



LNB

Low-Noise Block Downconverter Installation and Operation Manual

Part Number MN-LNB
Revision 0

IMPORTANT NOTE: The information contained in this document supersedes all previously published information regarding this product. Product specifications are subject to change without prior notice.

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PREFACE

About this Manual

This manual provides installation and operation information for the Comtech EF Data family of Outdoor Low Noise Block Down Converter (LNB). This manual is an informational document intended for the persons responsible for the operation and maintenance of the LNB.

Disclaimer

Comtech EF Data has reviewed this manual thoroughly in order to provide an easy-to-use guide to this equipment. All statements, technical information, and recommendations in this manual and in any guides or related documents are believed reliable, but the accuracy and completeness thereof are not guaranteed or warranted, and they are not intended to be, nor should they be understood to be, representations or warranties concerning the products described. Further, Comtech EF Data reserves the right to make changes in the specifications of the products described in this manual at any time without notice and without obligation to notify any person of such changes.

If there are any questions regarding this equipment or the information in this manual, please contact the Comtech EF Data Customer Support Department.

Conventions and References

Cautions and Warnings



WARNING indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.



CAUTION indicates a hazardous situation that, if not avoided, may result in minor or moderate injury. CAUTION may also be used to indicate other unsafe practices or risks of property damage.



IMPORTANT or **NOTE** indicates information critical for proper equipment function, or a statement that is associated with the task being performed.

Recommended Standard Designations

Recommended Standard (RS) Designations have been superseded by the new designation of the Electronic Industries Association (EIA). References to the old designations are shown only when depicting actual text displayed (e.g., RS-232, RS-485, etc.) via serial remote or Ethernet operation of the unit. All other references in this manual will use the EIA designations.

Trademarks

Other product names mentioned in this manual may be trademarks or registered trademarks of their respective companies and are hereby acknowledged.

Metric Conversion

Metric conversion information is located on the inside back cover of this manual. This information is provided to assist the operator in cross-referencing non-metric to metric conversions.

Electrical Safety Notice

This equipment has been designed to minimize exposure of personnel to hazards. For further information, contact Comtech EF Data, Customer Support Department. The operators and technicians must:

- Know how to work around, with, and on high voltage equipment.
- Exercise every precaution to ensure personnel safety.
- Exercise extreme care when working near high voltages.
- Be familiar with the warnings presented in this manual.

Installation Guidelines Regarding Power Line Quality

The LNB is reliant on a continuous DC power source and high stability 10MHz reference for operation. These can be supplied by L Band modem with optional LNB supply and 10MHz reference over outdoor coaxial cable or at the antenna from Comtech EF Data LPOD family of outdoor amplifier BUCs with optional LNB supply feature. In the case where the LNB is mated with our LPOD product the following cautions should apply.



Comtech EF Data has become familiar with the varying quality of the AC power grid around the world. Observing the following installation guidelines should help ensure a reliable installation.

- **Surge suppression:** High voltage surges can cause failure of the power supply. These surges are typically caused by circuit switching on the main AC power grid, erratic generator operation, and also by lightning strikes. While the LPOD does have built in surge suppression, if the unit is to be installed in a location with questionable power grid quality, Comtech EF Data recommends installation of additional power conditioning/surge suppression at the power junction box.
- **Grounding:** The LPOD provides a grounding terminal. This is provided to allow the user to ground the LPOD to the antenna's grounding network. All components installed at the antenna should be grounded to a common grounding point at the antenna.
- **Electrical welding:** If welding needs to take place at the antenna, disconnect all cables from the LPOD except for the ground wire. Cap all RF connections with terminations. This will prevent damage to the input/output circuitry of the LPOD.
- **Lightning:** Lightning strikes on or around the antenna will generate extremely high voltages on all cables connected to the LPOD. Depending on the severity of the strike, the LPOD's internal surge protection combined with the recommended external suppression may protect the LPOD's power supply. However, if the installation will be in an area with a high probability of lightning strikes, Comtech EF Data recommends the installation of surge suppression on the RF and IF cables. One source of these suppressors is PolyPhaser (www.polyphaser.com).

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.

Customer Support



Refer to p. xii in this Preface for information regarding this product's Warranty Policy.

Contact the Comtech EF Data Customer Support Department for:

- Product support or training
- Reporting comments or suggestions concerning manuals
- Information on upgrading or returning a product

A Customer Support representative may be reached during normal business hours at:

Comtech EF Data
Attention: Customer Support Department
2114 West 7th Street
Tempe, Arizona 85281 USA

480.333.2200 (Main Comtech EF Data number)
480.333.4357 (Customer Support Desk)
480.333.2161 FAX

To return a Comtech EF Data product (in-warranty and out-of-warranty) for repair or replacement:

- **Contact** the Comtech EF Data Customer Support Department during normal business hours. Be prepared to supply the Customer Support representative with the model number, serial number, and a description of the problem.
- **Request** a Return Material Authorization (RMA) number from the Comtech EF Data Customer Support representative.
- **Pack** the product in its original shipping carton/packaging to ensure that the product is not damaged during shipping.
- **Ship** the product back to Comtech EF Data. (Shipping charges should be prepaid.)

Online Customer Support

An **RMA number** can be requested electronically by accessing Comtech EF Data's online **Support** page (www.comtechedata.com/support.asp). From this page:

- **Click** the **Service** hyperlink, then read the **Return Material Authorization** section for detailed instructions on Comtech EF Data's return procedures.
- **Click** [**Send RMA Request**] on the **Support** page or the **RMA Request** hyperlink provided in the **Service | Return Material Authorization** section; fill out the *Billing Information*, *Return Information*, and *Unit to be Returned* sections completely, then click [**Send email**]
- or –
- **Send an e-mail** providing this same detailed information to the Customer Support Department at service@comtechedata.com.

Chapter 1. INTRODUCTION

1.1 Introduction

The Comtech EF Data (CEFD) Low-Noise Block Downconverter (LNB) series (Figure 1) is available for X-Band operation. It meets or exceeds system requirements for commercial geosynchronous satellites worldwide. Its compact design and rugged construction make it ideal for transportable applications and severe environments. It has a comprehensive set of options to accommodate systems ranging from Very Small Amplifier Terminal (VSATs) to major earth stations.



Figure 1 LNB Low Noise Block Downconverter

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 LNB series 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 LNB is housed in a waterproof enclosure with a small profile to better accommodate redundancy configurations. The enclosure also provides a pressurizable, integral waveguide flange.

1.5 Functional Description

Features:

- Flexible configuration
- Low phase noise - Meets or exceeds MIL-188-165A
- Noise Figure options
- Gain options
- Output power options
- Transmit Reject options
- Optional Fault Reporting
- Mates directly to LPOD family of BUCs for DC supply, 10MHz source
- Optional 1:1 Redundancy

The LNB is a field-interchangeable block downconverter module that translates a band-specific frequency block, in this case, X-Band, from the antenna down to L-Band (950 to 1450 MHz).

The LNB requires a +12 to +24VDC source and high stability 10MHz reference source supplied via coaxial cable with external tri-plexer. DC power can be supplied via optional 4 or 6 pin connector with 10MHz reference delivered via external di-plexer.

10 MHz reference should provide sinewave output at 0, +-5dBm.

Reference phase noise: <-125 dBc 10Hz
<-152 dBc 100Hz
<-160 dBc 1KHz
<-165 dBc >10KHz

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



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

Unpack the LNB as follows:

Step	Procedure
1	Cut the tape at the top of the carton indicated by OPEN THIS END.
2	Remove the cardboard/foam space covering the LNB.
3	Remove the LNB, 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 Mounting

No special tools are required.

Waveguide flange contains 8-32 threaded holes for single unit configuration or #8 screw thru-holes for optional redundant configurations.

2.3 LNB Connector Pinouts

LNB can be supplied with the following connector configurations, depending on the model and options:

- 4 pin
- 6 pin

See Table 2-1 below



Use of Power Supply Voltage greater than +24Vdc may cause damage to the LNB.

Table 2-1. LNB Connector Pinouts

4-Pin	6-Pin
ITT Cannon KPT02A8-4P	ITT Cannon MS3112E10-6P
Mating Conn. (Female): Amphenol: PT06E84S	Mating Conn. (Female): Amphenol MS3116F10-6S
A: +12 to +24VDC Input	A: +12 to +24VDC Input
B: GND	B: GND
C: FLT - NO (NC or open collector optional)	C: GND
D: Fault common	D: FLT – NO
	E: FLT – Common
	F: FLT – NC

Normally Open or Closed contact refers to faulted condition

Chapter 3. PHYSICAL DESCRIPTIONS

3.1 Dimensional Envelope

All dimensions are in Inches (centimeters are in parentheses).

3.1.1 X-Band LNB Dimensions

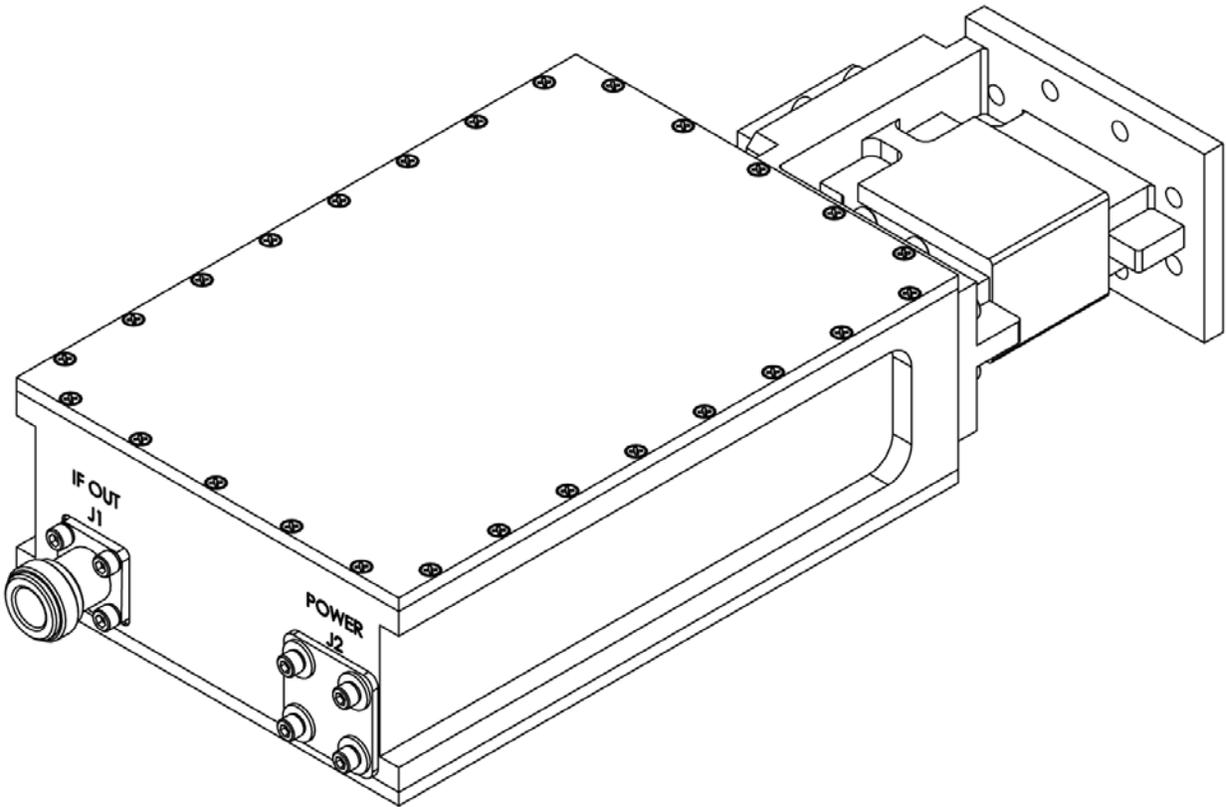


Figure 1 LNB

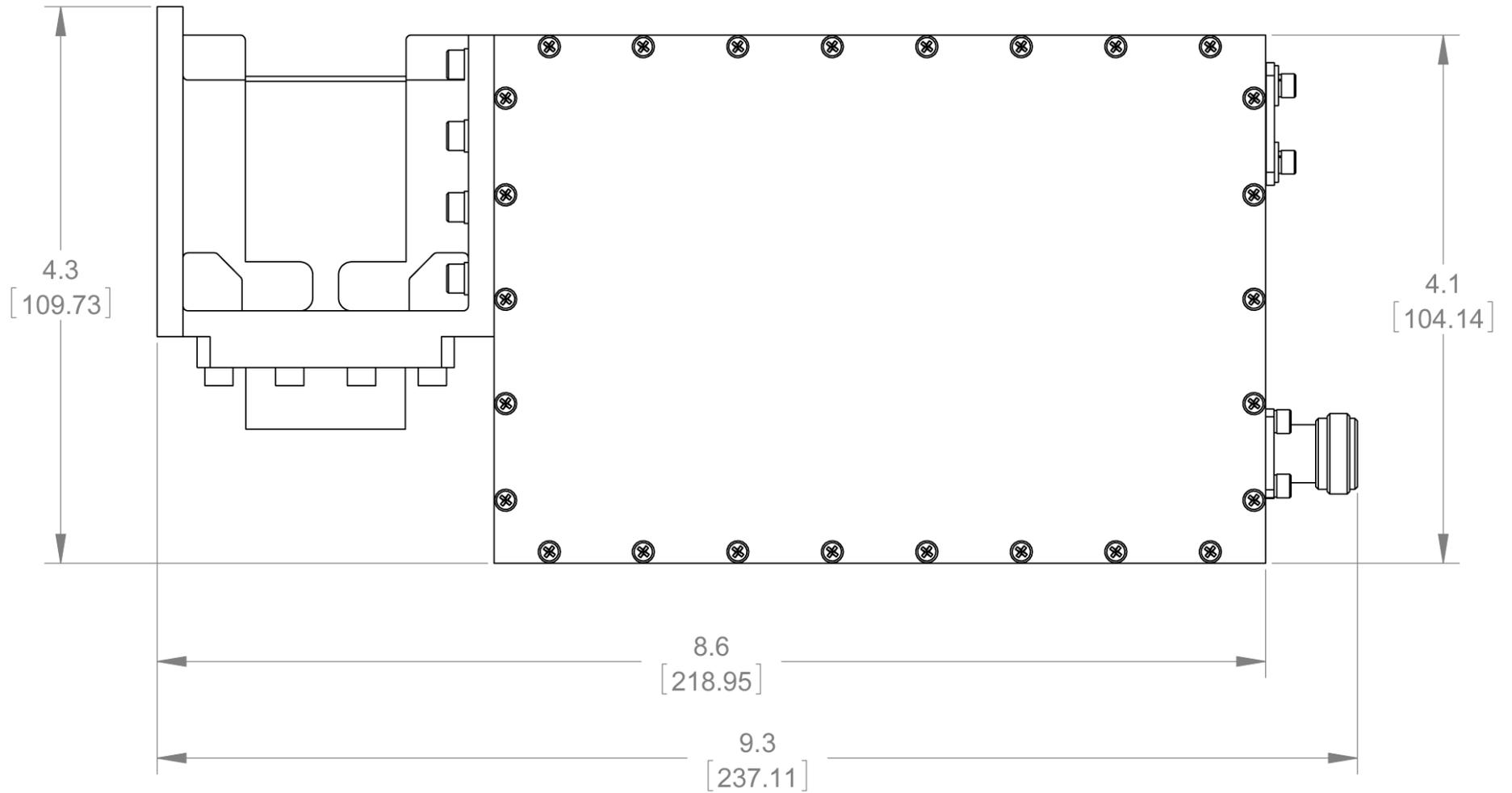


Figure 2

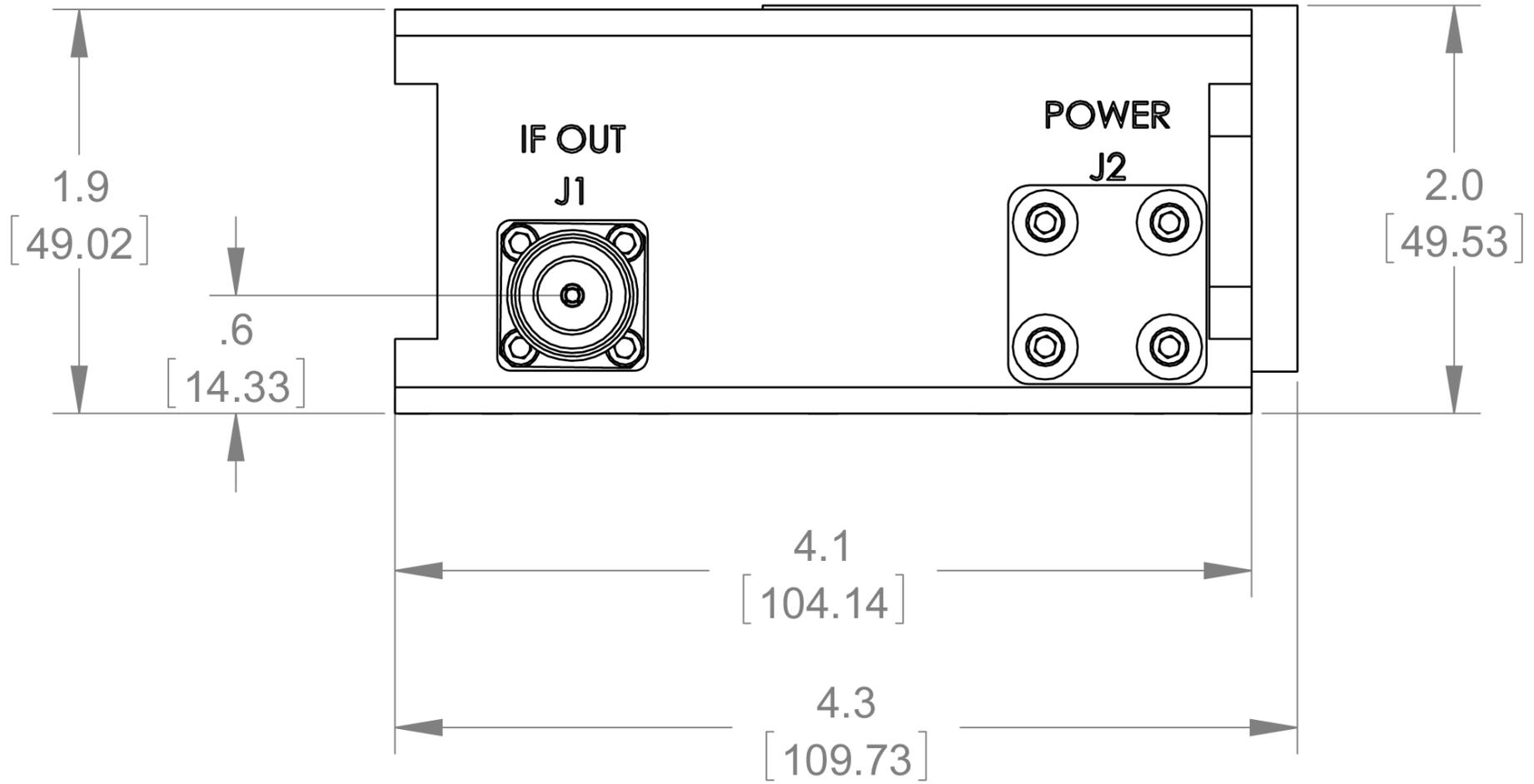


Figure 3

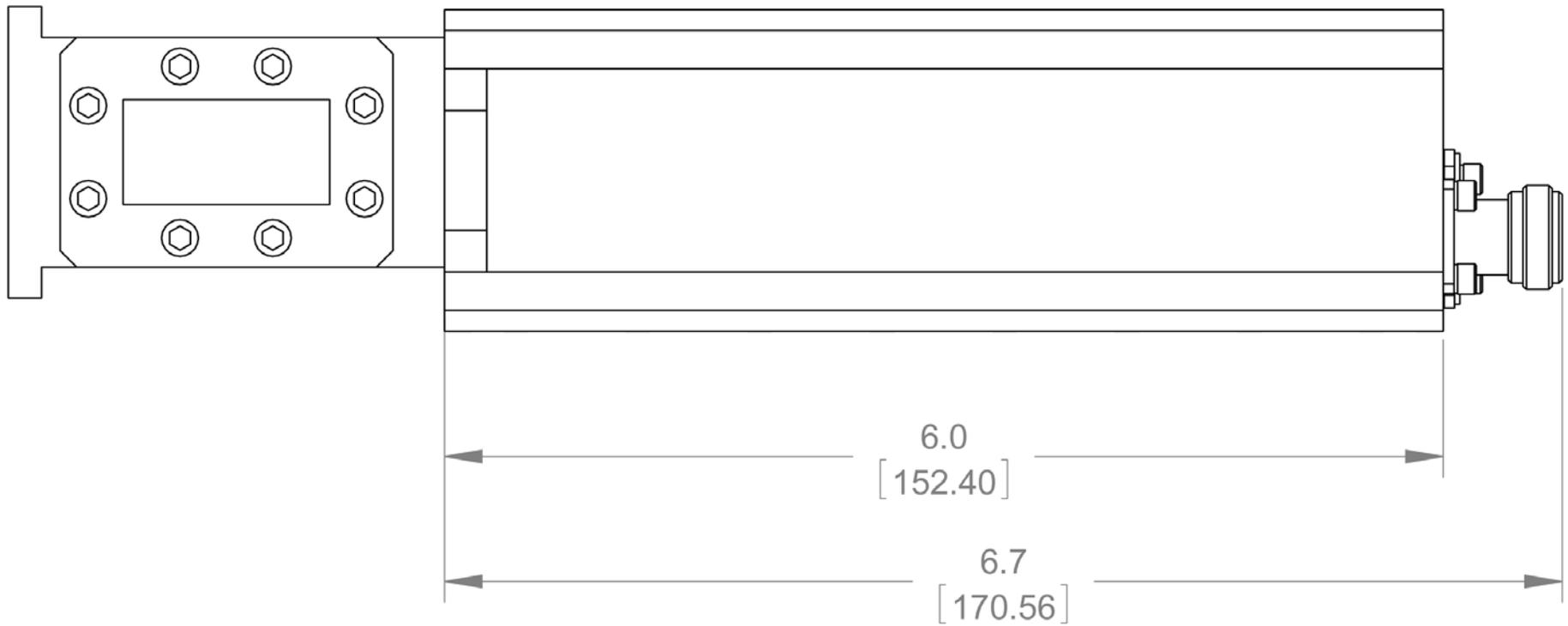


Figure 4

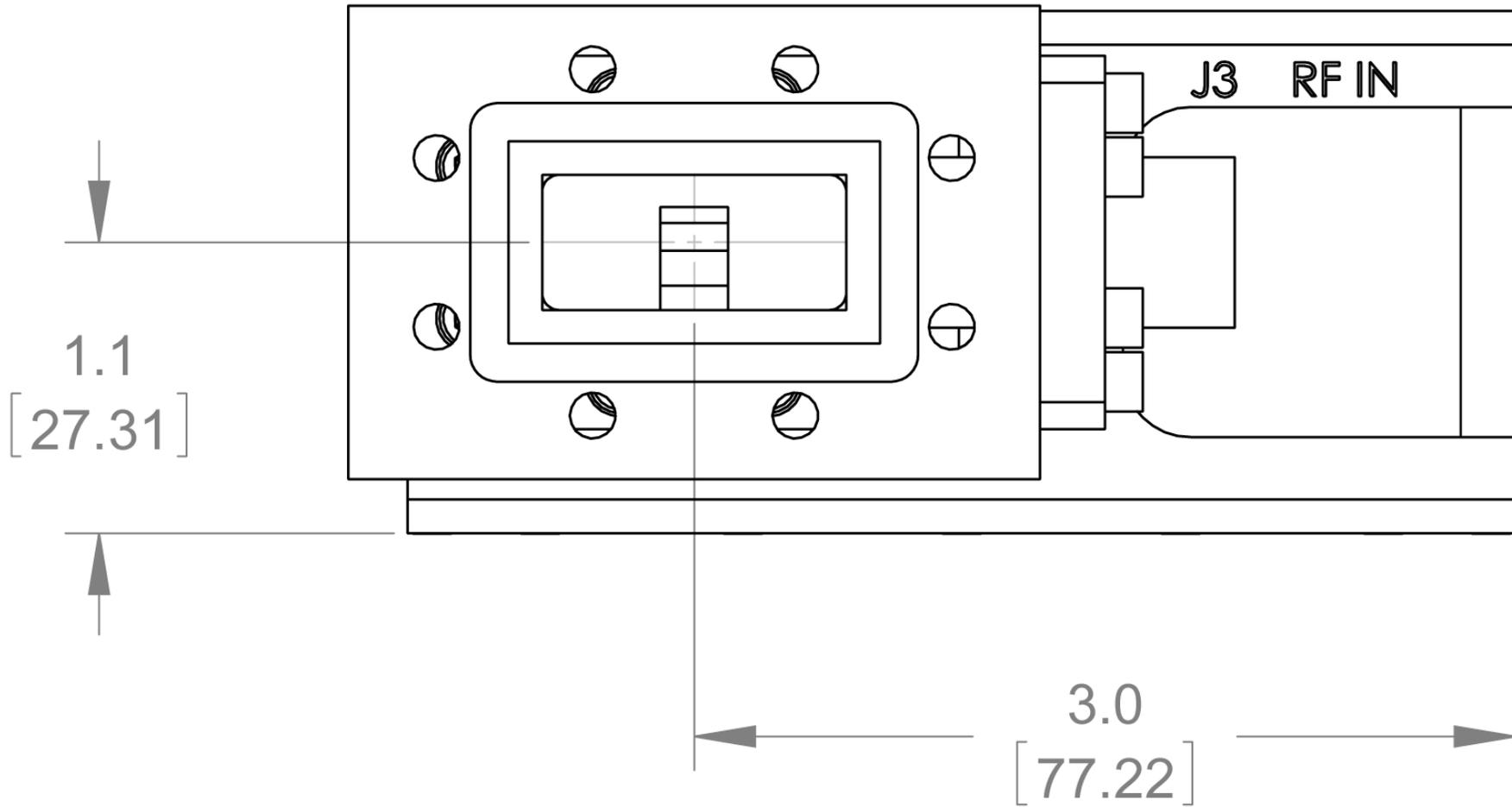


Figure 5

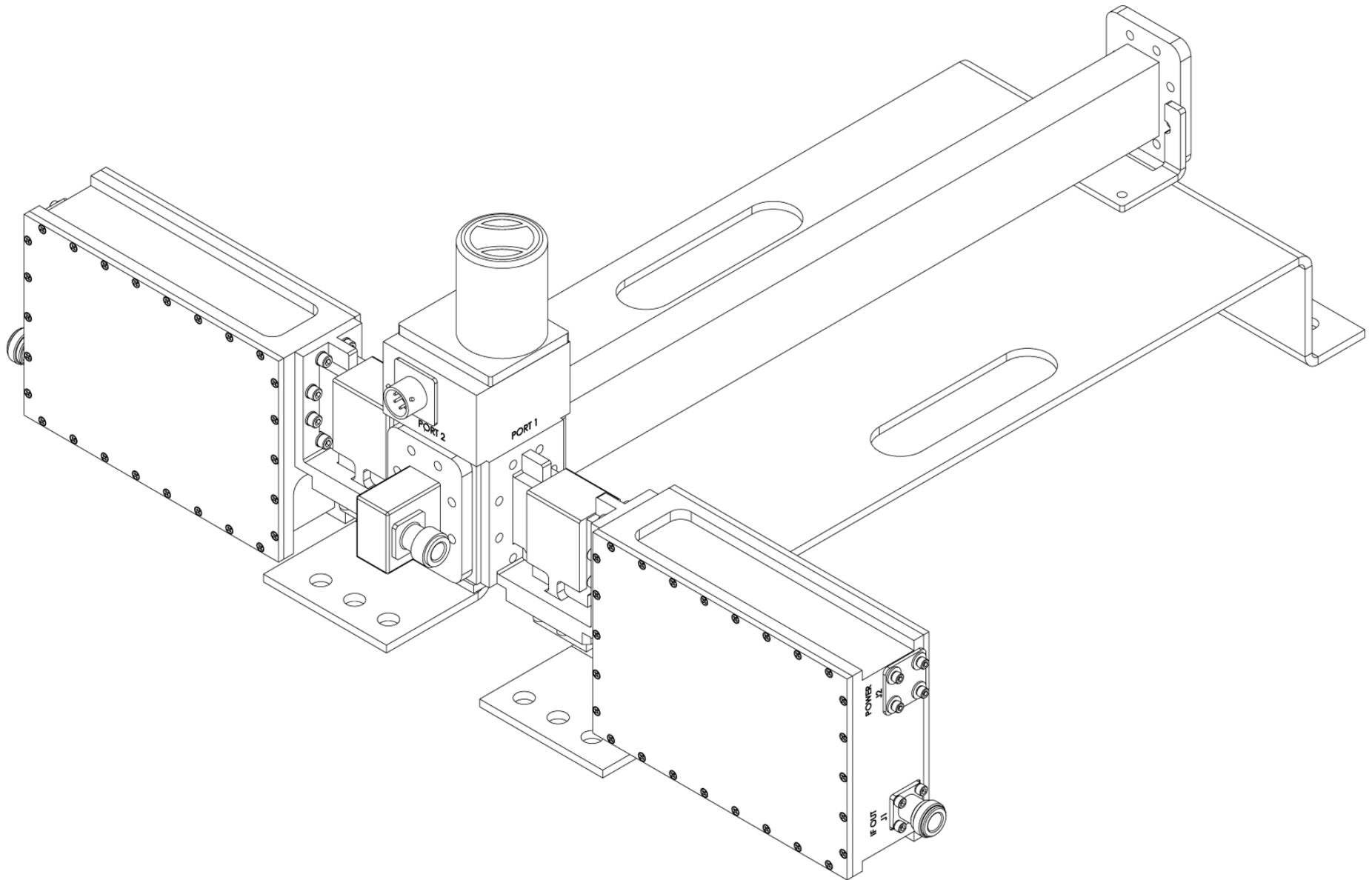


Figure 6 Redundant Configuration

Chapter 4. SPECIFICATIONS

4.1 Summary of Specifications

Frequency RF	7.25 to 7.75 GHz
Frequency IF	950 to 1450 MHz
Noise Temperature	45, 50K
Gain	50, 60, 70 dB
Overall Stability (Over Temperature)	± 1.0 dB over Full Band ±0.50 dB p-p over 40 MHz
Level @ 1 dB Comp.	+10 dBm min.
Third Order Intercept	+20 dBm min.
Spurious in Band	-65dBc
T/R filter option	Internal, External
AM-PM Conversion	0.05°/dB @ -5 dBm
Phase Noise	Meets MIL-STD-188-165A
Linear Group Delay	±0.05 ns/MHz
Parabolic Group Delay	±0.005 ns/MHz ²
Ripple	±1 ns p-p
Input Return Loss	19 dB
Output Return Loss	15 dB
Input Waveguide	CPR-112
Output Connector	Type N Female Standard, Optional SMA
Operating Temp.	-40 to +140°F (-40 to +60°C)
Input Power	+12V to +24VDC, 9W max.
Power Connector	Coaxial, or optionable 4pin KPT02A8-4P or 6pin MS3112E10-6P. External 10MHz reference through coaxial connection only.

METRIC CONVERSIONS

Units of Length

Unit	Centimeter	Inch	Foot	Yard	Mile	Meter	Kilometer	Millimeter
1 centimeter	—	0.3937	0.03281	0.01094	6.214×10^{-6}	0.01	—	—
1 inch	2.540	—	0.08333	0.2778	1.578×10^{-5}	0.254	—	25.4
1 foot	30.480	12.0	—	0.3333	1.893×10^{-4}	0.3048	—	—
1 yard	91.44	36.0	3.0	—	5.679×10^{-4}	0.9144	—	—
1 meter	100.0	39.37	3.281	1.094	6.214×10^{-4}	—	—	—
1 mile	1.609×10^5	6.336×10^4	5.280×10^3	1.760×10^3	—	1.609×10^3	1.609	—
1 mm	—	0.03937	—	—	—	—	—	—
1 kilometer	—	—	—	—	0.621	—	—	—

Temperature Conversions

Temperature	° Fahrenheit	° Centigrade
Water freezes	32	0
Water boils	212	100
Absolute 0	-459.69	-273.16

Formulas
$^{\circ}\text{C} = (\text{F} - 32) * 0.555$
$^{\circ}\text{F} = (\text{C} * 1.8) + 32$

Units of Weight

Unit	Gram	Ounce Avoirdupois	Ounce Troy	Pound Avoirdupois	Pound Troy	Kilogram
1 gram	—	0.03527	0.03215	0.002205	0.002679	0.001
1 oz. avoird.	28.35	—	0.9115	0.0625	0.07595	0.02835
1 oz. troy	31.10	1.097	—	0.06857	0.08333	0.03110
1 lb. avoird.	453.6	16.0	14.58	—	1.215	0.4536
1 lb. Troy	373.2	13.17	12.0	0.8229	—	0.3732
1 kilogram	1.0×10^3	35.27	32.15	2.205	2.679	—



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