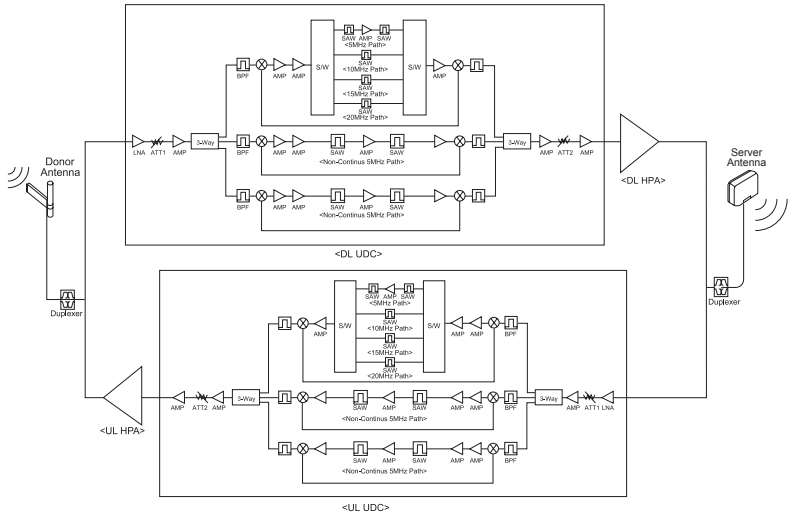
2.2.1 Block Diagrams

The following diagram explains how the Tri MINI serves signals.

a. iDEN

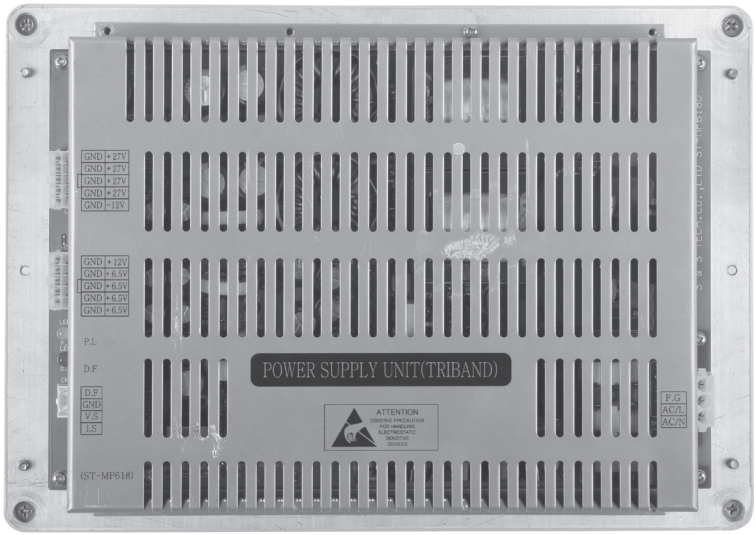


b. CDMA



2.2.2 PSU (Power Supply Unit)

The PSU (Power Supply Unit) supplies a steady DC power to Tri MINI by drawing power from the general in-wall AC outlets.



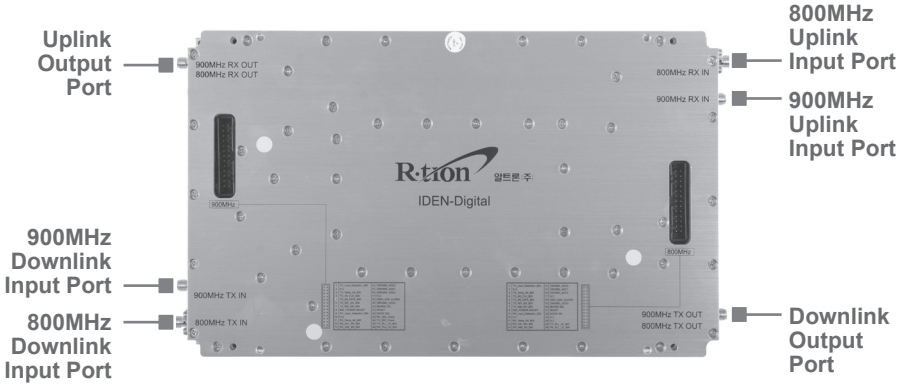
Specifications

Item		Specifications
Environmental	Operating Temp	-10˚C~50˚C (14˚F~122˚F)
	Humidity	20%~90%RH
	Cooling method	Convection
Voltage		AC110~125V
Current		13A Max / 6.5V, 1A / 12V, 1A / -12V, 4A / 27VDC
Frequency		50~60Hz typical
Leakage Current		0.5mA max.@110V AC

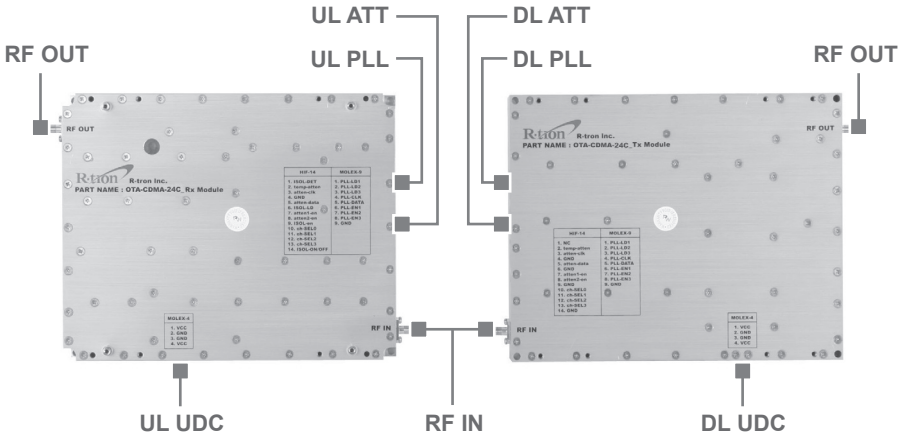
2.2.3 UDCs (Up Down Converters)

The UDCs(Up Down Converters) are basically bi-directional amplifiers that sharply filters out unwanted noise.

a. iDEN

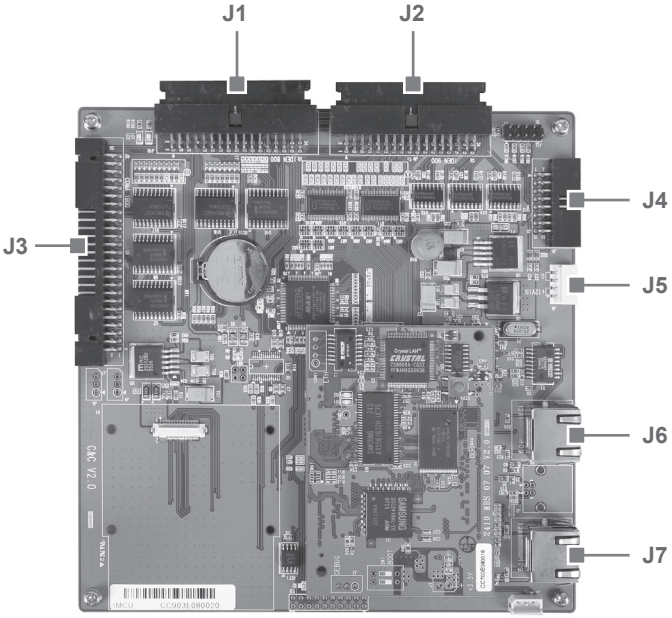


b. CDMA



2.2.4 MCU (Main Control Unit)

The MCU (Main Control Unit) is the control unit of Tri MINI. It controls and monitors operational parameters. It is also responsible for generating an alarm, an event log and many other functions of the Tri MINI.



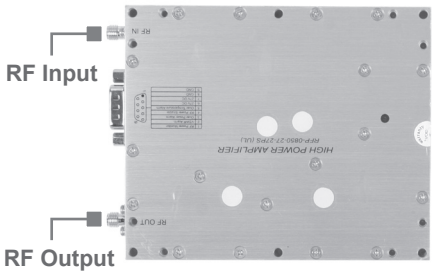
Pin Map

Port	Connected to
J1	iDEN 800 PLL, B/S, OUT DET, DL(Tx)/UL(Rx) HPA
J2	iDEN 900 PLL, B/S, OUT DET
J3	CDMA UL, DL Control Pins
J4	Alarms, LEDs
J5	MCU Vcc(+12V)
J6	Local Port
J7	Remote Port

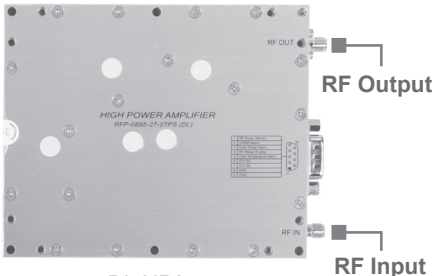
2.2.5 HPAs (High Power Amplifiers)

The HPAs (High Power Amplifiers) amplifies the transmitted signal from a base station at the final stage of the repeater and vice versa.

a. iDEN

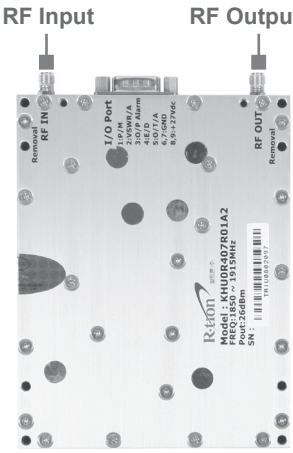


<UL HPA>

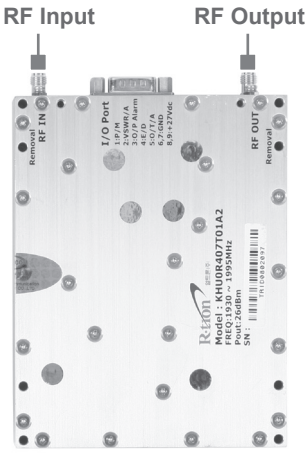


<DL HPA>

b. CDMA



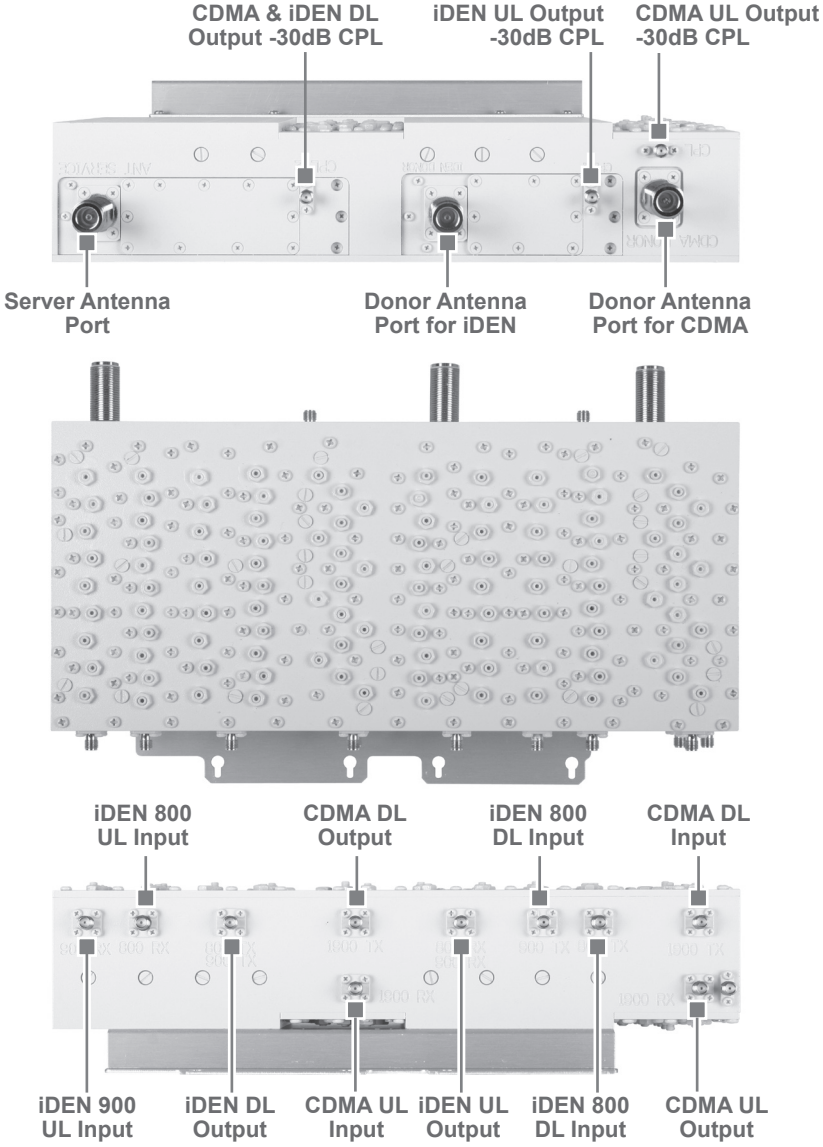
<UL HPA>



<DL HPA>

2.2.6 Multiplexer

A multiplexer is a device that combines two or more signals onto a common channel or medium to increase its transmission efficiency.



3. Hardware Installation

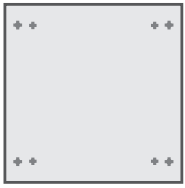
The installation procedure is as follows:
- Check List of Items
- Mounting
- Grounding
- RF Cable Connection
- Power On

3.1 Check List of Items

Index	Items	Quantity
1	Repeater	1
2	AC Cord	1
3	Anchor Bolts	4
4	Wall Mounting Template	1
5	UTP Cross LAN Cable	1
6	Quick Guide	1
7	User's Manual	1

3.1.1 Items

Repeater



Wall Mounting Template

UTP Cross LAN Cable

AC Cord

Anchor Bolts

User's Manual

Quick Guide

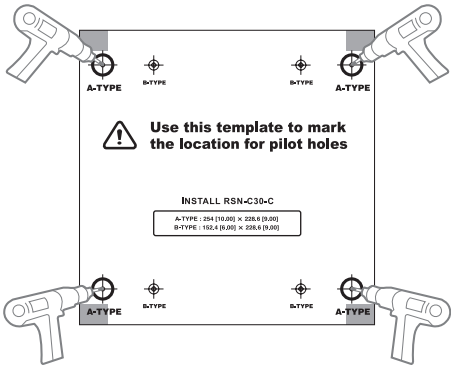
3.2 Mounting

Tri MINI is easy to mount using the assembled mounting bracket, which has 9 holes for the provided 5/16” fixing screws.

Step 1 Remove the cover of double-coated foam tape squares at each corner on the back side of the template.

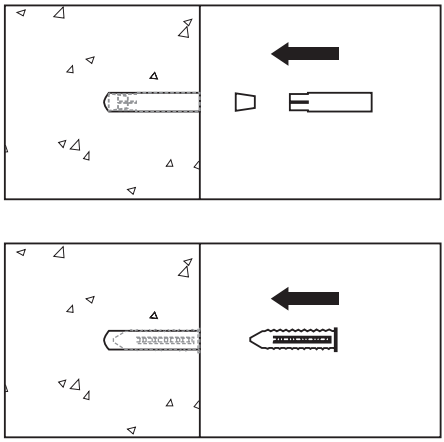
Step 2 Stick the provided template to the wall using the tape squares while adjusting the horizon.
Mark the position for 4 screws depending on the installation location.

Step 3 Drill holes directly through the template.

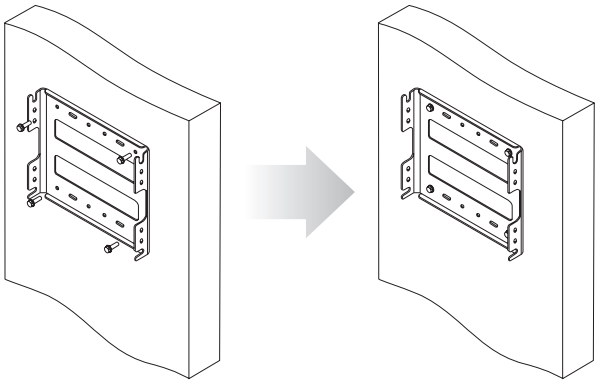


3. Hardware Installation

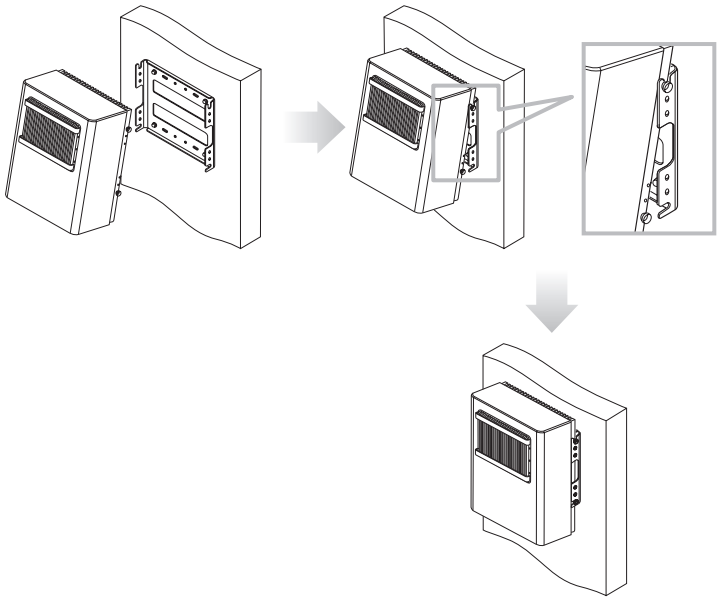
Step 4 Install the set anchor bolts or the plastic anchor bolts on the holes.



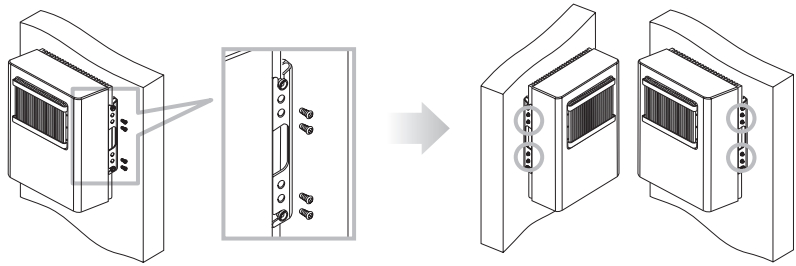
Step 5 Attach the mounting bracket to the wall using provided bolts or extra screws.



Step 6 Lean the Tri MINI to hang the topside of the Guide Ring on the mounting bracket, and push toward the wall to mount.

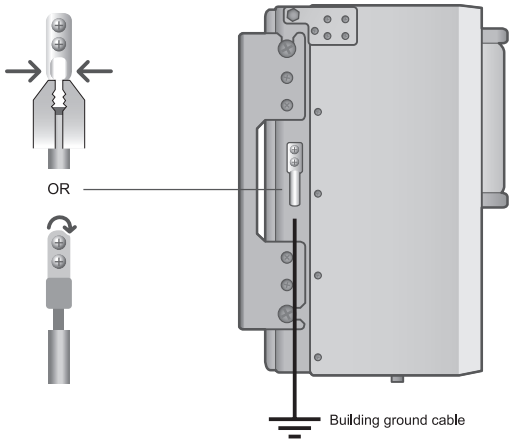


Step 7 Fix the Tri MINI using 8 screws provided.



3.3 Grounding

A rod on the left side is intended for a building ground.
Connect the ground cable to the rod.



Warning

Dangerously high voltages may occur and damage the equipment if the equipment is not grounded properly.

3.4 RF Cable Connection

Step 1 Connect a cable from a donor antenna to the DONOR ANTENNA Port.

Step 2 Connect a cable from a repeater's service antenna to the SERVER ANTENNA Port.

Warning

DO NOT connect or disconnect the coaxial cable while the power is on.

Note

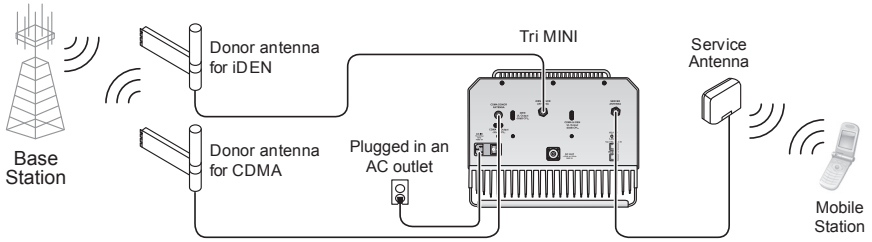
Enough isolation?

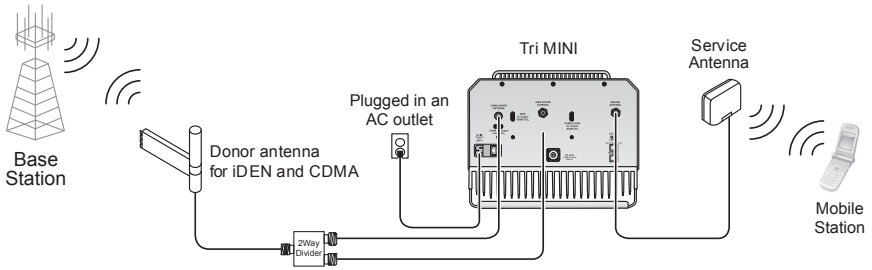
Antenna isolation = Path loss between the server antenna port and the donor antenna port

Antenna isolation ≧Repeater max. gain +15dB

If antenna isolation < Repeater max. gain +15dB → System oscillation or Low gain

Model	Max Gain	Minimum required isolation (@Max Gain)
RSN-TRI-25/24-DC	40dB to 80dB(CDMA)	≥95dB(80dB+15dB)
	50dB to 80dB(iDEN)	





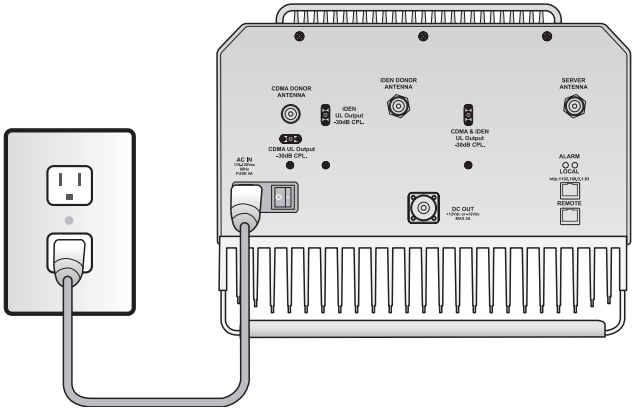
3.5 Power On

Step 1 Connect the power cord.

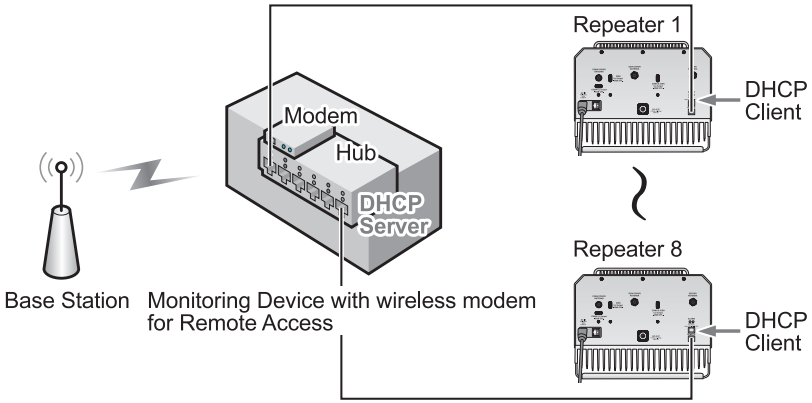
Step 2 Plug the power cord into a wall outlet.

Step 3 Power Switch turns on.

Step 4 Check if the green LED at the bottom turns on.

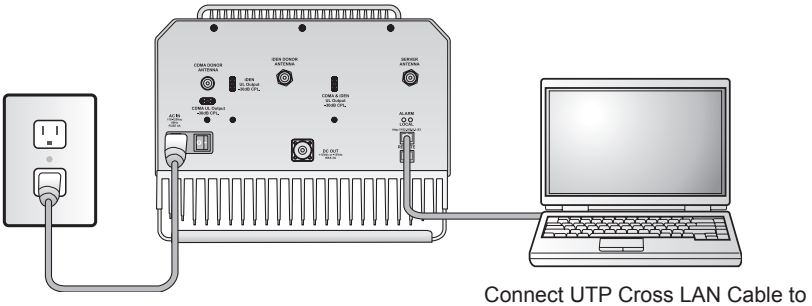


4.1 Connections



The remote port allows remote users to access the repeater through an external monitoring device.

Power on the switch to “I”
The switch is located on the bottom of the main body.



Connect UTP Cross LAN Cable to a PC and the Tri MINI.

Local port provides on-site access to the repeater.

4.2 System Requirements

Tri MINI operates on a customer provided PC based platform with the following system requirements :

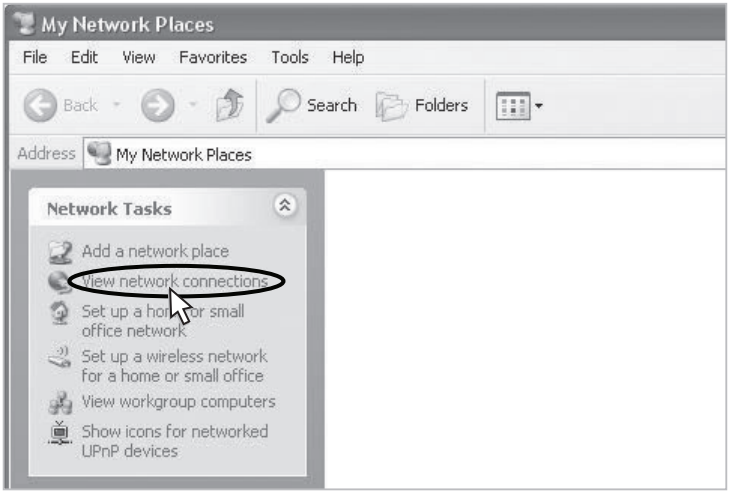
- Windows® 2000, Windows® XP or Windows® Vista
- Internet Explorer 6.0(Recommended) or higher
- 128 MB RAM or higher
- Pentium Ⅲ processor or higher
- RJ-45 jack required

4.3 Network Setup

4.3.1 Windows XP

Step 1 Click the **Start** button and **My Network Places**.

Step 2 Click **View network connections**.



Step 3 Right-click **Local Area Connection** to see a shortcut menu and click **Properties**.