

Comba

RH-8132

850MHZ CDMA AND UMTS DUAL MODE FIBER OPTIC REPEATER

USER MANUAL

RH-8132 QE: 1-0-0

Comba Telecom Ltd.

The information contained herein is the responsibility of and is approved by the following, to whom all enquiries should be directed in the first instance:

This is an unpublished work the copyright in which vests in Comba International ("Comba"). All rights reserved.

The information contained herein is confidential and the property of Comba and is supplied without liability for errors or omissions. No part may be reproduced, disclosed or used except as authorised by contract or other written permission. The copyright and the foregoing restriction on reproduction and use extend to all media in which the information may be embodied.

0.1 CONTENTS

Section	Page
0.1	CONTENTS..... 3
0.2	INDEX TO FIGURES AND TABLES 4
0.3	HISTORY..... 5
0.4	GLOSSARY OF TERMS 6
0.5	SAFETY NOTICES AND ADMONISHMENTS..... 7
1	GENERAL INFORMATION 8
2	EQUIPMENT DESCRIPTION..... 11
2.1	EQUIPMENT LAYOUT 11
2.2	KIT OF PARTS 12
3	INSTALLATION 13
3.1	WARNINGS AND ALERTS 13
3.2	SITE PLANNING CONSIDERATIONS..... 14
3.2.1	REPEATER INSTALLATION CHECKLIST 15
3.3	INSTALLATION PROCEDURES 16
3.3.1	GOODS INWARDS INSPECTION 16
3.3.2	TOOLS..... 16
3.3.3	PREPARATION..... 16
3.3.4	DAU MOUNTING RACK 16
3.3.5	CABINET MOUNTING OF DAU..... 17
3.3.6	DRU WALL MOUNTING 18
3.3.7	DRIP-LOOP 18
3.4	EQUIPMENT CONNECTORS 19
3.4.1	DAU CONNECTORS 19
3.4.2	DRU CONNECTORS 20
3.5	EQUIPMENT CONNECTION..... 21
3.5.1	GROUNDING CONNECTION..... 21
3.5.2	LI-ION BATTERY CONNECTION 21
3.5.3	OPTICAL CONNECTION 22
3.5.4	ETHERNET CONNECTION..... 22
3.5.5	CONNECTION TO PC 22
3.5.6	EXTERNAL ALARM CONNECTION..... 22
4	COMMISSIONING..... 23
4.1	PRE-COMMISSIONING TASKS 23
4.2	COMMISSIONING PROCEDURES 23
5	MAINTENANCE 24
6	APPENDICES..... 25
6.1	APPENDIX A: TOOLS FOR INSTALLATION AND MAINTENANCE 25
6.2	APPENDIX B: RMA (RETURN MATERIAL AUTHORIZATION) FORM 26

0.2 INDEX TO FIGURES AND TABLES

Figure 1: Front, Side and Bottom Views of DAU Enclosure	9
Figure 2: Front, Side and Bottom Views of the DRU Enclosure	10
Figure 3: Equipment Internal Layout of DAU	11
Figure 4: Equipment Internal Layout of DRU	12
Figure 5: Cabinet Mounting of DAU	17
Figure 6: Wall Mounting Overview	18
Figure 7: DAU Connectors	19
Figure 8: RH-8132 DRU Bottom Panel	20
Figure 9: Pins Allocation for "EXT_ALM" Port	22
Table 1: DAU KOP	12
Table 2: DRU KOP	12
Table 3: Pin Definition of "EXT_ALM" Port	22

0.3 HISTORY

Change No.	ENU	Details Of Change
1	1-0-0	RH-8132 user manual first created in June 2012 and referred to its Chinese manual RH8132-1001YH.

0.4 GLOSSARY OF TERMS

ALC	Automatic Level Control
ATT	Attenuation
BTS	Base Transceiver Station
CSA	Cross Sectional Area
DAU	Digital Access Control Unit
dB	Decibel
dBm	Decibels relative to 1 milliwatt
DL	Downlink
DPX	Duplexer
DT	Donor Terminal
DRU	Digital Remote RF Unit
E/O, O/E	Electrical/Optical, Optical/Electrical
FSK	Frequency Shift Keying
FOU	Fiber Optical Unit
GSM	Global Standard for Mobile Communication
Hz	Hertz
ID	Identification
LNA	Low Noise Amplifier
MCU	Main Control Unit
MHz	Megahertz
MT	Mobile Terminal
MTBF	Mean Time Between Failures
NF	Noise Figure
OMC	Operation & Maintenance Center
OMT	Operation & Maintenance Terminal
OP	Optical Fiber
PA	Power Amplifier
PLL	Phase Locked Loop
PSU	Power Supply Unit
RF	Radio Frequency
RFU	Radio Frequency Unit
RX	Receive
SMA	Sub-Miniature "A" Connector
SIU	Slide-In-Unit
TX	Transmit
UL	Uplink
VAC	Volts Alternating Current
VSWR	Voltage Standing Wave Ratio
WDM	Wavelength Division Multiplexer

0.5 SAFETY NOTICES AND ADMONISHMENTS

This document contains safety notices in accordance with appropriate standards. In the interests of conformity with the territory standards for the country concerned, the equivalent territorial admonishments are also shown.

Any installation, adjustment, maintenance and repair of the equipment must only be carried out by trained, authorized personnel. At all times, personnel must comply with any safety notices and instructions.

Specific hazards are indicated by symbol labels on or near the affected parts of the equipment. The labels conform to international standards, are triangular in shape, and are coloured black on a yellow background. An informative text label may accompany the symbol label.

Hazard labeling is supplemented by safety notices in the appropriate equipment manual. These notices contain additional information on the nature of the hazard and may also specify precautions.

Warning:

These draw the attention of personnel to hazards that may cause death or injury to the operator or others. Examples of use are cases of high voltage, laser emission, toxic substances, point of high temperature, etc.

Alert:

These draw the attention of personnel to hazards that may cause damage to the equipment. An example of use is the case of static electricity hazard.

Caution notices may also be used in the handbook to draw attention to matters that do not constitute a risk of causing damage to the equipment but where there is a possibility of seriously impairing its performance, e.g. by mishandling or gross maladjustment. Warnings and Cautions within the main text do not incorporate labels and may be in shortened form.

Caution:

The user is cautioned that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

NOTE:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

To comply with FCC RF exposure requirements, the device and the antenna for this device must be installed to ensure a minimum separation distance of 3.94 meters or more from a person's body. Other operating configurations should be avoided.

End of Section

1 GENERAL INFORMATION

The RH-8132 850MHz CDMA and UMTS Dual Mode Fiber Optic Repeater (hereinafter called "RH-8132") can be used in a point-to-point or point-to-multipoint distributed antenna system to provide effective coverage enhancement. It uses fiber transmission and is suitable for applications where large signal coverage is required, such as citywide enhancement, highways, canyons, campuses, underground tunnels, airports, convention centres, etc.

This system consists of Digital Access Unit (DAU) and Digital Remote RF Unit (DRU).

The low loss of optical fiber makes it suitable for long distance transmission. This system can support optical transmission of up to 10dB signal transmission loss. There is no isolation problem as in standard off-air repeaters, which means customer can select the service antenna flexibly according to the real situation, such as directional or Omni-directional antenna.

Remote configuration and surveillance is possible through Comba's OMC remote control and monitoring system.

Characteristics of RH-8132 are as follows:

- Supports 7.5 MHz of CDMA subband (870.5~877.5/825~832.5 MHz) and 5 MHz of WCDMA subband (877.5~882.5/832.5~837.5 MHz).
- Flexible network configuration as star, daisy chain and mixed configuration.
- Automatic and manual time delay adjustment effectively avoids same frequency interference in chain configuration.
- Optional redundancy design for PSU and PA module.
- Supports remote firmware upgrade via fibre.
- Local Operation and Maintenance Terminal (OMT): operating status and parameters can be set or monitored by OMT PC locally. And the point-to-point setting and inquiry between DAU and DRU is realizable through optical fiber, which makes it convenient for on-site configuration.
- Operation Maintenance Center (OMC): system working parameters and communication configuration can be set or inquired remotely through the ethernet cable.

The figures below show the equipment enclosure layout of RH-8132 DAU and DRU.

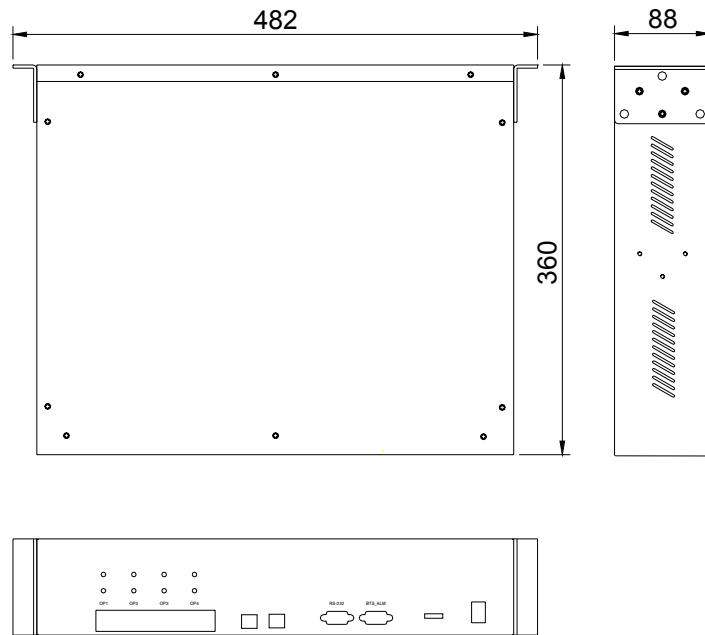


Figure 1: Front, Side and Bottom Views of DAU Enclosure

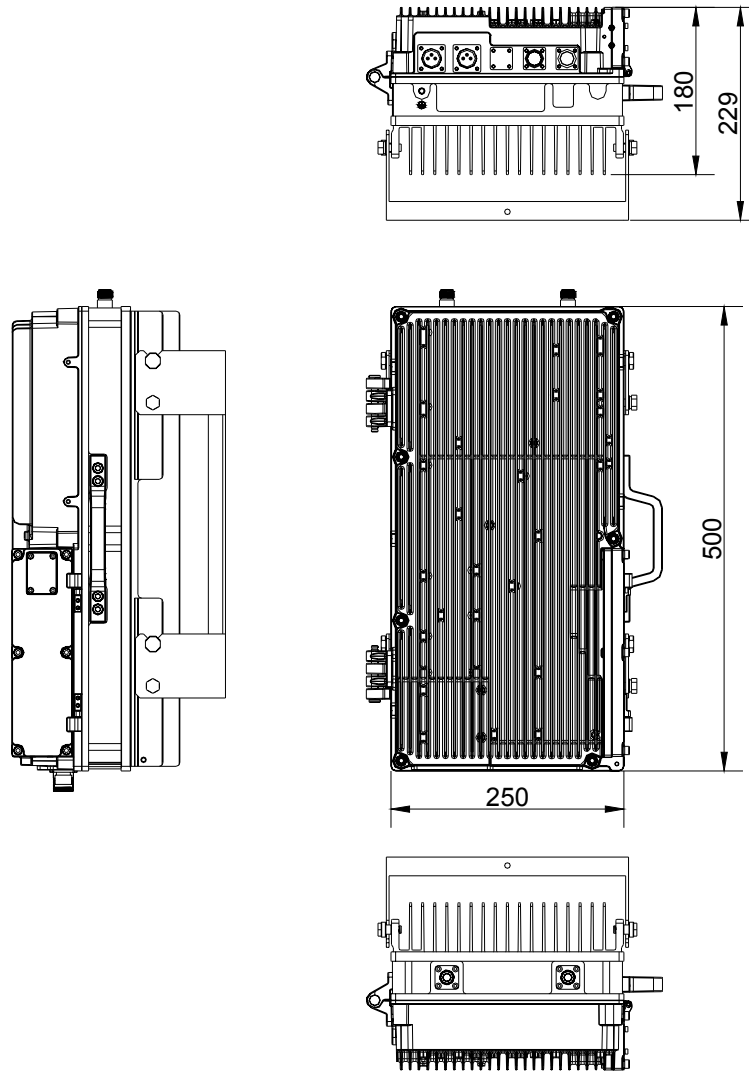


Figure 2: Front, Side and Bottom Views of the DRU Enclosure

End of section

2 EQUIPMENT DESCRIPTION

2.1 EQUIPMENT LAYOUT

The internal layouts for the DAU are shown below:

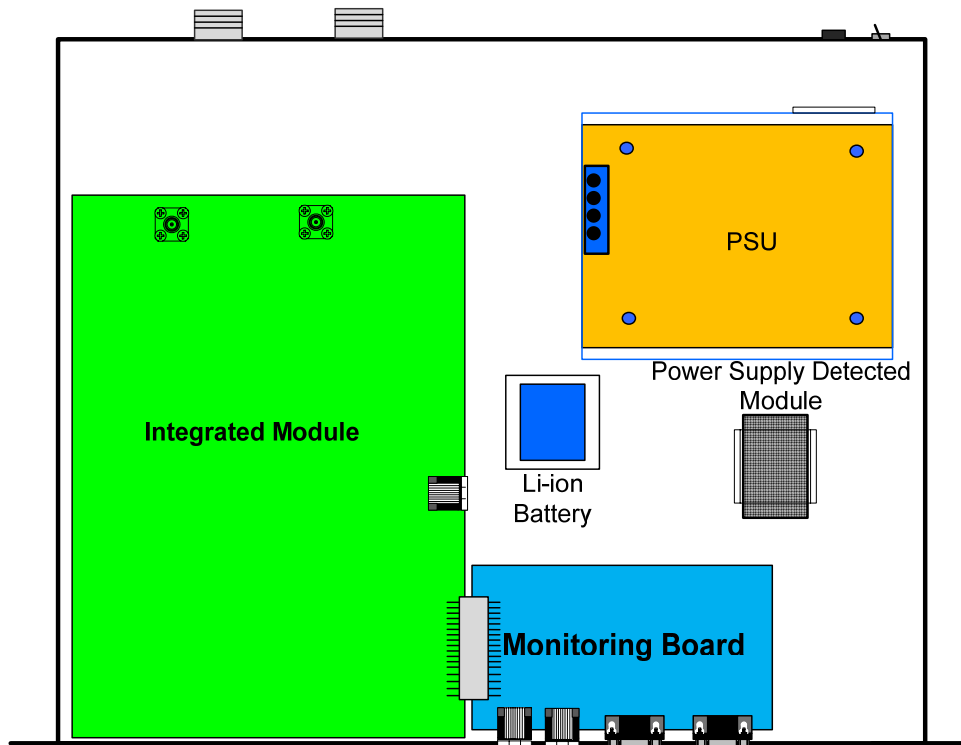


Figure 3: Equipment Internal Layout of DAU

The internal layouts for the DRU are shown below:

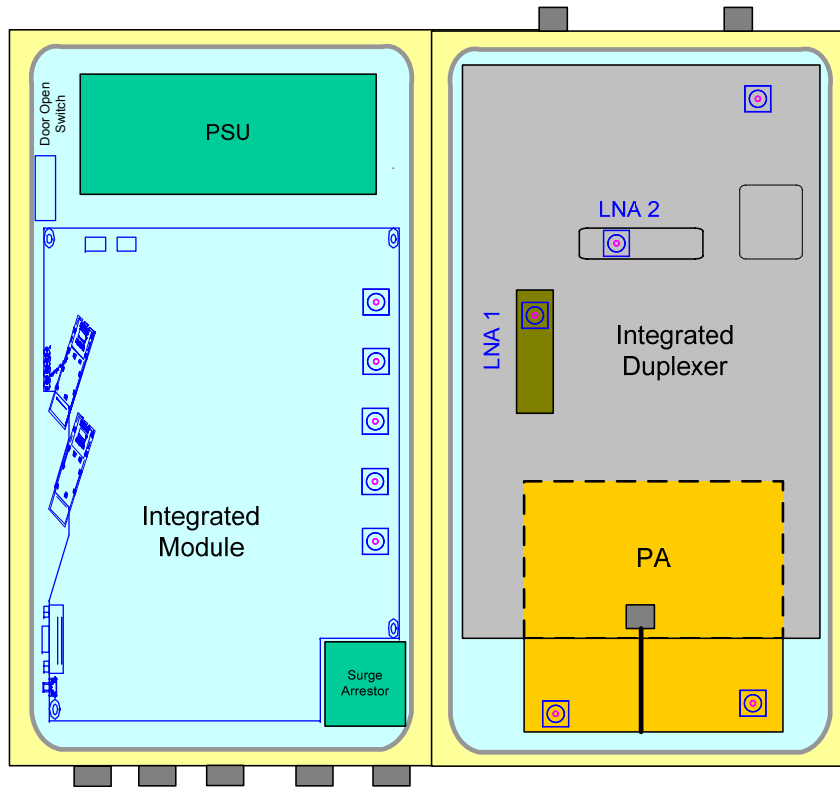


Figure 4: Equipment Internal Layout of DRU

2.2 KIT OF PARTS

For this system, the following are shipped:

Table 1: DAU KOP

Product Identifier	Description	Quantity
Omni Antenna	XD-GSM-900/1800V-3	1
Wall Plug	Φ8	4
Philips Pan Head Self-tapping Screw	GB/T845, ST4x25	4
Spring Washer	GB/T93	4
Plain Washer	GB/T95	4

Table 2: DRU KOP

Product Identifier	Description	Quantity
Power Supply Cable	N/A	1
Fuse	N/A	2
Masonry Bolt	M10x110	4

End of Section

3 INSTALLATION

3.1 WARNINGS AND ALERTS

Laser

Laser light can cause damage to eyes. Laser light is not visible. Viewing it directly does not cause pain. The iris of the eye will not close when viewing a bright light. Consequently, serious damage to the retina of the eye is possible. NEVER LOOK INTO THE END OF A FIBER WHICH MAY HAVE A LASER COUPLED TO IT.

Radio Frequency Energies

There may be situations, particularly for workplace environments near high-powered RF sources, where recommended limits for safe exposure of human beings to RF energy could be exceeded. In such cases, restrictive measures or actions may be necessary to ensure the safe use of RF energy.

High Voltage

The equipment has been designed and constructed to prevent, as far as reasonably, practicable danger. Any work activity on or near equipment involving installation, operation or maintenance must be, as far as reasonably, free from danger.

Where there is a risk of damage to electrical systems involving adverse weather, extreme temperatures, wet, corrosive or dirty conditions, flammable or explosive atmospheres, the system must be suitably installed to prevent danger.

Protective Earthing

Equipment provided for the purpose of protecting individuals from electrical risk must be suitable for the purpose and properly maintained and used.

Handling Precautions

This covers a range of activities including lifting, lowering, pushing, pulling, carrying, moving, holding or restraining an object, animal or person. It also covers activities that require the use of force or effort, such as pulling a lever, or operating power tools.

Electrostatic Discharge (ESD)

Observe standard precautions for handling ESD-sensitive devices. Assume that all solid-state electronic devices are ESD-sensitive. Ensure the use of a grounded wrist strap or equivalent while working with ESD-sensitive devices. Transport, store, and handle ESD-sensitive devices in static-safe environments.

3.2 SITE PLANNING CONSIDERATIONS

Site Considerations

The DAU can be located indoors to facilitate coupling of BTS signals and power supply connections. The recommended input range of BTS signal is -15~5 dBm. Hence, an appropriate coupler must be used according to input power of the repeater.

The DRU is designed to be waterproof, rainproof, and with snow protection. Temporary protection should be taken when the equipment enclosure is opened for installation or maintenance in an outdoor environment. The equipment must not be opened for installation or maintenance in bad weather (e.g. gale, storm rainfall, extreme temperatures and high humidity)

The site considerations for DRUs are listed below:

- The distance between the service antenna of DRU and coverage area should satisfy line of sight requirements for maximum coverage area.
- The maximum fiber length is 20km, with a maximum optical path loss of 10dB.
- The system delay of the optical system must be taken into consideration when there are neighboring BTS sites overlapping in coverage.

Installation Location

Mounting surface shall be capable of supporting the weight of the equipment.

In order to avoid electromagnetic interference, a proper Mounting location must be selected to minimize interference from electromagnetic sources such as large electrical equipment.

Environmental

Humidity has an adverse effect on the reliability of the equipment. It is recommended to install the equipment in locations having stable temperature and unrestricted air-flow.

The installation location for the product should be well ventilated. The equipment has been designed to operate at the temperature range and humidity level as stated in the product specifications in the datasheet.

Direct sun light exposure to the equipment should be avoided. Provide additional shelter if necessary.

Powering

The power supply unit (PSU) provides power to all modules within the equipment. Depending on the product variant, it is recommended that the PSU operates on a dedicated circuit breaker or fused circuit.

Grounding Requirement

Verify that the equipment has been well grounded. This includes antennas and all cables connected to the system. Ensure lightning protection for the antennas is properly grounded.

Cable Routing

Depending on equipment configuration, a variety of types of cables are required. Where applicable, ensure cables are properly routed and secured so that they are not damaged.

Manual Handling

During transportation and installation, take necessary handling precautions to avoid potential physical injury to the installation personnel and the equipment.

3.2.1 REPEATER INSTALLATION CHECKLIST

- Working space available for installation and maintenance for each mounting arrangement. Ensure unrestricted airflow.
- Ensure earthing point is within reach of the ground wire.
- Ensure a power source is within reach of the power cord and the power source has sufficient capacity.
- Where appropriate, ensure unused RF connectors are terminated.
- Where appropriate, ensure unused optical fibre connectors are protected.
- Do not locate the equipment near large transformers or motors that may cause electromagnetic interference.
- Reduce signal loss in feeder cable by minimizing the length and number of RF connections.
- Ensure the equipment will be operated within the stated environment (refer to datasheet).
- Where needed, couple BTS RF signal with a coupler to prevent damaging the equipment.
- Where appropriate, confirm available of suitably terminated grade of RF and optical fiber. (optical fiber \leq 20km from DAU to DRU)
- Observe handling of all cables to prevent damage.

3.3 INSTALLATION PROCEDURES

3.3.1 GOODS INWARDS INSPECTION

1. Verify the number of packages received against the packing list.
2. Check all packages for external damage; report any external damage to the shipping courier. If there is damage, a shipping agent should be present before unpacking and inspecting the contents because damage caused during transit is the responsibility of the agent.
3. Open and check each package against the packing list. If any items are missing, please contact Comba.
4. Do not remove items from antistatic packing until ready for installation. If damage is discovered at the time of installation, contact the shipping agent.

3.3.2 TOOLS

See Appendix A for a full list of the recommended tools required for installation and maintenance.

3.3.3 PREPARATION

Optical Fiber:

- Optical fibers require proper handling. Do not stretch, puncture, or crush the fiber cable with staples, heavy equipment, doors, etc.
- Always maintain the minimum bending radius specified by the cable manufacturer. The minimum bend radius is usually 10 times the cable's outer diameter. In the case of a single optical fiber that is not enclosed by the jacket, the minimum bending radius is 3cm.

3.3.4 DAU MOUNTING RACK

The mounting rack is used for mounting the equipment to either a wall or on a pole. Shown below is the diagram of the mounting rack. The round holes are used for masonry bolts, and square holes for carriage bolts.

3.3.5 CABINET MOUNTING OF DAU

If a 2-post open-rack is to be used for installation of the DAU, the mid-mounting brackets are to be used. For rack or cabinet mounting, the mid-Mounting brackets are to be removed from the 4U shelf. Cage nut and screws are not supplied. Unless otherwise recommended by rack manufacturer, M6 cage nut / bolt are to be used.

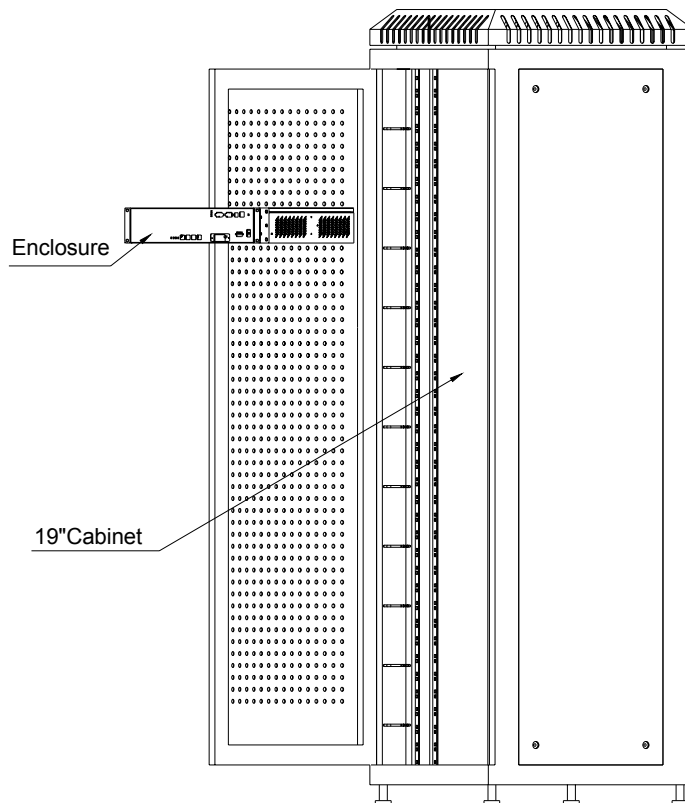


Figure 5: Cabinet Mounting of DAU

3.3.6 DRU WALL MOUNTING

- Drill holes on the wall by using the position of the four round holes on the Mounting rack as a guide.
- Insert the masonry bolts M10x110 through the round holes and tighten them to take the weight of the entire DRU.
- Hook the enclosure up onto the mounting rack and align the hole positions to that of the mounting rack, then installed the hex socketed bolt (M8 x 12) to complete the installation.

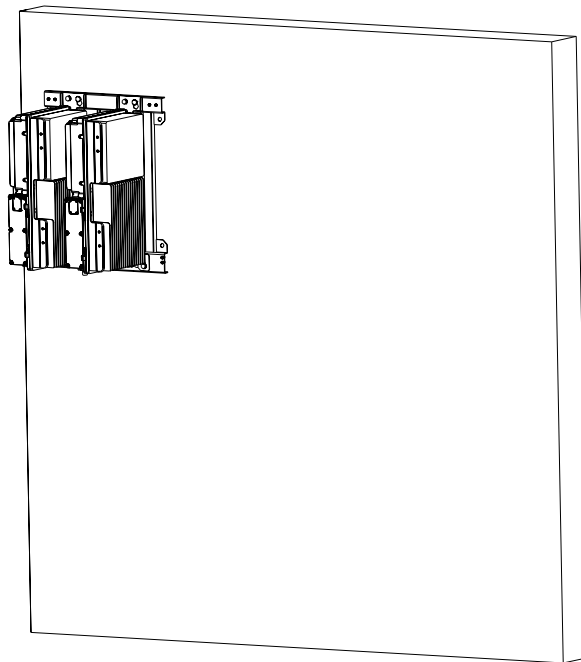


Figure 6: Wall Mounting Overview

3.3.7 DRIP-LOOP

Comba recommends that every horizontal cable entry to the equipment forms a 'U' before it's entry to the equipment. Any accumulated water on the cable will drip down at the bottom of the loop and will not accumulate at the equipment connectors.

3.4 EQUIPMENT CONNECTORS

The DAU is connected via the connectors located on the front and back panel. The DRU is designed for all cables entries from the bottom of the enclosure.

3.4.1 DAU CONNECTORS

3.4.1.1 DAU Connectors

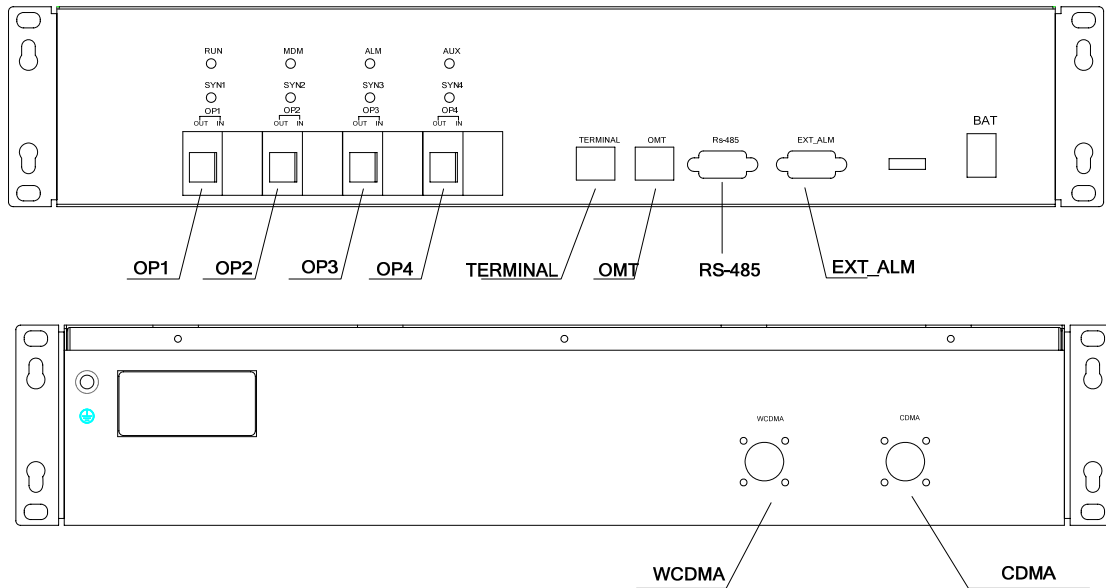


Figure 7: DAU Connectors

3.4.2 DRU CONNECTORS

Connectors on the DRU are identified below:

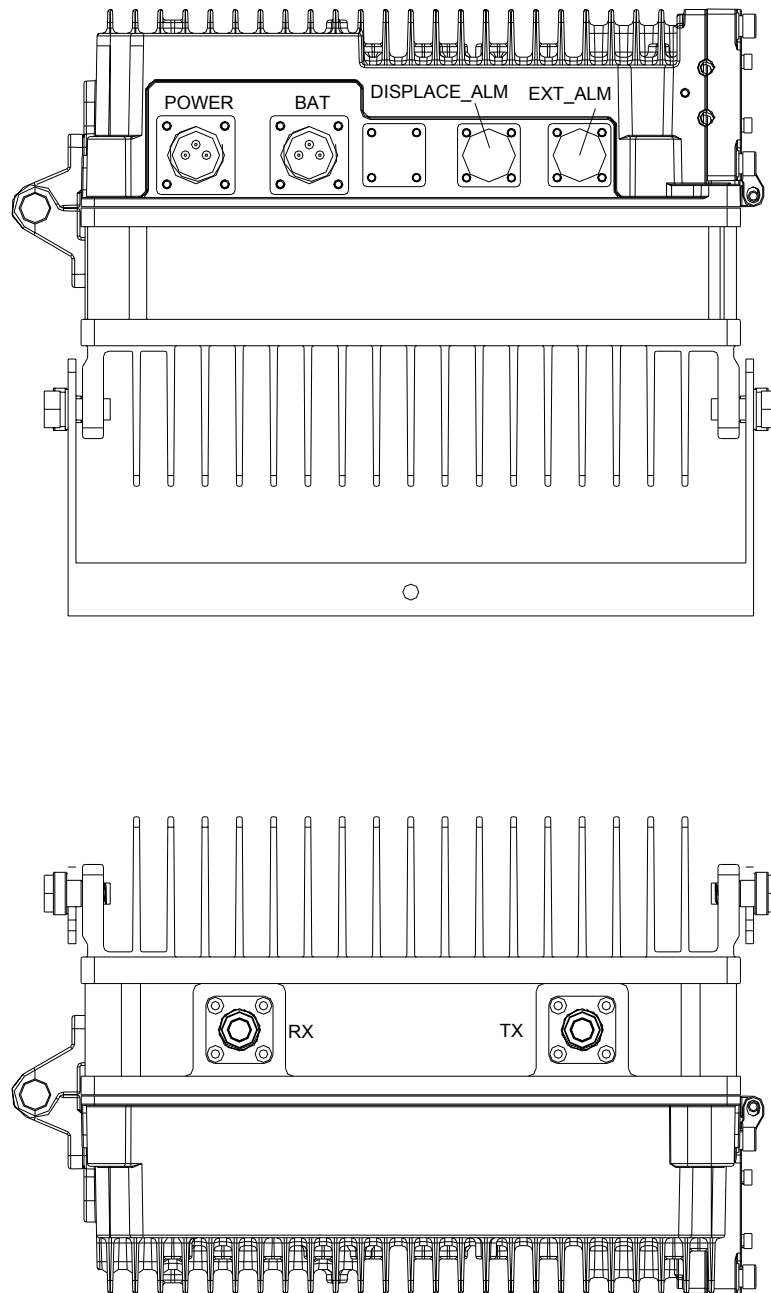


Figure 8: RH-8132 DRU Bottom Panel

3.5 EQUIPMENT CONNECTION

3.5.1 GROUNDING CONNECTION

Ground Connection

To ensure safe operation of the product, a ground (earth) connection is required. For single phase AC power source, the product must be grounded by connecting the “earth wire” of the power cord to the ground terminal of the AC supply. For operating this product with DC power system (such as rectifiers), the product should not be connected to power systems that switch open the return lead because the return lead could function as the ground (earth) connection for the equipment.

Protective Ground Connection

The enclosure must be grounded securely by connecting a copper wire (CSA 16mm²) to the grounding terminal on the equipment/rack, and the other end to a protective ground (i.e., building earth point). An internationally acceptable colour code of the ground connection wire is green/yellow.

Such a ground connection implements the “Protective Ground Connection”, and must be connected to the equipment at the designated ground point, and preferable using crimp connectors. In general, do not connect the supply before establishing an adequate ground (earth) connection.

1. DAU Grounding Connection

Connect the grounding terminal located on the back panel of DAU to a protective ground (i.e., building earth point).

2. DRU Grounding Connection

The equipment must be grounded securely. Connect a copper wire to the grounding terminal located on the cooling fin, and connect the other end to a protective ground (i.e., building earth point). An internationally acceptable colouring code of the ground connection wire is green/yellow.

3.5.2 LI-ION BATTERY CONNECTION

Li-ion battery is provided with this system to ensure power is supplied to the system monitoring unit and MCU and to ensure the alarm message could be sent to OMC effectively in case of mains power failure.

Caution: Be careful of the risk of explosion if battery is replaced by an incorrect type. Dispose of used batteries according to the instructions.

DAU Li-ion Battery Connection

The Li-ion battery is located within the PSU SIU and is disconnected prior to shipment. Before equipment power up, user needs to withdraw the PSU SIU from the DAU shelf, locate and connect the in-line connector of the battery pack and then reinsert the PSU SIU.

DRU Li-ion Battery Connection

With the equipment lying flat, remove the bolts with an Allen Key, unlock and open the enclosure door. Locate the battery pack, the in-line connector of the battery pack is “disconnected” from the PSU during shipment. Connect the in-line connector, turn on the battery switch located on the PSU, close the enclosure door, insert and tighten bolts to complete this procedure.

3.5.3 OPTICAL CONNECTION

The DAU is connected to DRU via optical fiber (length < 20km). Connect the LC/UPC connector to one port between OP1~OP2, and FC/UPC to optical adaptor.

On the DRU, there are two optical ports. **NOTICE: OP1 shall be connected with the upper level of DAU or equipment and OP2 shall be connected with sub level of DAU or equipment.** WLAN port is used for connecting with baseband transmit.

3.5.4 ETHERNET CONNECTION

Connect the local RJ45 Ethernet connector to the DAU TERMINAL when DRU adopts remote monitoring via Ethernet.

3.5.5 CONNECTION TO PC

Connect DAU to PC

Connect the RS-232 port located on the MCU SIU module to the serial port of PC with the RS-232 cable supplied to achieve local monitoring.

Connect DRU to PC

Connect the RS-232 port located on the bottom of the DRU to the serial port of PC with the RS-232 cable supplied to achieve local monitoring.

3.5.6 EXTERNAL ALARM CONNECTION

Four external alarms INPUT to DRU are realized on the “EXT_ALM” port, this is a 7-pin CPC connector. The following figure and table shows the pin allocation and definition. Pin numbering are shown looking-into the connector on the enclosure.

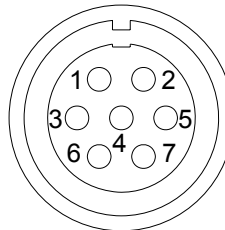


Figure 9: Pins Allocation for “EXT_ALM” Port

Table 3: Pin Definition of “EXT_ALM” Port

Pin number	1	2	3	4	5	6	7
Alarm definition	EXT. Alarm 1	EXT. Alarm 2	Reserved	GND	Reserved	Reserved	Reserved

End of section

4 COMMISSIONING

4.1 PRE-COMMISSIONING TASKS

After equipment installation, perform the following steps before equipment powering and commissioning, check that the expected voltage, current, and power levels do not violate any ratings. Double check all connections including ground before applying power. Do not manipulate circuits or make changes when power is applied:

- Visually inspect the power connection within the equipment. Ensure that the power cable is correctly and securely connected, including grounding wire, RF cable and optical cable.
- Check grounding connection and verify that the ground resistance is less than 5Ω.
- Connect the equipment to the PC installed with OMT software.
- With the DAU installed, apply power to the DAU by switching on the “Power” switch.
- With the DAU switched on, DRU installed and all cablings connected, apply power to the DRU by switching on the PSU switch on the integrated PSU.
- Monitor the initialization of DAU and DRU wait until equipment initialization has completed.
- The online commissioning can be commenced with following the commissioning steps.

4.2 COMMISSIONING PROCEDURES

Since end-to-end connection is available for RH-8132 OMT software, users can configure the parameters at DAU, and then offset the parameters of DAU at DRU according to desired coverage level and interference to other BTS signals. Perform the following procedures for system commissioning.

- Locally connect to DRU(s) and set its site ID.
- Locally connect to DAU and set its site ID and network parameters. Then register the site ID of DRU at DAU.
- Check the working status of DAU and DRU. If damage occurs, proceed with RMA process.
- At DRU, adjust downlink gain so that the output power can achieve the design requirement.
- At DAU, configure the uplink gain of DAU to make the UL output noise level to be lower than the BTS noise threshold. Refer to the table below for the comparison between UL gain and UL output noise level of DAU.
- Configure the UL gain of both DAU and DRU to ensure high quality communication link within the desired area.
- Confirm no interference to BTS to complete commissioning.

End of section

5 MAINTENANCE

The RH-8132 repeater is designed for trouble-free operation and generally does not need maintenance. Maintenance activities should only be carried out by trained personnel.

The equipment operation status can be observed remotely through OMT/OMC.

Periodic inspection of the repeater equipment(s) is recommended. The recommended tasks include:

- Measurement of the return loss of the feeder system.
- Ensure the stable connection of cables, power cords and facilities located indoor.
- Inspect and record operation status and parameters, such as receive signal level, output noise level, DL output power of the repeater, from OMC or OMT.
- Check the PSU voltage of DAU.
- Verify that the actual coverage effects have not degraded.
- Check the working status of optical TX/RX power.
- Check the controlling and monitoring function.
- Verify lightning and grounding protection is in good condition.
- Ensure the labels are clear and legible.

End of section

6 APPENDICES

6.1 APPENDIX A: TOOLS FOR INSTALLATION AND MAINTENANCE

The following are the recommended list of tools new installation and routine maintenance:

- Slotted screwdriver
- Philips screwdriver
- Ring spanner (Assorted size: 12~20mm)
- Electrically operated drill and masonry drill bits \varnothing 10mm
- Anti-static wrist strap
- Allen key (M5.5)
- Side cutter
- Frequency counter (e.g. FLUKE PM6685R)
- RF Power Meter (e.g. Bird 5000)
- T-shaped Pentagon Key Wrench

6.2 APPENDIX B: RMA (RETURN MATERIAL AUTHORIZATION) FORM



Comba Telecom Ltd.
611 East Wing, No. 8 Science Park West Avenue, Hong Kong Science Park, Tai Po, Hong Kong
Tel: +852 2636 6861 Fax: +852 2637 0966

RMA Request Form

Date: _____

From: _____
Address: _____
Tel: _____ Fax: _____
E-Mail: _____
ATTN: _____

Product Information:

Table with 6 columns: Item, Model, Serial Number, Return Category, Qty, Problem Description. Rows 1-10.

Notes:

- 1. For 'Return Category' column, please select from A: Return of Defective Product, B: Return of Trial Sample, or C: Return of New and Unused Product.
2. If A or C category of return product is chosen, please give short description of the problem or reason for returning.

Transportation Information:

Location of Product: _____

Transportation Method: _____

Shipping Forwarder: _____

Note: Location of Product must be stated, while Transportation Method or Shipping Forwarder can be left blank if not determined.

Signature: _____

For Comba Use (Only)

Return Merchandise Authorization Number (RMA#): _____

Recommended Action: _____

Shipment and Handling Cost to be paid by: _____

Approved by: _____

Date: _____

End of section

End of Document



Hong Kong Office

Address: 611 East Wing, No. 8 Science Park West Avenue, Hong Kong Science Park, Tai Po, Hong Kong.
Tel: +852 2636 6861 Fax: +852 2637 0966

Singapore Office

Address: No. 1 Kaki Bukit View, #02-10 Techview, Singapore 415941
Tel: + 65 6345 4908 Fax: + 65 6345 1186

Thailand Office

Address: 3rd Floor, T. Shinawatra Building, 94 Sukhumvit Soi 23, Sukhumvit Road, Klongtoeynua, Wattana, Bangkok 10110
Tel: +66 2664 3440 Fax: +66 2664 3442

India Office

Address: Suite No. 2, E-172, TSH House, Greater Kailash – I, New Delhi – 110 048, India
Tel: + 91 11 4173 9997 / 8 Fax: + 91 11 4173 9996

Sweden Office

Address: Gustavslundsvagen 147, S- 167 51 Bromma, Stockholm, Sweden
Tel: +46 8 25 38 70 Fax: +46 8 25 38 71

Brazil Office

Address: Avenida Engenheiro Luiz Carlos Berrini 1297, cj 122, 04571-090 Brooklin Novo, São Paulo, Brazil
Tel: +55 11 35093700 Fax: +55 11 35093720

Dubai Office

Address: P.O. Box 450583, DUBAI, U.A.E.
Tel: +971 0 4 433 5320 Fax: +971 0 4 422 6774

US Office

Address: Comba Telecom Inc. 2390 Bering Drive, San Jose, CA 95131, USA
Tel: +1 408 526 0180 Fax: +1 408 526 0181

China Office

Address: No.10, Shenzhou Road, Guangzhou Science City, Guangzhou, China
Tel: + 86 20 2839 0000 Fax: + 86 20 2839 0136

www.comba-telecom.com