LNA

Low-Noise Amplifier Series

Installation and Operation Manual

Part Number MN/LNAS.IOM

Revision 1

Comtech EF Data, 2114 West 7th Street, Tempe, Arizona 85281 USA, 480.333.2200, FAX: 480.333.2161

Table of Contents

Tables

Figures

PREFACE

Product Support

For all product support, please call:

+1.240.243.1880

+1.866.472.3963 (toll free USA)

About this Manual

This manual gives installation and operation information for the Comtech EF Data LNA Low Noise Amplifier Series unit. Anyone who installs or operates the unit must read this manual.

Cautions and Warnings

WARNING means a potentially hazardous situation that could result in death or serious injury.

CAUTION means a hazardous situation that could result in minor or moderate injury, or risks of property damage.

IMPORTANT or **NOTE** means information critical for correct equipment function, or an important statement that is applicable to a task.

Patents and Trademarks

See all of Comtech EF Data's Patents and Patents Pending at http://patents.comtechefdata.com.

Comtech EF Data acknowledges that all trademarks are the property of the trademark owners.

DoubleTalk® is licensed from "Raytheon Applied Signal Technology".

DoubleTalk® is a registered trademark of "Raytheon Applied Signal Technology".

Carrier-in-Carrier® is a registered trademark of Comtech EF Data.

Microsoft®, Windows®, Internet Explorer® and Visio® are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

Google Chrome® is a registered trademark of Google Inc.

Mozilla Firefox® is a registered trademark of the Mozilla Foundation.

Copyright

Licensing

The software included in this product contains copyrighted open source software that is licensed under the GPL. The list of licenses and copies of the licenses are available via the product's web interface.

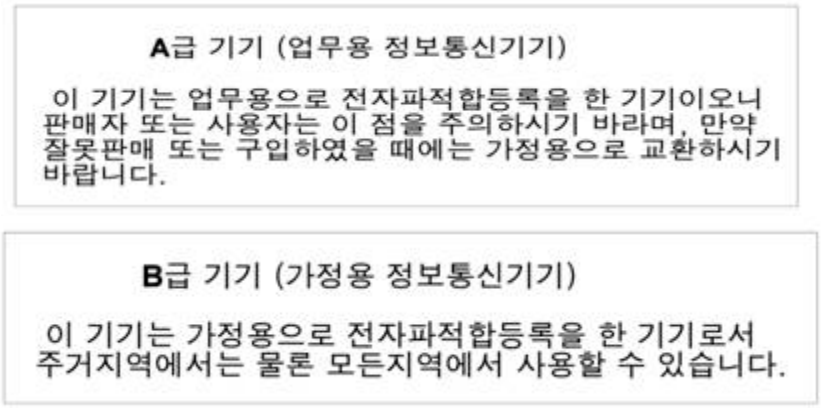
Regulatory Compliance

Telecommunications Terminal Equipment Directive

In accordance with the Telecommunications Terminal Equipment Directive 91/263/EEC, do not connect this equipment directly to the Public Telecommunications Network.

EMC (Electromagnetic Compatibility)

South Korean Electromagnetic Compatibility



Unofficial translation:

Class A: EMC Registration is done on this equipment for business use only (Class A). Product seller and user should notice that this equipment is not for household use.

Class B: EMC Registration is done on this equipment mainly for household use (Class B) and also can be used in all areas.

European

In accordance with European Directive 89/336/EEC, independent testing showed that the MN/LNAS.IOM complied with these standards:

Emissions EN 55022 Class B Limits and methods of measurement of radio interference characteristics of Information Technology Equipment
(Also tested to FCC Part 15 Class B)

Immunity EN 50082 Part 1 Generic immunity standard, Part 1: Domestic, commercial and light industrial environment.

Additionally, the MN/LNAS.IOM complied with these standards:

- EN 61000-3-2 Harmonic Currents Emission
- EN 61000-3-3 Voltage Fluctuations and Flicker
- EN 61000-4-2 ESD Immunity
- EN 61000-4-4 EFT Burst Immunity
- EN 61000-4-5 Surge Immunity
- EN 61000-4-6 RF Conducted Immunity
- EN 61000-4-8 Power frequency Magnetic Field Immunity
- EN 61000-4-9 Pulse Magnetic Field Immunity
- EN 61000-4-11 Voltage Dips, Interruptions, and Variations Immunity
- EN 61000-4-13 Immunity to Harmonics

Electrical Safety

The LNA has been shown to comply with the EN 60950 Safety of Information Technology Equipment (including electrical business machines) safety standard.

Fuses

CAUTION: Always replace the fuses with the correct fuse type and rating. Use correct fuses to help prevent damage to the equipment.

Class I Pluggable Equipment Type A-Protective Earthing

The cable distribution system/telecommunication network of this product relies on protective earthing and the integrity of the protective earthing must be insured

In Finland:

"Laite on liitettävä suojakoskettimilla varustettuun pistorasiaan"

In Norway:

“Apparatet må tilkoples jordet stikkontakt”

In Sweden:

“Apparaten skall anslutas till jordat uttag”

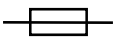
Galvanic Isolator Use

Utrustning som är kopplad till skyddsjord via jordat vägguttag och/eller via annan utrustning och samtidigt är kopplad till kabel-TV nät kan i visa fall medföra risk för brand. För att undvika detta skall vid anslutning av utrustningen till kabel-TV nät galvanisk isolator finnas mellan utrustningen och kabel-TV nätet

Restricted Access Location

In Nordic Countries, equipotential bonding should be applied using the permanently connected ground stud by a qualified service person

International Symbols

Symbol	Definition
~	Alternating Current
	Fuse

Symbol	Definition
	Protective Earth
	Chassis Ground

Environmental

Maximum storage temperature allowed is -4 to +158°F (-20 to +70°C).

Do not operate the LNA in an environment where it is exposed to:

- Precipitation
- Condensation
- Humid atmospheres above 95% RH
- Altitudes (unpressurized) greater than 2000 meters
- Excessive dust or vibration
- Flammable gases
- Corrosive or explosive atmospheres
- Extremes of temperature outside the ambient range 32 to 122°F (0 to +50°C)

Operation in vehicles or other transportable installations that are equipped to provide a stable environment is permitted. If such vehicles do not provide a stable environment, safety of the equipment to EN 60950 may not be guaranteed.

Comtech EF Data Headquarters

http://www.comtechefdata.com

Comtech EF Data Corp.

2114 West 7th Street

Tempe, Arizona USA 85281

+1.480.333.2200

Warranty Policy

Comtech EF Data products are warranted against defects in material and workmanship for a specific period from the date of shipment, and this period varies by product. In most cases, the warranty period is two years. During the warranty period, Comtech EF Data will, at its option, repair or replace products that prove to be defective. Repairs are warranted for the remainder of the original warranty or a 90 day extended warranty, whichever is longer. Contact Comtech EF Data for the warranty period specific to the product purchased.

For equipment under warranty, the owner is responsible for freight to Comtech EF Data and all related customs, taxes, tariffs, insurance, etc. Comtech EF Data is responsible for the freight charges only for return of the equipment from the factory to the owner. Comtech EF Data will return the equipment by the same method (i.e., Air, Express, Surface) as the equipment was sent to Comtech EF Data.

All equipment returned for warranty repair must have a valid RMA number issued prior to return and be marked clearly on the return packaging. Comtech EF Data strongly recommends all equipment be returned in its original packaging.

Comtech EF Data Corporation's obligations under this warranty are limited to repair or replacement of failed parts, and the return shipment to the buyer of the repaired or replaced parts.

Limitations of Warranty

The warranty does not apply to any part of a product that has been installed, altered, repaired, or misused in any way that, in the opinion of Comtech EF Data Corporation, would affect the reliability or detracts from the performance of any part of the product, or is damaged as the result of use in a way or with equipment that had not been previously approved by Comtech EF Data Corporation.

The warranty does not apply to any product or parts thereof where the serial number or the serial number of any of its parts has been altered, defaced, or removed.

The warranty does not cover damage or loss incurred in transportation of the product.

The warranty does not cover replacement or repair necessitated by loss or damage from any cause beyond the control of Comtech EF Data Corporation, such as lightning or other natural and weather related events or wartime environments.

The warranty does not cover any labor involved in the removal and or reinstallation of warranted equipment or parts on site, or any labor required to diagnose the necessity for repair or replacement.

The warranty excludes any responsibility by Comtech EF Data Corporation for incidental or consequential damages arising from the use of the equipment or products, or for any inability to use them either separate from or in combination with any other equipment or products.

A fixed charge established for each product will be imposed for all equipment returned for warranty repair where Comtech EF Data Corporation cannot identify the cause of the reported failure.

Exclusive Remedies

Comtech EF Data Corporation's warranty, as stated is in lieu of all other warranties, expressed, implied, or statutory, including those of merchantability and fitness for a particular purpose. The buyer shall pass on to any purchaser, lessee, or other user of Comtech EF Data Corporation's products, the aforementioned warranty, and shall indemnify and hold harmless Comtech EF Data Corporation from any claims or liability of such purchaser, lessee, or user based upon allegations that the buyer, its agents, or employees have made additional warranties or representations as to product preference or use.

The remedies provided herein are the buyer's sole and exclusive remedies. Comtech EF Data shall not be liable for any direct, indirect, special, incidental, or consequential damages, whether based on contract, tort, or any other legal theory.

Chapter 1. INTRODUCTION

1.1 Introduction

The Comtech EF Data (CEFD) Low-Noise Amplifier (LNA) series (Figure 1-1) includes LNAs, available in C-Band and Ku-Band. They meet or exceed system requirements for commercial geosynchronous satellites worldwide. Their compact design and rugged construction make them ideal for transportable applications and severe environments. They have a comprehensive set of options to accommodate systems ranging from Very Small Amplifier Terminal (VSATs) to major earth stations.

Figure 1-1. LNA: Left, C-Band Low-Noise Amplifier; Right, Ku-Band Low-Noise Amplifier

1.2 Technology

The amplifiers incorporate both HEMT (High Electron Mobility Transistors) devices for Low-Noise temperature performance and GaAs FET (Gallium Arsenide) devices for low intermodulation. The unit uses surface mounted components for robotic manufacturing techniques, thereby insuring maximum product consistency and enhanced reliability.

1.3 Reliability

The Comtech EF Data amplifier series (CLNA and KLNA) utilizes proprietary circuitry and high quality components to achieve an MTBF (mean time between failures) in excess of 160,000 hours. Each unit is subjected to a 72 hour burn-in and temperature cycled from -40 to 140°F (-40 to +60°C).

1.4 Construction

The LNAs (CLNA and KLNA) are housed in waterproof enclosures with a small profiles to better accommodate redundancy configurations. The enclosures also provide a pressurizable, integral waveguide flange.

Chapter 2. INSTALLATION

2.1 Unpacking

Inspect shipping containers for damage. If shipping containers are damaged, keep them until the contents of the shipment have been carefully inspected and checked for normal operation.

The modulator and manual are packaged in pre-formed, reusable, cardboard cartons containing foam spacing for maximum shipping protection.

CAUTION

Do not use any cutting tool that will extend more than 1 inch into the container. This can cause damage to the LNA.

Do these steps:

1. Cut the tape at the top of the carton indicated by OPEN THIS END.
2. Remove the cardboard/foam space covering the LNA.
3. Remove the LNA and manual from the carton.
4. Save the packing material for storage or reshipment purposes.
5. Inspect the equipment for any possible damage incurred during shipment.
6. Check the equipment against the packing list to ensure the shipment is correct.
7. Refer to the following sections for further installation instructions.

2.2 Installation Tools

No special tools are required.

2.3 LNA Connector Pinouts

The LNA can be supplied with these connector configurations, depending on the model and options:

- 4-pin
- 6-pin

Table 2-1. LNA Connector Pinouts

Version	Connector Pinouts
4-pin LNA	A: Power Input B: GND C, D: Alarm
6-pin LNA – C-Band	A: Power Input B: GND C: FLT – Normally Closed D: FLT - Common E: FLT – Normally Open F: N/C
6-pin LNA – Ku-Band	A: Power Input B, C: GND D: FLT – Normally Closed E: Common F: FLT – Normally Open

Chapter 3. FUNCTIONAL AND PHYSICAL DESCRIPTIONS

3.1 Dimensional Envelope

All dimensions are in English units (centimeters are in parentheses).

3.1.1 C-Band LNA

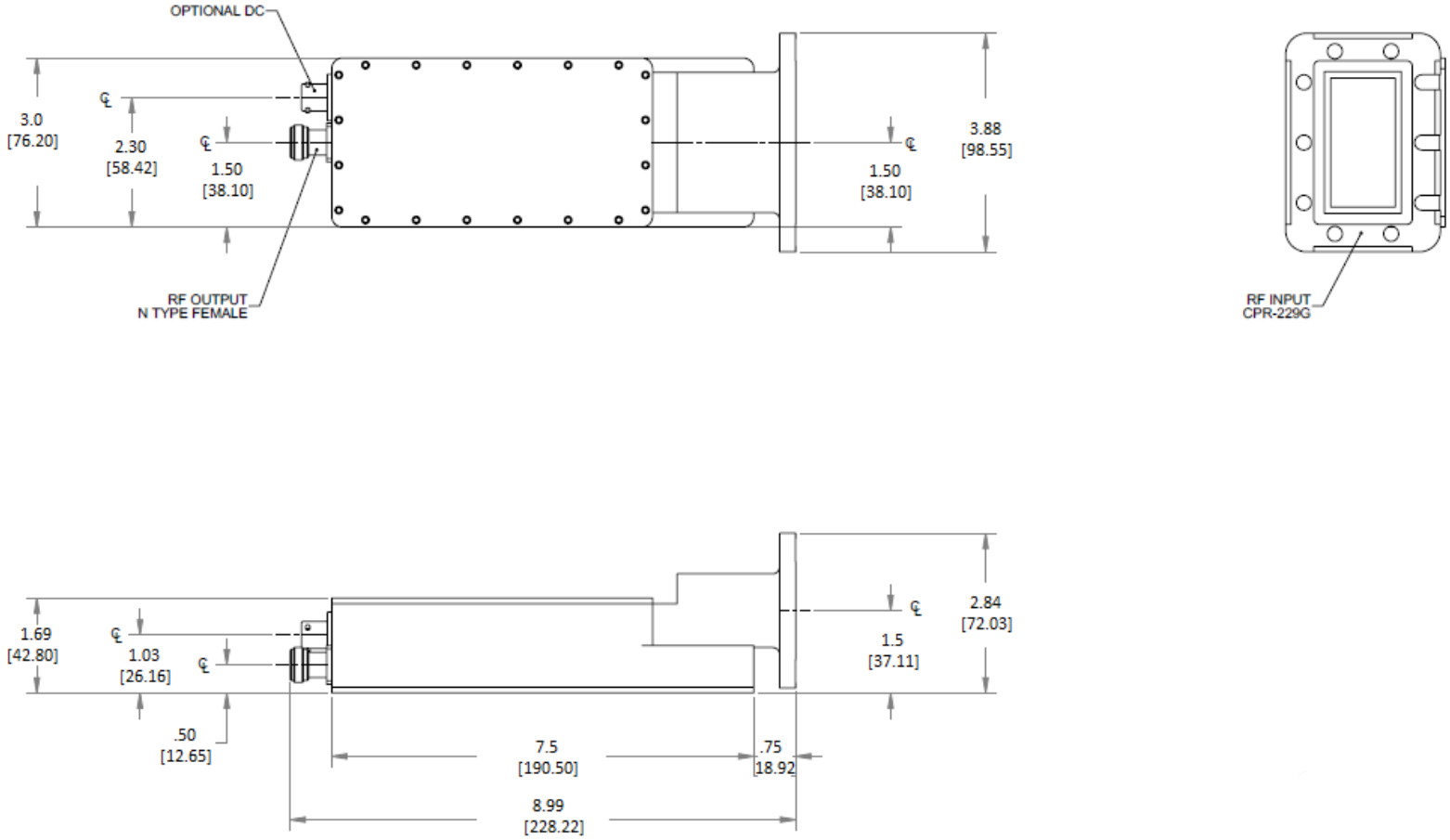


Figure 3-1. C-Band LNA Dimensions

3.1.2 Ku-Band LNA

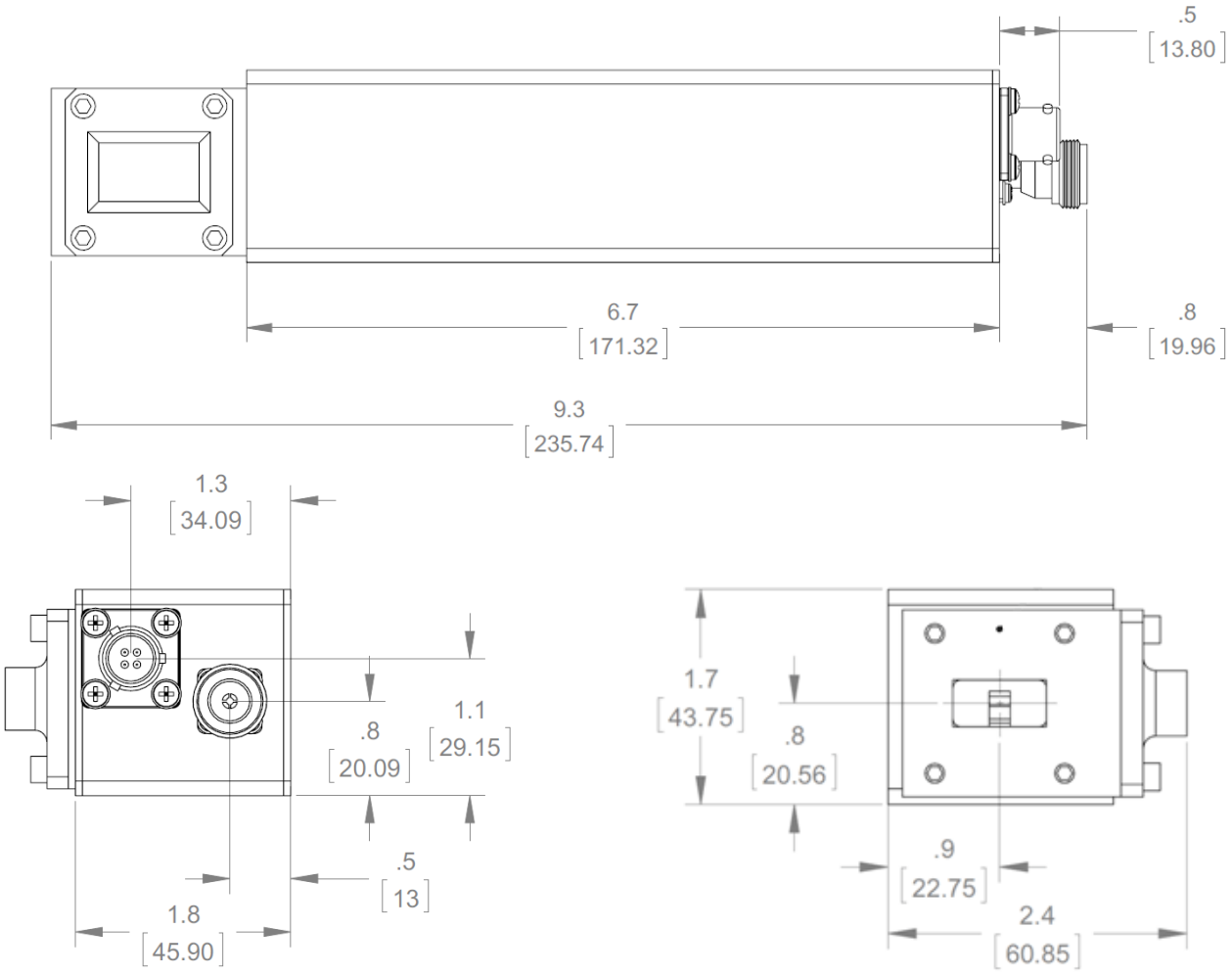


Figure 3-2. Ku-Band LNA Dimensions

Chapter 4. SPECIFICATIONS

4.1 Summary of Specifications

Frequency	**CLNA** 3.4 to 4.2 GHz 3.625 to 4.2 GHz 4.5 to 4.8 GHz	**KLNA** 10.95 to 12.75 GHz
Noise Temperature	**CLNA** 30, 35, 40, 45K	**KLNA** 80, 85K
Gain	50, 60 dB	
Overall Stability (Over Temperature)	**CLNA** ± 0.75 dB over Full Band 0.40 dB p-p over 40 MHz	**KLNA** ± 1.5 dB over Full Band 0.75 dB p-p over 40 MHz
Level @ 1 dB Comp.	+10 dBm	
Third Order Intercept	+20 dBm	
AM-PM Conversion	0.5°/dB @ -5 dBm	
Linear Group Delay	0.01 ns/MHz	
Parabolic Group Delay	0.001 ns/MHz^2	
Ripple	0.1 ns p-p	
Input/Output VSWR	1.25:1 max.	
Input Waveguide	**CLNA** CPR229	**KLNA** WR75
Output Connector	Type N Standard, Optional SMA	
Operating Temp.	-40 to +140°F (-40 to +60°C)	
Input Power	+12 to +24 VDC @ 120 mA	
Power Connector	**CLNA** Coaxial or PTA02A-9-4P	**KLNA** Coaxial and 4-Pin

4.2 Power Consumption

The equipment is rated for operation over the range 100 - 240 Volts AC. It has a maximum power consumption of 60 Watts, and draws a maximum of 600 mA.

4.3 Fuses

The LNA is fitted with two fuses - one each for line and neutral connections. These are contained within the body of the IEC power inlet connector, behind a small plastic flap.

For 115 and 230 volt AC operation, use T1.25A, 20mm fuses.

4.4 Cables and Connectors

The LNA is shipped with a line inlet cable suitable for use in the country of operation.

If it is necessary to replace this cable, make sure the replacement has an equivalent specification.

Examples of acceptable ratings for the cable include HAR, BASEC and HOXXX-X.

Examples of acceptable connector ratings include VDE, NF-USE, UL, CSA, OVE, CEBEC, NEMKO, DEMKO, BS1636A, BSI, SETI, IMQ, KEMA-KEUR and SEV.

4.5 Operating Requirements for Regulatory Compliance

To maintain continued compliance with the European Directives:

- Make connections to the Tx and Rx IF ports (Type N or Type F connectors using a good quality coaxial cable - for example 50 Ω or 75 Ω.
- Make sure all D type connectors attached to the rear panel have back-shells that provide continuous metallic shielding. Cable with a continuous outer shield (either foil or braid, or both) must be used, and the shield must be bonded to the backshell.
- Make sure the equipment operates with its cover on at all times. If it becomes necessary to remove the cover, make sure that the cover is correctly reinstalled before normal operation resumes.

See also: Preface.docx#RegulatoryCompliance

2114 WEST 7TH STREET TEMPE ARIZONA 85281 USA
480 • 333 • 2200 PHONE
480 • 333 • 2161 FAX