

# Instruction Manual

# Model 4115-267

## Ka-Band Block Upconverter

May 2015, Rev. C



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## INSTRUCTION MANUAL

# MODEL 4115-267 Ka-Band Upconverter, Weather Resistant

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All Cross Technologies, Inc. products are warranted against defective materials and workmanship for a period of one year after shipment to customer. Cross Technologies, Inc.'s obligation under this warranty is limited to repairing or, at Cross Technologies, Inc.'s option, replacing parts, subassemblies, or entire assemblies. Cross Technologies, Inc. shall not be liable for any special, indirect, or consequential damages. This warranty does not cover parts or equipment which have been subject to misuse, negligence, or accident by the customer during use. All shipping costs for warranty repairs will be prepaid by the customer. There are not other warranties, express or implied, except as stated herein.



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# MODEL 4115-267 Ka-Band Upconverter, Weather Resistant\*

## 1.0 General

### 1.1 Equipment Description

The 4115-267 Ka-band Block Upconverter converts 0.52 - 0.92 GHz up to 26.5 - 26.9 GHz. Front panel LEDs provide indication of DC Power, and PLL Alarms. The L-band to RF gain is -15 to +15 dB adjustable in 0.5 dB steps. Connectors are Type N female for the L-band, Super SMA female for the RF output. Gain, and internal reference frequency are controlled by the Ethernet M&C. The 4115 is powered by a 100-240  $\pm$ 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.

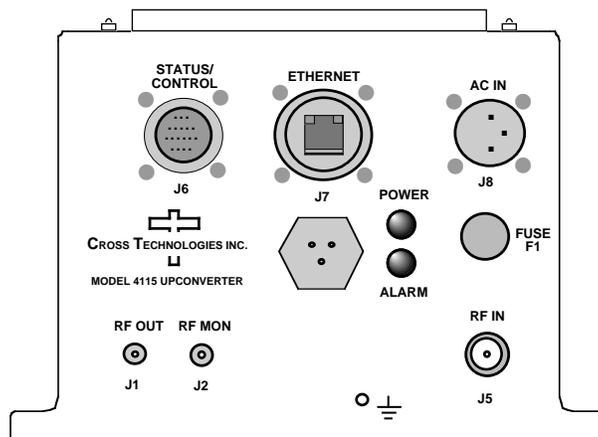


FIGURE 1A Model 4115-267 Ka-Band Block Upconverter, Front Panel

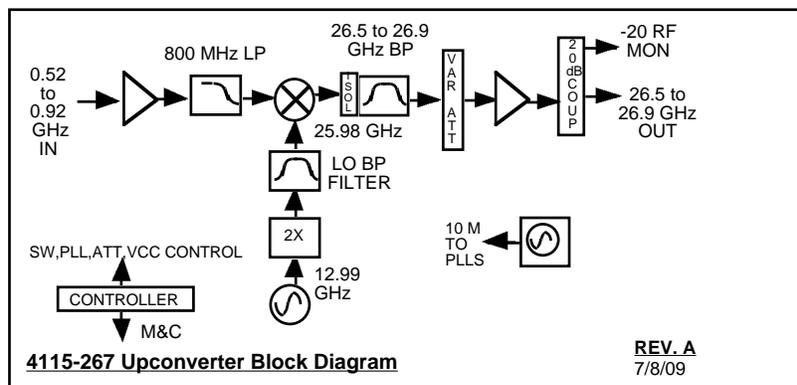


FIGURE 1B Model 4115-267 Ka-Band Block Upconverter, Block Diagram

## 1.2 Technical Characteristics

<b>TABLE 1.0 4116-267 Ka Band Block Upconverter Specifications**</b>						
<b>Input Characteristics</b>						
Input Impedance/Return Loss	50Ω/14 dB					
Frequency	0.52 to 0.92 GHz					
Noise Figure, Maximum	20 dB maximum gain					
Input Level Range	-20 to -5 dBm					
<b>Output Characteristics</b>						
Impedance/Return Loss	50Ω / 14 dB					
Frequency (GHz)	26.5 to 26.9 GHz					
Output Level Range	-35 to +5 dBm					
Output 1 dB Compression	+10 dBm					
<b>Channel Characteristics</b>						
Gain	+15 ± 1 dB, (+2 dB,-30 to +60 degrees C) (+15 to -15 variable in 0.5 dB steps)					
Image Rejection	> 60 dB, minimum					
Spurious, In band	SIGNAL RELATED <-50 dBC in band, -30 to +5 dBm out; SIGNAL INDEPENDENT,<-70 dBm					
Spurious, Out of Band	<-50 dBm					
Intermodulation	<-50 dBC for two carriers each at -10 dBm, below maximum input and output level out.					
Frequency Response	±2 dB, over RF band; ± 0.8 dB, 40 MHz BW					
Group Delay	3ns p-p over any 40 MHz BW in the 400 MHz output band					
Frequency Sense	Non-inverting					
<b>LO Characteristics</b>						
LO Frequency	25.98 GHz					
Frequency Accuracy	± 0.05 ppm maximum over temp internal reference					
Phase Noise @ Frequency	100 MHz	1 KHz	10 KHz	100 KHz	1 MHz	10 M
dBC/Hz	-60	-70	-80	-95	-108	-125
<b>Controls, Indicators</b>						
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					
<b>Other</b>						
RF Out, Mon. Connector	Super SMA (female) 50Ω, weather resistant					
RF In Connector	Type N (female), 50Ω, weather resistant					
Weather Resistant* Connectors	<b>Status/Control Connector</b> , MS3112E14-18S; Mating Cable Connector, MS3116F14-18P. <b>Ethernet Connector</b> , RJF21B; Mating Cable Connector,RJF6G; Cable interface, Standard RJ45. <b>AC Input Connector</b> , Clipper Series, CL1M1102, Mating Cable Connector, CL1F1101. (Unless otherwise specified, the mating connector is provided reassembled onto a standard NEMA 5-15 U.S. power cord.)					
Size	8" Wide X 6" High X 16" Deep, Weather Resistant* enclosure.					
Power	100-240 ±10% VAC, 47 - 63 Hz, 20 watts maximum.					
**+0 to +50 degrees C; Specifications subject to change without notice.						

## 2.0 Installation

The 4115-267 Ka-Band Upconverter consists of a 8" W x 6" H x 16" D Weather Resistant enclosure. A switching,  $\pm 12$ , +24, +5 VDC power supply provides power for the internal assemblies. The 4115-267 can be secured to a mounting plate using the 4 holes on the bottom of the front and rear panels. See Figure 2.5 for mounting dimensions.

**Figure 2 - 4115-267 Assembled**



### 2.0.1 Connection to AC Input Power

The 4115-267 is furnished with a pre-assembled AC power input cable as described below.

4115-267 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 $\pm 10\%$ 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 4115-267 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 4115-267 M&C Commands**

Table 2.0: Model 4115-267 M&C Commands		
Command	Syntax	Description
Set Gain	{aaCGxxx}	where: xxx = 3 characters Range: -150 to 150 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: 00 to 31
Set Int. 10 MHz reference offset	{aaCOxxxxx}	where: xxxxx = 5 characters Range: +2000 to -2000

## 2.3 M&C Queries

**Table 2.1 Model 4115-267 M&C Commands**

<b>Table 2.1: Model 4115-267 M&amp;C Queries</b>		
<b>Command</b>	<b>Syntax</b>	<b>Description</b>
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
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
Int. 10 MHz reference offset	{aaSO}	Returns {aaSOxxxxx} where: xxxxx = 5 characters Range: +2000 to -2000

*continued on page 8...*

**Table 2.1 Model 4115-267 M&C Commands (Continued from page 7)**

<b>Table 2.1: Model 4115-267 M&amp;C Queries - Continued...</b>		
<b>Command</b>	<b>Syntax</b>	<b>Description</b>
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 {aaSVxxxxxxxxxyyy} where:
		xxxxxxxx = unit model number
		yyyy = unit firmware revision

## 2.4 ETHERNET Interface Installation and Operation

The 4115-267 frequency converter 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 4115-267's Ethernet port to the Ethernet network connector on the PC using a crossover RJ-45 cable.

#### LAN Connection

For LAN connections, attach the 4115-267 Ethernet port to the LAN using a normal RJ-45 cable. Use any PC on the LAN to connect to the 4115-267.

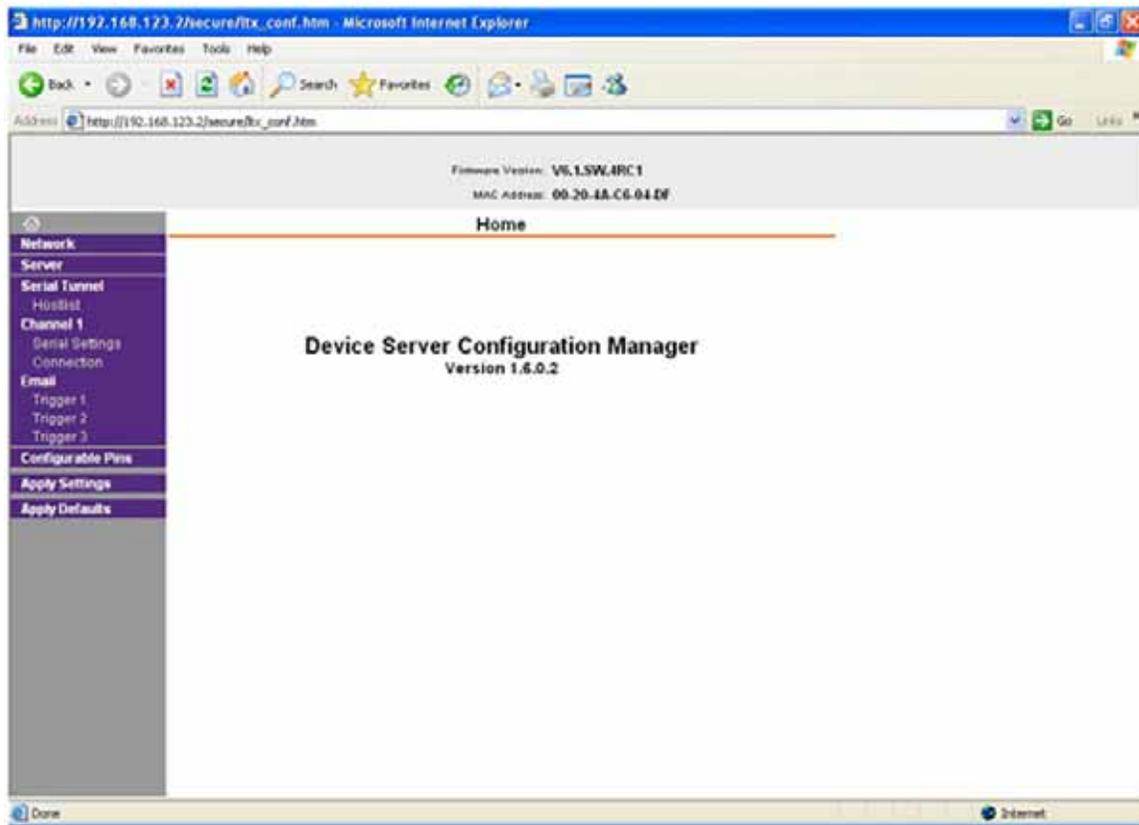
### 2.4.2 Ethernet Configuration

Each 4115-267 must be configured with an appropriate IP address, Netmask, and Gateway assigned by your network manager. The 4115-267 is set at the factory with a static address which is 192.168.123.2. The device server in the 4115-267 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 4115-267 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**

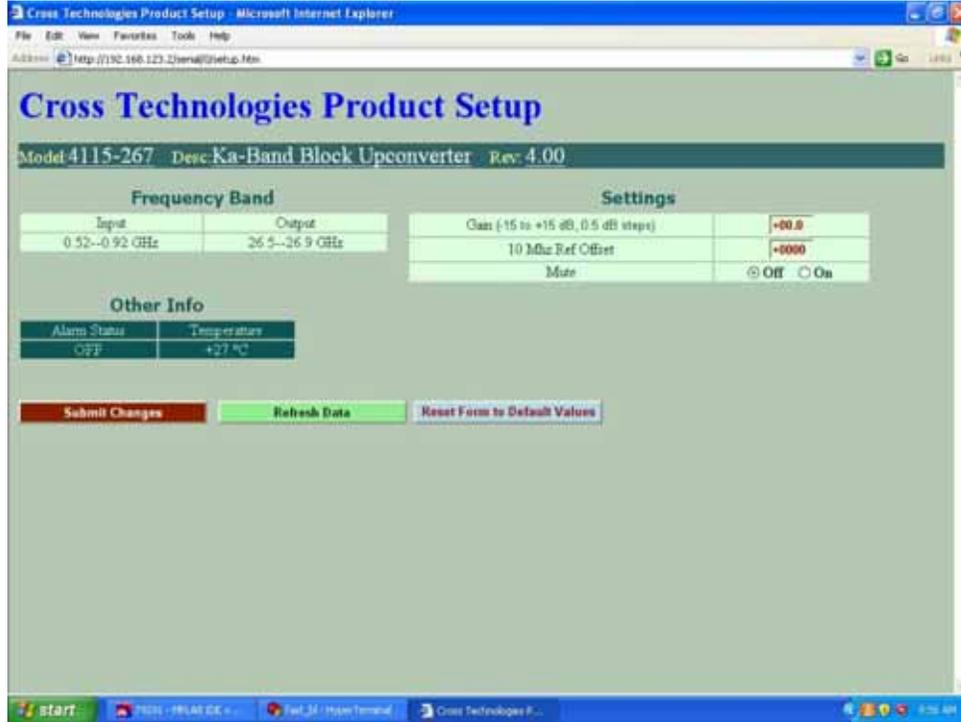


In the left frame of the configuration manager click on Network to display the Network Settings screen. Enter the IP address, Subnet mask, and Gateway address with delimiter dots (example: 192.168.192.47). Click on apply settings to apply the new settings in the device server.

### 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 4115-267 frequency converter.

Figure 2-C: Model 4115-267 Web page

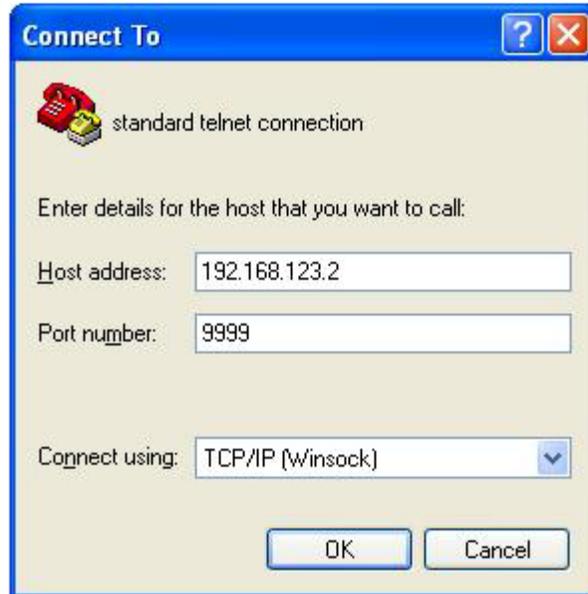


## 2.4.4 SNMP Configuration

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 .

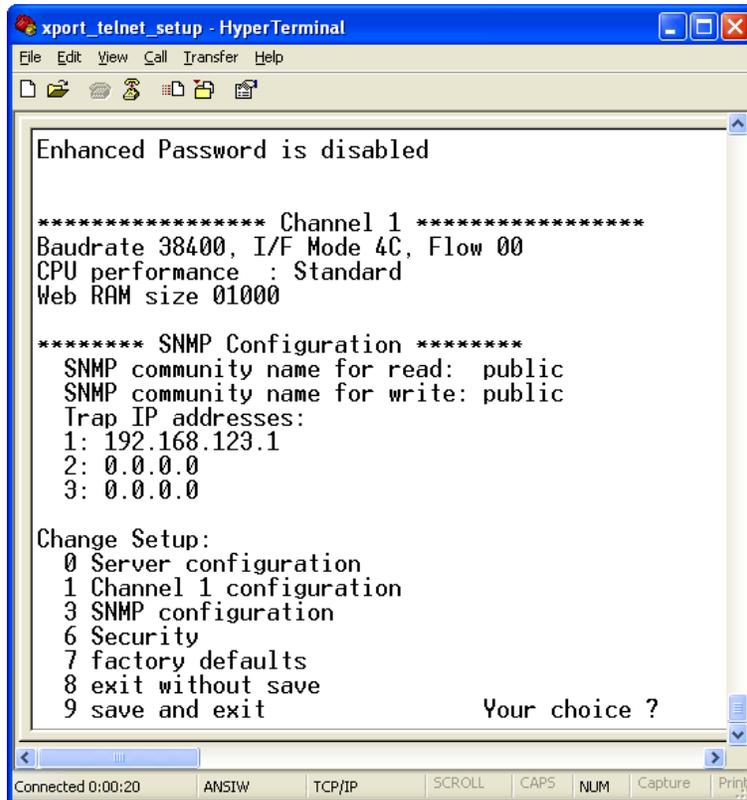
Start the Hyper Terminal application and select "New Connection" from the "File" drop down menu. The next screen is a "Connect To" dialog box. Select TCP/IP (Winsock) from the "Connect" using drop down menu. Enter the IP address of the 4115-267 in the "Host address:" field and 9999 in the "Port number" 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**

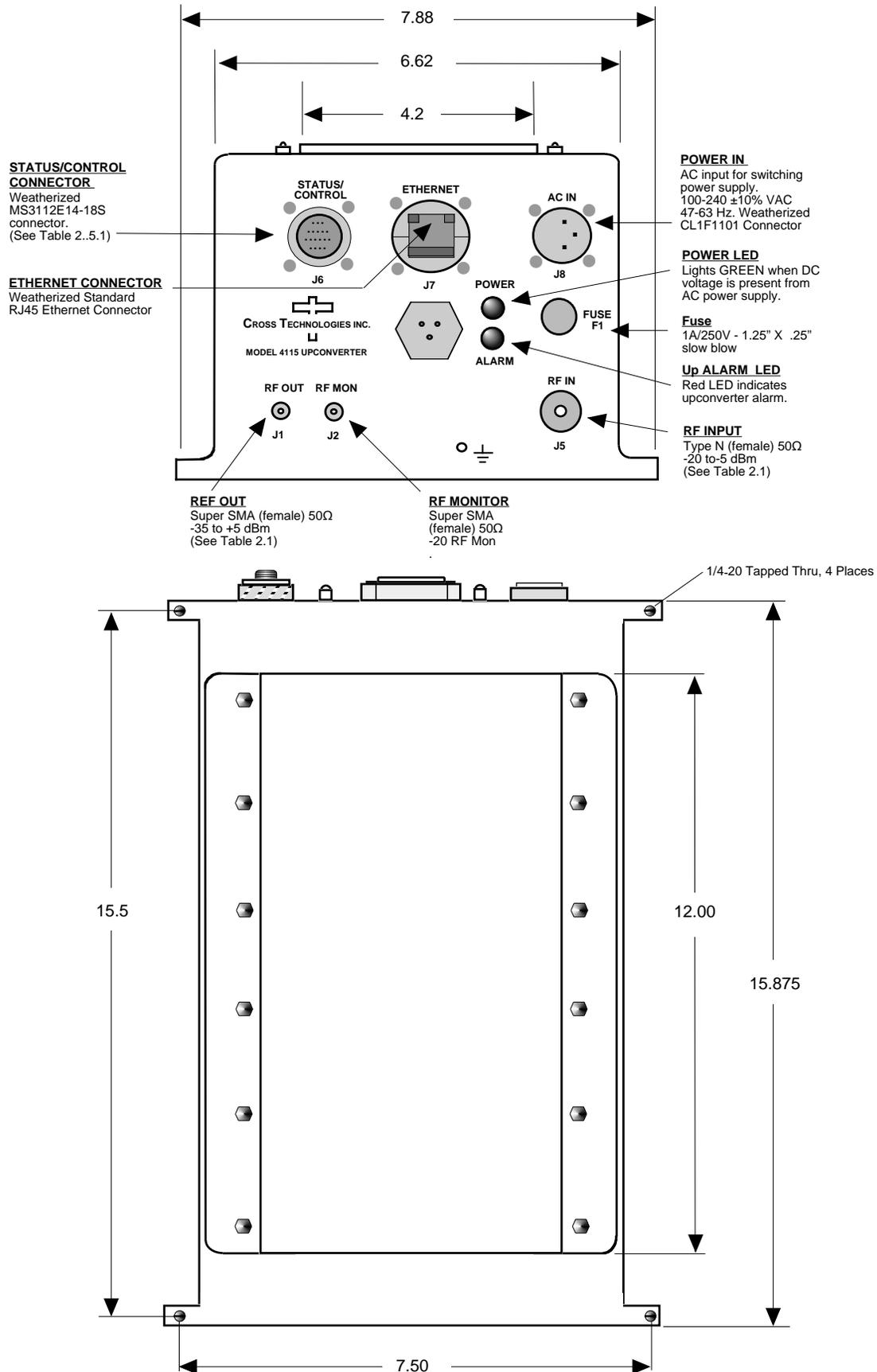


Once the *Telnet* connection is established you will be prompted to “Press Enter for Setup Mode.” Press enter and a menu of device server configuration options will appear (see Figure 2-F). Select menu item 3, “SNMP configuration.” You will be prompted to enter SNMP community read and write strings. 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** Front panel input and output connections, overall dimensions and mounting baseplate 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 multi-purpose MS3116, 18 pin connector as shown in Table 2.1. The Ethernet signals connect via a standard RJ45 connector.

**Table 2.5.1: Monitor and Control Connector**

Monitor and Control Connector Pinout	
Connector part number MS3112E14-18S	
Mating Cable 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 4115-267 Tri-Band Downconverter

1. Connect a -20 dBm to -5 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  $\pm$ 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 for +15 to  $\pm$ 1 dB insuring that the output level is always in the range of -35 to +5 dBm.
7. AC Fuse - The fuse is a 1.25" x .25" - 1.5 amp (slow blow) and is inserted in the fuse F1 position.

**NOTE:** If a fuse continues to open, the power supply is most likely defective.

4115-267 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 $\pm$ 10% VAC, 47-63 Hz, 20 watts max.
2	Neutral
3	Ground



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