Instruction Manual

Model 4115-300

Ka-Band Block Upconverter

Weather Resistant Unit

November 2015, Rev. H

When ordering parts from Cross Technologies, Inc., be sure to include the equipment model number, equipment serial number, and a description of the part.

CROSS TECHNOLOGIES, INC.

6170 Shiloh Road

Alpharetta, Georgia 30005

(770) 886-8005 • FAX (770) 886-7964 • Toll Free 888-900-5588

WEB www.crosstechnologies.com

E-MAIL info@crosstechnologies.com

INSTRUCTION MANUAL

MODEL 4115-300 Ka-Band Upconverter, Weather Resistant*

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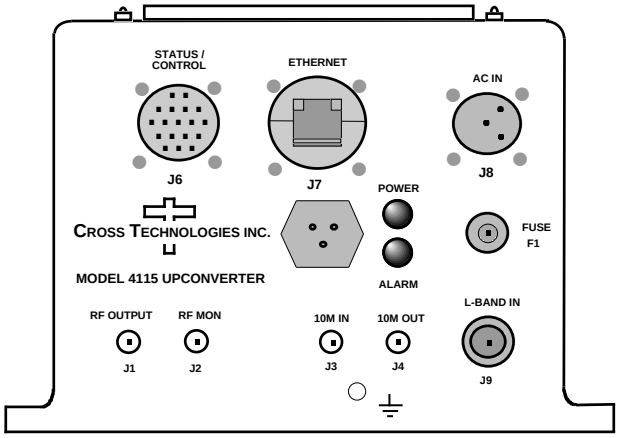
MODEL 4115-300 Ka-Band Upconverter, Weather Resistant*

1.0 General

1.1 Equipment Description

The 4115-300 Ka-band Block Upconverter converts 0.95 - 1.95 GHz up to 27.5 - 31.0 GHz in four selectable fixed bands. Front panel LEDs provide indication of DC Power and PLL Alarms. The L-band to RF gain is +30 dB. Connectors are 2.92.mm for RF Out and RF Monitor, SMA for the external reference input and reference output and Type N (all female) for the L-band. Gain, band select, and internal 10 MHz frequency are controlled by the Ethernet M&C. In AUTO, the 10 MHz reference stays in external if the external level is in the +2 to +8 dBm range. It is powered by a 100-240 ± 10% VAC power supply, and mounted in a 8"Wide X 6"High X 16"Deep Weather Resistant enclosure.

NOTE: ***Weather Resistant** enclosures are designed to be water resistant for installation in an outdoor enclosure/antenna hut OR mounted outdoors on an antenna assembly at their specified temperature ranges. They are designed to be located "out in the elements" (water, sleet, snow, etc.) but they are *not* designed to be "submerged under" water. If an extended temperature range is required, there is an **Extended Temperature** option (**Option W21**; -30˚C to +60˚C) available at an additional cost. Contact Cross for quote.



Model 4115-300 Ka-Band Block Upconverter Front Panel

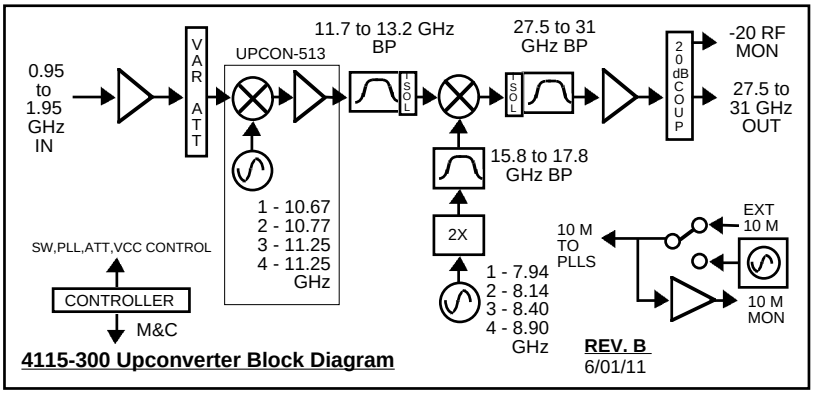


FIGURE 1.0 Model 4115-300 Ka-Band Block Upconverter Block Diagram

1.2 Technical Characteristics

TABLE 1.0 4115-300 Block Upconverter Specifications**

Input Characteristics	
Impedance / Return Loss	50Ω / 14 dB
Frequency (GHz)	0.95 to 1.95 GHz
Noise Figure, Maximum	20 dB maximum gain
Input Level	-40 to -15 dBm
Output Characteristics	
Impedance / Return Loss	50Ω / 14 dB, Mute & Unmute
Frequency (GHz)	Band 1 - 27.5 to 28.5
	Band 2 - 28.0 to 29.0
	Band 3 - 29.0 to 30.0
	Band 4 - 30.0 to 31.0
Output Level Range	-15 to 0 dBm
Output 1 dB Compression	+8 dBm, maximum gain
Mute at Maximum Level Out	>60 dB @ 0 dBm Output

Channel Characteristics	
Gain @ Fc	+ 30 ± 3 dB, (+30 to 0 dB variable in 0.5 dB Steps)
Spurious, Inband	SIGNAL RELATED <-50 dBC in band, -15 to 0 dBm out; SIGNAL INDEPENDENT, <-55 dBm; over 27.5 to 31 GHz Band
Spurious, Out of Band	<-50 dBm, over 27.0 - 27.5 and 31.0 - 31.5 GHz Band
Intermodulation	< -45 dBC for two carriers at 4 MHz spacing, each at -5 dBm out
Frequency Response	±2 dB, over RF band; ± 0.5 dB, 40 MHz BW, Frequency Sense-Non-Inverting
LO Characteristics	
LO Frequency	Band Specific
Frequency Accuracy	± 0.05 ppm maximum over temp internal reference; external reference input
10 MHz Level In/Mon	+2 to +8 dBm in, Monitor Output = input level ± 1.0 dB, 50 ohms

Phase Noise @ F (Hz) >	100 MHz	1kHz	10kHz	100kHz	1MHz
dBC/Hz	-65	-75	-80	-95	-105

Controls, Indicators	
Gain, Band, 10M Frequency	Gain, band select and internal 10 MHz frequency via Ethernet, M&C or Status/Control Connector
PLL, Alarm	Red LED, External Contact Closure
Power	Green LED

Technical Characteristics continued on page 5...

Technical Characteristics continued from page 4...

Other	
RF Out, Mon. Connector	2.92mm (40 GHz) female, 50Ω
L-Band Connector	Type N (female), 50Ω
10 MHz Connectors	SMA (female), 50Ω
M&C Connector(s)	Status/Control Connector, MS3112E14-18S; Mating Cable Connector, MS3116F14-18P. Ethernet Conector, RJF21B; Mating Cable Connector, RJF6G; Cable interface, Standard RJ45. AC Input Connector, Clipper Series, CL1M1102,Mating Cable Connector, CL1F1101. (Unless otherwise specified, the mating connector is provided preassembled onto a standard NEMA 5-15 U.S. power cord.)
Size	8” Wide X 6” High X 16” Deep, Weatherized Resistant* Enclosure
Power	100-240 ±10% VAC, 47-63 Hz, 25 Watts Maximum, FCI Clipper Series CL1M1102, Weather Resistant Connector.
**+10˚C to +40˚C; Specifications subject to change without notice.	

2.0 Installation

The 4115-300 Ka-Band Upconverter consists of a 8”W X 6”H X 16”D Weather Resistant* enclosure.

A switching, ±12, +24, +5 VDC power supply provides power for the assemblies. The 4115-300 can be secured to a mounting plate using the 4 holes on the bottom of the front and rear panel. (See Figure 2.5 for mounting dimensions.)

Figure 2 - 4115-300 Front Panel

2.0.1 Connection to AC Input Power

The 4115-300 is furnished with a pre-assembled AC power input cable as described below.

4115-31 Power Input Connector, FCI Clipper Series, CL1M1102 & Crimp Pins	
Mating Connector FCI Clipper Series, CL1F1101, Crimp Pins	
and CL101021 Backshell	
Pin	Input Connector Pin Description
1	100-240 ±10% VAC, 47-63 Hz, 20 watts max.
2	Neutral
3	Ground

2.1 Message Protocol

The serial format for the RS232/RS422/RS485 port is 9600 baud, 8 data bits, no parity, and 1 stop bit.
All messages consist of ASCII printable characters so standard terminals and terminal emulator programs may be used to control and monitor the unit. All messages begin with the open bracket character “**{**” (ASCII 0x7B) and end with the close bracket character “**}**” (ASCII 0x7D). Messages consisting of commands to set or change operating parameters and modes of the unit begin with “C” (ascii 0x43) followed by a command specific character. Messages consisting of queries to report operating parameters and modes begin with “S” (ASCII 0x53) followed by a parameter specific character.

2.2 M&C Commands

The following tables summarize the commands and status queries applicable to the 4115-300 frequency converter.

* **PLEASE NOTE:** The two character {aa} prefix, shown in the table below, is present ONLY when RS485 is selected.

Table 2.0 Model 4115-300 M&C Commands

Table 2.0: Model 4115-300 M&C Commands		
Command	**Syntax**	**Description**
Set Frequency Band	{aaCBx}	where:
		x = 1 to select band 1: in = (950 to 1950 MHz) out = (27.5 to 28.5 MHz)
		x = 2 to select band 2: in = (950 to 1950 MHz) out = (28.0 to 29.0 MHz)
		x = 3 to select band 3: in = (950 to 1950 MHz) out = (29.0 to 30.0 MHz)
		x = 4 to select band 3: in = (950 to 1950 MHz) out = (30000 to 31000 MHz)
Set Gain	{aaCGxxx}	where:
		xxx = 3 characters
		Range: 000 to 300 (00.0 to 30.0 in 0.5 dB steps)
Set Serial Interface	{aaCIx}	where:
		x = 0 to select RS232
		x = 1 to select RS422
		x = 2 to select RS485
Set Mute	{aaCMx}	where:
		x = 1 to mute the output
		x = 0 to unmute output
Set RS485 address	{aaCRxx}	where:
		xx = 2 characters
		Range: 0 to 31
Set Int. 10 MHz reference offset	{aaCOxxxxx}	where:
		xxxxx = 5 characters
		Range: +2000 to +8000

2.3 M&C Queries

Table 2.1 Model 4115-300 M&C Queries

Table 2.1: Model 4115-300 M&C Queries		
Queries	**Syntax**	**Description**
Frequency Band	{aaSB}	Returns {aaSBx} where:
		x = 1 if band 1 is selected in = (950 to 2050 MHz) out = (27.5 to 28.5 MHz)
		x = 2 if band 2 is selected in = (950 to 2050 MHz) out = (28.0 to 29.0 MHz)
		x = if band 3 is selected in = (950 to 2050 MHz) out = (29.0 to 30.0 MHz)
		x = if band 4 is selected in = (950 to 1950 MHz) out = (30.0 to 31.0 MHz)
Gain	{aaSG}	Returns {aaSGxxx} where:
		xxx = 3 characters
		Range: 0 to 300 (in 0.5 dB steps)
		Example: {aaSG245} indicates the current gain setting is 24.5 dB
10 MHz reference	{aaSE}	Returns {aaSEx} where:
		x = 1 if Internal 10 MHz reference is selected
		x = 2 if External 10 MHz reference is selected
		x = 3 if Auto 10 MHz reference is selected
Serial Interface	{aaSI}	Returns {aaSIx} where:
		x = 0 if RS232 is selected
		x = 1 if RS422 is selected
		x = 2 if RS485 is selected
RS485 address	{aaSR}	Returns {aaSAxx} where:
		xx = 2 characters
		Range: 00 to 31
Mute	{aaSM}	Returns {aaSMx} where:
		x = 0 if mute is off
		x = 1 if mute is on

continued on page 8...

Table 2.1 Model 4115-300 M&C Queries (Continued from page 7...)

Table 2.1: Model 4115-300 M&C Queries - Continued...		
Queries	**Syntax**	**Description**
Int. 10 MHz reference offset	{aaSO}	Returns {aaSOxxxxx} where:
		xxxxx = 5 characters
		Range: +2000 to +8000
Unit Status	{aaSA}	Returns {aaSAxy} where:
		x = 0 if no summary alarm, x = 1 if summary alarm
		y = 0 if unit is using internal 10 MHz ref, y = 1 if unit is using external reference
Internal Temperature	{aaST}	Returns {aaSTxxx} where:
		xxx = 3 characters
		Range (-99 to +99) degrees Celsius
Model and firmware revision	{aaSV}	returns {aaSVxxxxxxxxyyyy} where:
		xxxxxxxx = unit model number
		yyyy = unit firmware rev.

2.4 ETHERNET Interface Installation and Operation

The 4115-300 frequency upconverter is equipped with a 10/100 Base-T compatible Ethernet interface for control and monitoring of its operating parameters. An HTML script interface allows the user to monitor and control the converter using a standard web browser. SNMP (Simple Network Management Protocol) is also supported. Contact Cross Technologies for the SNMP MIB file.

2.4.1 Methods of Connection

Directly Connected to a PC:

For control from a local PC, attach the 4115-300's Ethernet port to the Ethernet network connector on the PC using a crossover RJ-45 cable.

LAN Connection

For LAN connections, attach the 4115-300 Ethernet port to the LAN using a normal RJ-45 cable. Use any PC on the LAN to connect to the 4115-300.

2.4.2 Ethernet Configuration

Each 4115-300 must be configured with an appropriate IP address, Netmask, and Gateway assigned by your network manager. The 4115-300 is set at the factory with a static address of 192.168.123.2. The device server in the 4115-300 has a built in HTTP based configuration manager that is used to configure network settings. To access the configuration manager open a web browser and enter the IP address of the 4115-300 in the browser's address field. The window shown in Figure 2-A will appear. As delivered, there is no password set. Choose your user name and password here or leave those fields blank and click OK to proceed to the configuration manager web page.

Figure 2-A: Password Screen

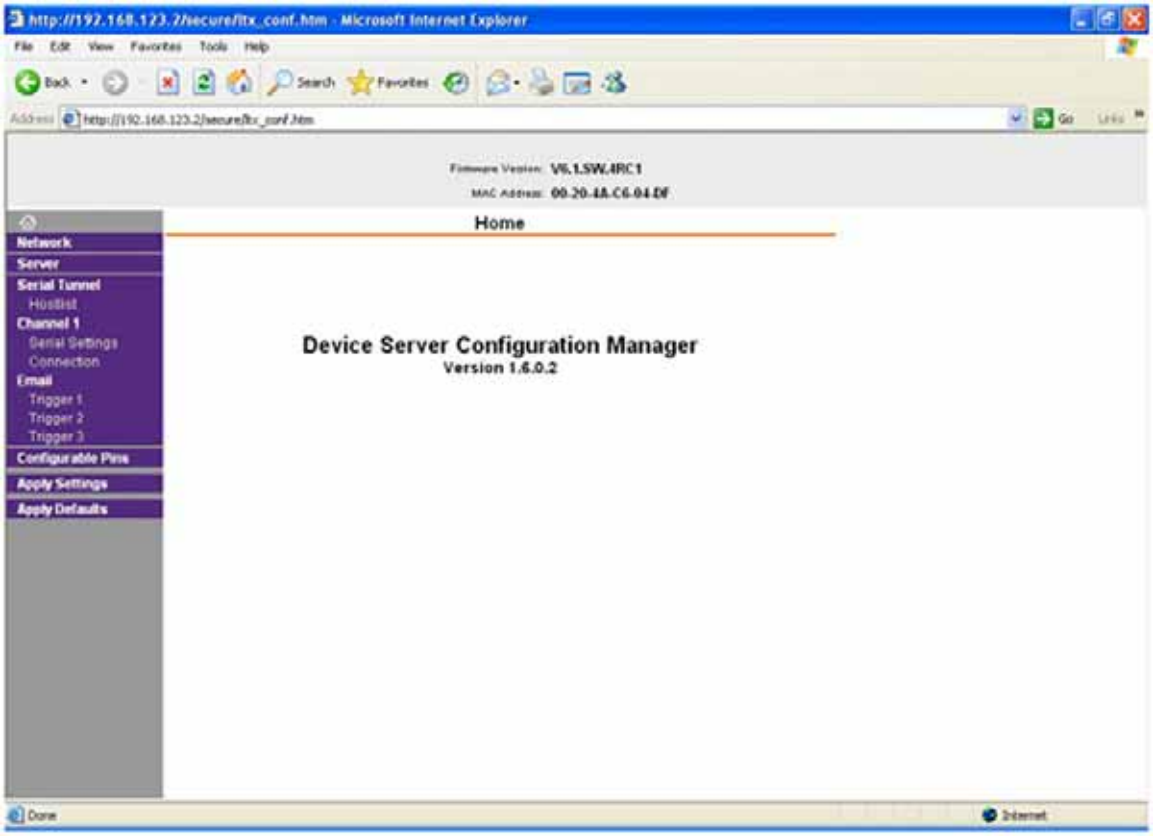


Figure 2-B: Configuration Manager Screen

In the left frame of the configuration manager click on Network to display the Network Settings screen. Enter the IP address, Subnet mask, and Gateway address with delimiter dots (example: 192.168.192.47). Click on apply settings to apply the new settings in the device server.

2.4.3 Web page M & C

Enter the following address in a web browser to access the M & C web page:
http://<ip address of 41xx>/serial/0/setup .htm where <ip address> is the IP address of the unit. Figure 2-C shows the web page from a model 4115-300 frequency converter.

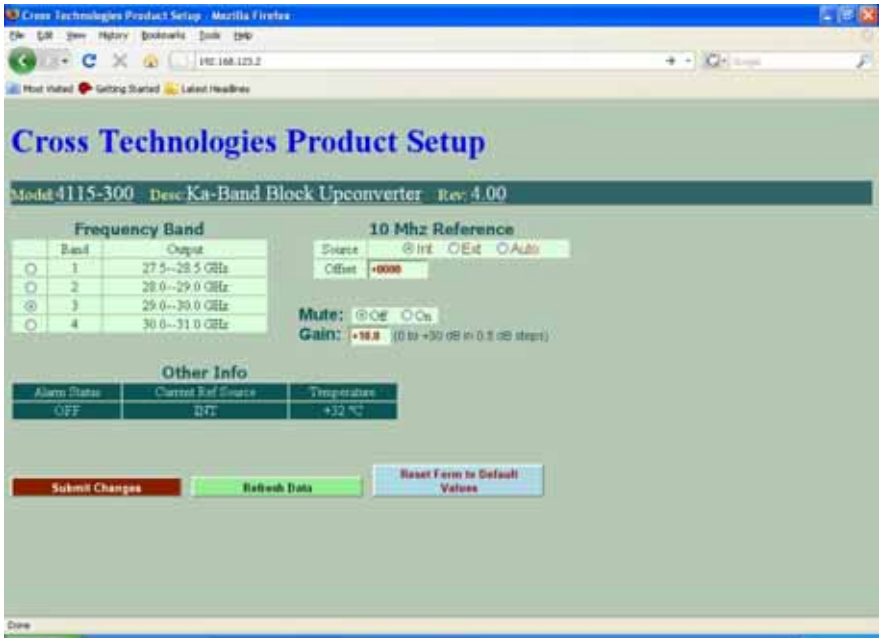


Figure 2-C: Model 4115-300 Web page

2.4.4 SNMP Configuration

Setting of SNMP parameters such as Community Write and Community Read strings requires a *Telnet*® connection to port 9999. The following instructions explain how to establish such a *Telnet*® connection using Windows XP's Hyper Terminal utility .

Start the Hyper Terminal application and select “New Connection” from the “File” drop down menu. The next screen is a “Connect To” dialog box. Select TCP/IP (Winsock) from the “Connect” using drop down menu. Enter the IP address of the 4115-300 in the “Host address:” field and 9999 in the “Port number” field.
Figure 2-E shows an example of the Hyper Terminal settings required to access the SNMP configuration menu.

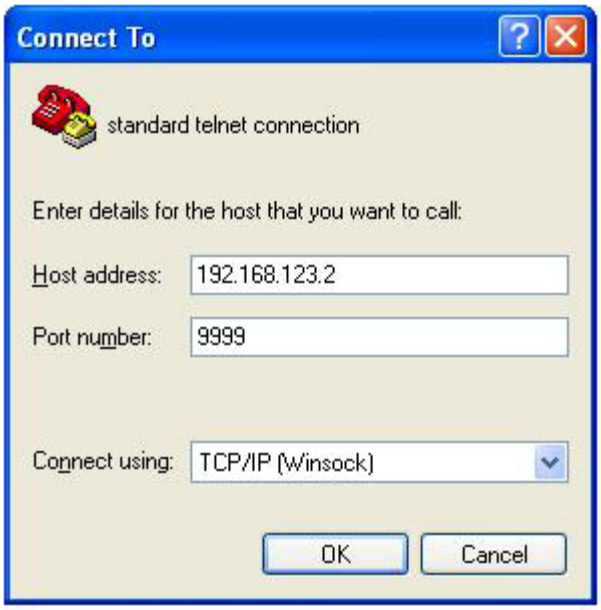


Figure 2-E: Telnet® Settings in Hyper Terminal

Once the *Telnet*® connection is established you will be prompted to "Press Enter for Setup Mode." Press enter and a menu of device server configuration options will appear (see Figure 2-F). Select menu item 3, "SNMP configuration." You will be prompted to enter SNMP community read and write strings. After setting your desired community strings you will be prompted to "Enter IP addresses for SNMP traps" You must enter at least one and up to four IP addresses of SNMP managers that will access the unit. This is required even though SNMP traps are not implemented. The unit will not process SNMP SET and GET requests from an SNMP manager unless the IP address associated with that manager is entered in the device server

Figure 2-F: Device Server Configuration Menu

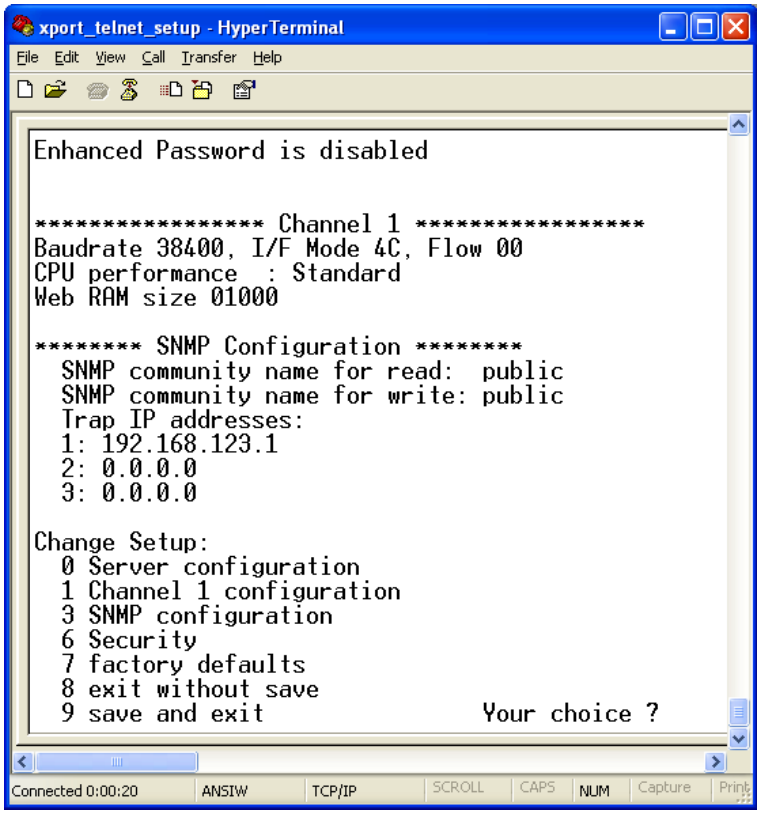
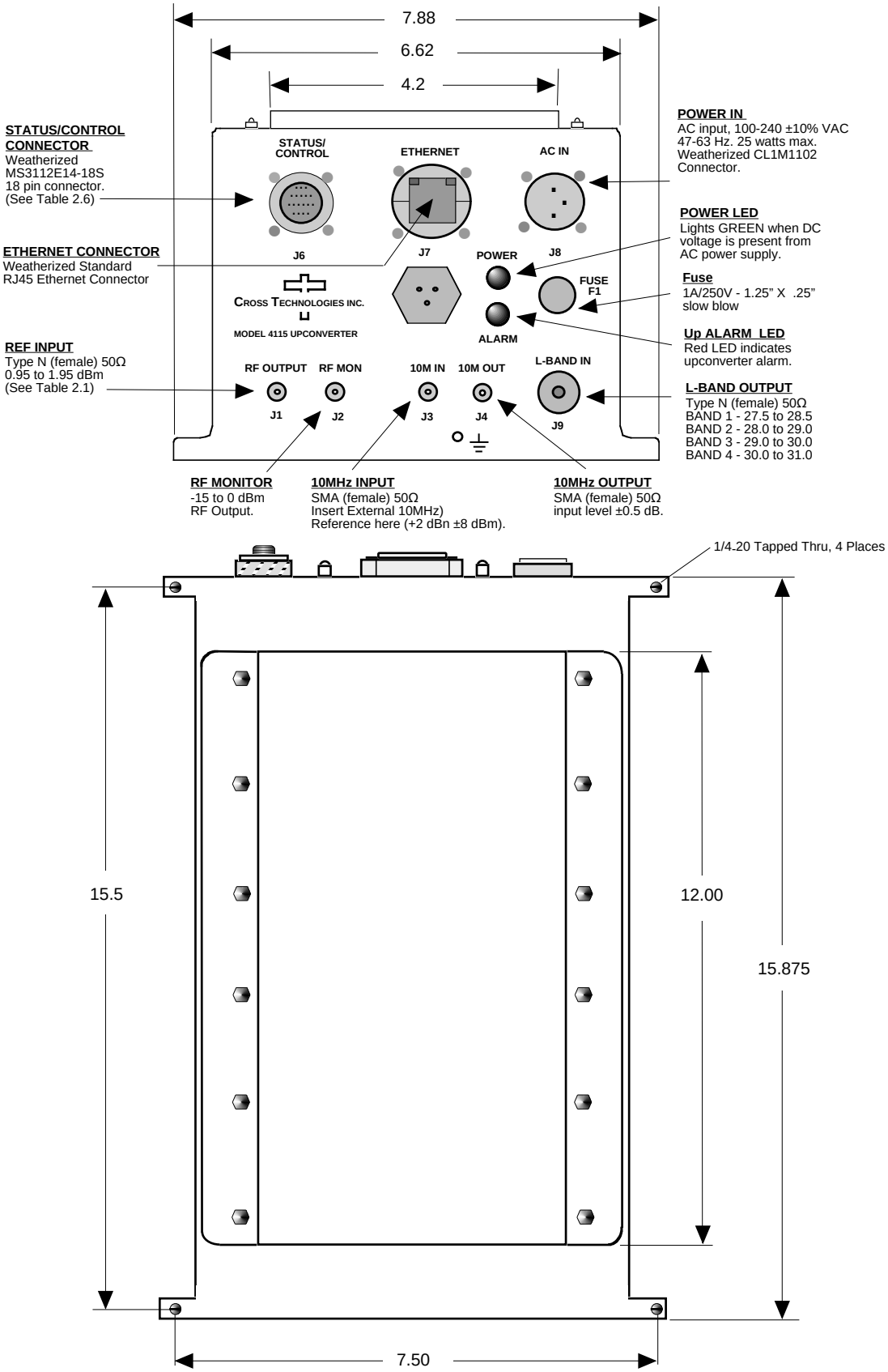


Figure 2.5 Shows front panel input and output connections, top view and baseplate mounting dimensions.



2.6 Physical Interface

All 4115 and 4116 units provide a RS232/RS422/RS485 interface port and a 10/100 Base-T Ethernet port. Both ports are available when the unit is installed and powered up. Commands may be sent to either port at any time and they will be processed in the order that they are received. The RS232/RS422/RS485 signals connect via a 18-pin, MS3112E14-18S connector as shown in Figure 2.5. The Ethernet signals connect via a standard RJ45 connector, part #RJF6G.

Table 2.6: Monitor and Control Connector

Monitor and Control Connector Pinout, MS3112E14-18S	
Connector part number MS3112E14-18S	
Mating Connector part number MS3116F14-18P	
Pin	**Signal Description**
A	Chassis Ground
N	Summary Alarm Normally Closed
P	Summary Alarm Common
R	Summary Alarm Normally Open
E	RS422/RS485 Data Out-
F	Signal Ground
C	RS422/RS485 Data In-
D	RS422/RS485 Data Out+, RS232 Data Out
B	RS422/RS485 Data In+, RS232 Data In

NOTE: Planning Ethernet Access

It is recommended that IP knowledgeable customer personnel be consulted as a resource in the installation and use of the Ethernet access features of the Cross Technologies product.

2.7 Installation/Operation

Installing and Operating the 4115-300 Ka-Band Block Upconverter

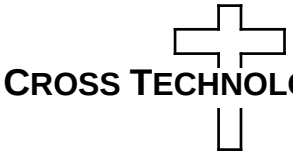
1. Connect a -40 to -15 dBm signal to L-BAND INPUT, (Figure 2.5).
2. Connect the RF OUTPUT, to the external equipment.
3. Using the pre-assembled AC power input cable (furnished), connect 100-240 ±10% VAC, 47 - 63 Hz to AC IN connector on the front panel.
4. If a custom length power cable must be made, refer to description below for connections*.
5. Be sure DS1 (green, DC Power) is on and DS2 (red, Alarm) is off (Figure 2.5).
6. Set the gain so that the output level is always within the range -15 to 0 dB. (see Table 2.0).
7. Select either INT (for internal 10 MHz ref), AUTO (for internal 10 MHz ref UNLESS a external 10 MHz, +2 to +8 dBm signal is connected to J2), or EXT (for external 10 MHz, +2 to +8 dBm ref that is inserted at J2) on front panel switch S1 (see Table 2.0).
8. Check that a 10 MHz, signal is present at the 10 MHz REF OUTPUT at the same level as the input, ±0.5 dB. (J4 - Figure 2.5).
9. AC Fuse - The fuse is a 1A/250V 1.25" x .25" (slow blow) and is inserted in the fuse F1 position. **NOTE:** If a fuse continues to open, the power supply is most likely defective.

2.8 Connection to AC Power

The 4115-300 is furnished with a pre-assembled AC power input cable as described below.

* 4115-31 AC Power Input Connections	
Connector, Clipper Series, CL1M1102 and crimp pins	
Mating Connector, Clipper Series, CL1F1101 and crimp pins	
Pin	**Input Connector Pin Description**
1	100-240 ±10% VAC, 47-63 Hz, 20 watts max.
2	Neutral
3	Ground

Unless otherwise specified, the mating conneector is provided preassembled onto a standard NEMA 5-15P U.S. power cord.



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