

# Instruction Manual

# Model 4116-253

## Ka-Band Block Downconverter

### Weather Resistant Unit

January 2015, Rev. 0



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# INSTRUCTION MANUAL

## MODEL 4116-253 Ka-Band Block Downconverter, Weather Resistant Unit

<b><u>TABLE OF CONTENTS</u></b>	<b><u>PAGE</u></b>
<b>Warranty</b>	<b>2</b>
<b>1.0 General</b>	<b>3</b>
1.1 Equipment Description	<b>3</b>
1.2 Technical Characteristics	<b>4</b>
<b>2.0 Installation</b>	<b>5</b>
2.1 Message Protocol	<b>5</b>
2.2 M&C Commands	<b>6</b>
2.3 M&C Queries	<b>7</b>
2.4 Ethernet Interface Installation	<b>8</b>
2.4.1 Methods of Connection	<b>8</b>
2.4.2 Ethernet Configuration	<b>8</b>
2.4.3 Web page M&C	<b>10</b>
2.4.4 SNMP Configuration	<b>10</b>
2.5 Downconverter Outline Drawings	<b>13</b>
2.6 Physical Interface	<b>14</b>
2.7 Installation/Operation	<b>15</b>

**WARRANTY** - The following warranty applies to all Cross Technologies, Inc. products.

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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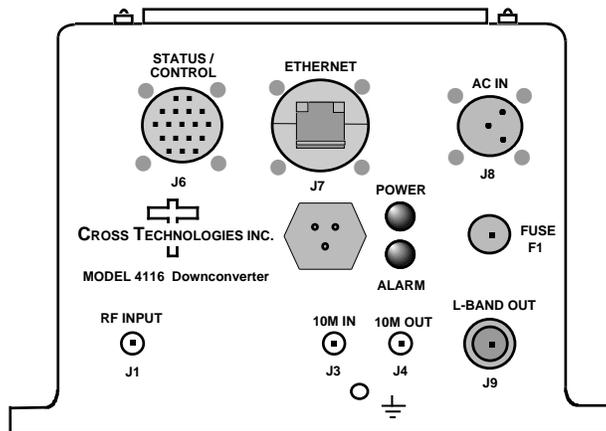
# MODEL 4116-275 Ka-Band Block Downconverter, Weather Resistant

## 1.0 General

### 1.1 Equipment Description

The 4116-253 Ka-band Block Downconverter converts 25.3 - 26.3 GHz to 0.95 - 1.95 GHz. Front panel LEDs provide indication of DC Power and PLL Alarms. The L-band to RF gain is  $+30 \pm 3$  dB maximum and is adjustable in  $0.5 \pm 0.5$  dB steps. Connectors are 2.92 mm for RF In, SMA for external reference input and output, and Type N (all female) for L-band out. Gain 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. The unit is powered by a 100-240  $\pm 10\%$  VAC power supply, and is mounted in a 8"W X 6"H X 16"D 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 4116-253 Ka-Band Block Downconverter, Front Panel

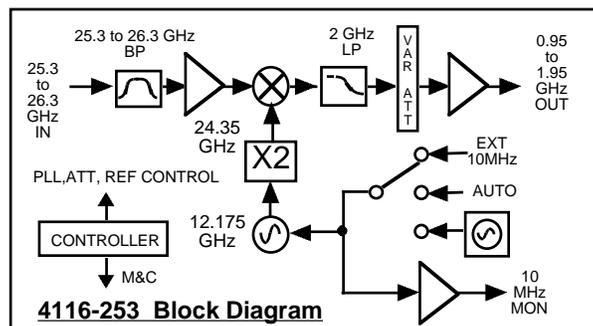


FIGURE 1. Model 4116-253 Ka-Band Block Downconverter Block Diagram

## 1.2 Technical Characteristics

<b>TABLE 1.0 4116-253 Downconverter Specifications*</b>						
<b>Input Characteristics</b>						
Impedance/Return Loss	50Ω/14 dB					
Frequency (GHz)	25.3 to 26.3					
Noise Figure, Max.	20 dB maximum gain					
Input Level Range	-50 to -30 dBm					
<b>Output Characteristics</b>						
Impedance/Return Loss	50Ω/14 dB					
Frequency	0.95 to 1.95 GHz					
Output Level Range	-20 to 0 dBm					
Output 1 dB Comp.	+10 dBm, maximum gain, Gmax					
<b>Channel Characteristics</b>						
Gain at F <sub>c</sub>	+30 ±3 dB, (+30 to 0 dB variable in 0.5 ±0.5 dB steps)					
Image Rejection	> 60 dB, minimum					
Spurious, Inband	SIG. REL. <-50 dBC, -15 to 0 dBm out; 2Xf <sub>o</sub> <-45 dBC; SIG. Independent, <-60 dBm; .95-1.95 GHz out, Gmax					
Spurious, Out of band	<-55 dBC, 0.5 - 0.94 GHz and 1.96 - 2.45 GHz; at Gmax					
Intermodulation	<-50 dBC for two carriers at 4 MHz spacing, each at -5 dBm out; at Gmax					
Frequency Response	±1.5 dB, 950-1950 MHz out; ±1.0dB, 1150-1550 MHz out (25.5-25.9 GHz In)					
Phase Linearity	±5 degrees max. from linear phase, 1150-1550 MHz out (25.5-25.9 GHz In)					
Frequency Sense	Non-inverting					
<b>LO Characteristics</b>						
LO Frequency	24.35 GHz					
Frequency Accuracy	± 0.01 ppm max. over temp internal reference; external reference input					
Phase Noise @ Freq (Hz)>	100 MHz	1 kHz	10 kHz	100 kHz	1 MHz	10M - 40M
dBC/Hz	-65	-75	-80	-95	-110	-120
10 MHz Level In/Mon.	+2 to +8 dBm in; Monitor Output = input level ± 1.0 dB, 50 ohms					
<b>Controls, Indicators</b>						
Gain, 10M Frequency	Gain 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 In Connector	2.92 mm (female), 50Ω					
L-Band Connector	Type N (female), 50Ω					
10 MHz Connectors	SMA (female), 50Ω					
Status/Control Conn.	Multipin MS3112E14-18S Weather Resistant Connector					
Ethernet Connector	Standard RJ45 Weather Resistant Ethernet Connector, RJF6G					
Size	8" Wide X 6" High X 16" Deep Weather Resistant* Enclosure					
Power	100-240 ±10% VAC, 47 - 63 Hz, 25 watts maximum/ FCI Clipper Series CL1M1102 Weather Resistant Connector					
**+0 to +50 degrees C; Specifications subject to change without notice.				© 2015 Cross Technologies, Inc.		

## 2.0 Installation

The 4116-253 Ka-Band Downconverter 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 internal assemblies.

The 4116-253 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. 4116-253 Front Panel Configuration**



### 2.0.1 Connection to AC Input Power

The 4116-253 is furnished with a pre-assembled AC power input cable as described below.

4116-253 Power Input Connector, FCI Clipper Series	
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 4116-253 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 4116-253 Downconverter M&C Commands**

<b>Table 2.0: Model 4116-253 M&amp;C Commands</b>		
<b>Command</b>	<b>Syntax</b>	<b>Description</b>
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 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
Set 10 MHz reference mode	{aaCEx}	where:
		x = 1 to select internal reference
		x = 2 to select external reference
		x = 3 to select auto reference

## 2.3 M&C Queries

Table 2.1 - Model 4116-253 Downconverter M&C Queries

Table 2.1: Model 4116-253 M&C Queries		
Queries	Syntax	Description
Gain	{aaSG}	Returns {aaSGxxx} where: xxx = 3 characters Range: 300 to 000 (+30 to 0 dB) 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
Int. 10 MHz reference offset	{aaSO}	Returns {aaSOxxxxx} where: xxxxx = 5 characters Range: -2000 to 2000
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 yyy = unit firmware rev.

## 2.4 ETHERNET Interface Installation and Operation

The 4116-253 Block Downconverter 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 4116-253's Ethernet port to the Ethernet network connector on the PC using a crossover RJ-45 cable.

#### LAN Connection:

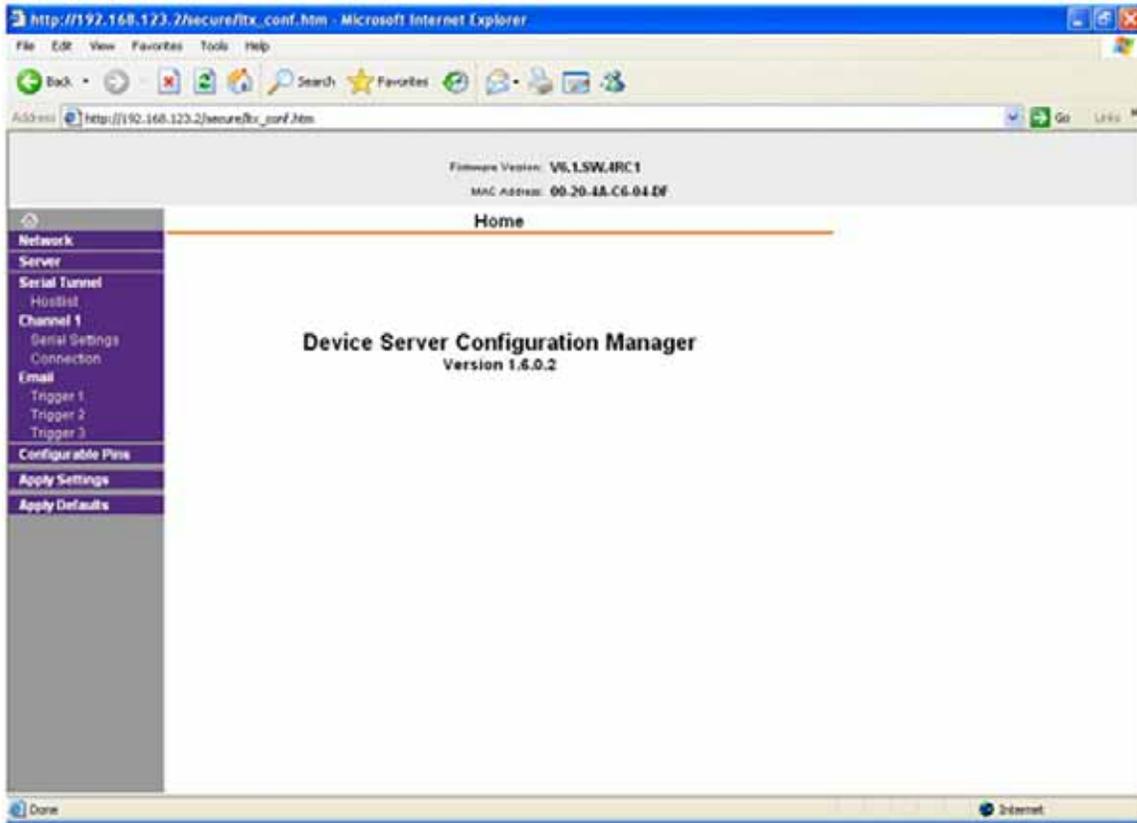
For LAN connections, attach the 4116-253 Ethernet port to the LAN using a normal RJ-45 cable. Use any PC on the LAN to connect to the 4116-253.

### 2.4.2 Ethernet Configuration

Each 4116-253 must be configured with an appropriate IP address, Netmask, and Gateway assigned by your network manager. The 4116-253 is set at the factory with a static address of 192.168.123.2. The device server in the 4116-253 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 4116-253 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 (page 11) shows the web page from a model 4116-253 frequency converter.

**Cross Technologies Product Setup**

Unit ID: (not assigned)  192.168.123.2

Model: 4116-253 Desc: Ka-Band Block Downconverter Rev: 5.20

Frequency Band	
Input	Output
25.3 – 26.3 GHz	0.95 – 1.95 GHz

10 Mhz Reference	
Source	<input checked="" type="radio"/> Int <input type="radio"/> Ext <input type="radio"/> Auto
Offset	+0000

Gain: +30.0 (0 to +30 dB in 0.5 dB steps)

Other Info	
Alarm Status	Current Ref Source
OFF	INT

Auto Refresh: Auto Refresh Off

**NOTE: You must stop auto-refresh before changing operating values.**

Figure 2-C - Model 4116-253 Web Page

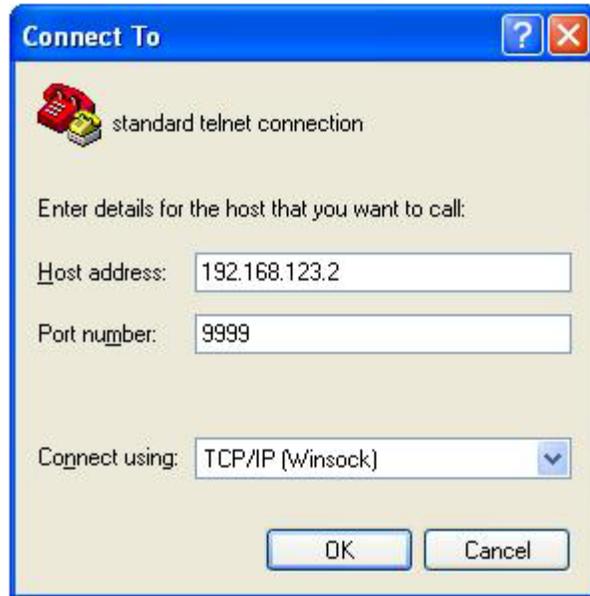
### 2.4.4 SNMP Configuration

Setting of SNMP parameters such as Community Write and Community Read strings requires a *Telnet*<sup>®</sup> connection to port 9999. The following instructions explain how to establish such a *Telnet*<sup>®</sup> 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 4116-253 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

```
xport_telnet_setup - HyperTerminal
File Edit View Call Transfer Help
Enhanced Password is disabled

***** Channel 1 *****
Baudrate 38400, I/F Mode 4C, Flow 00
CPU performance : Standard
Web RAM size 01000

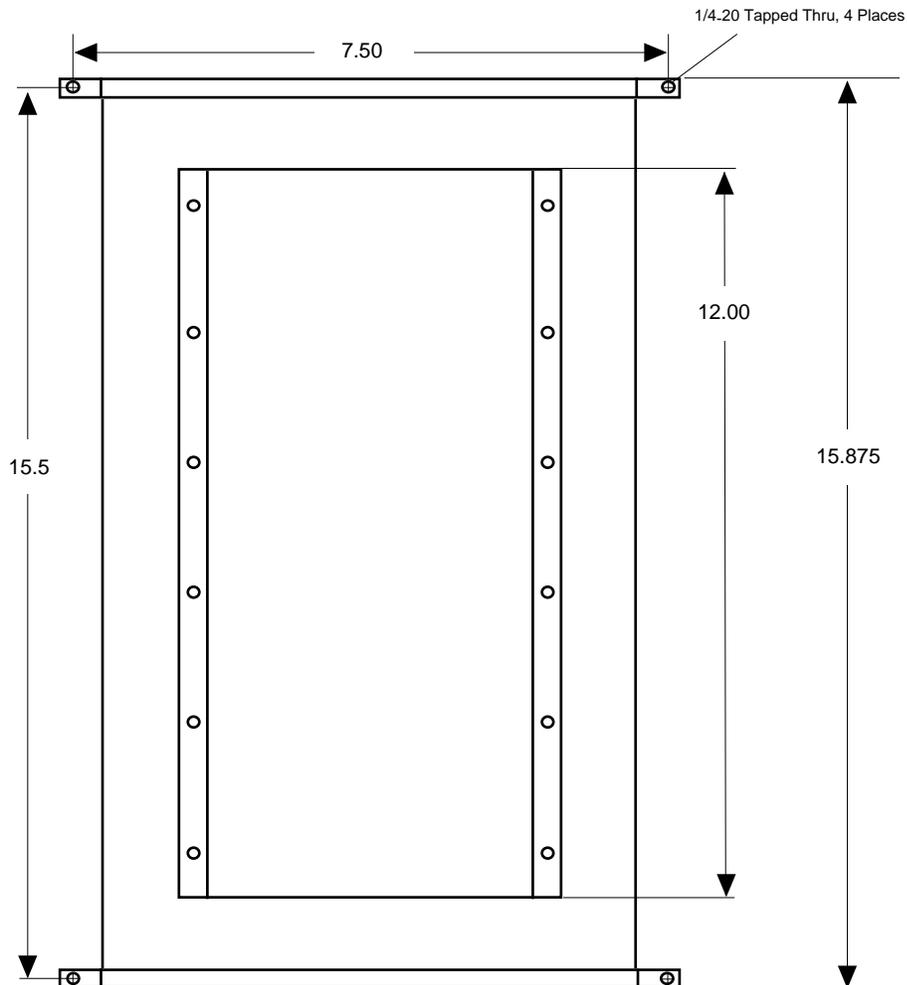
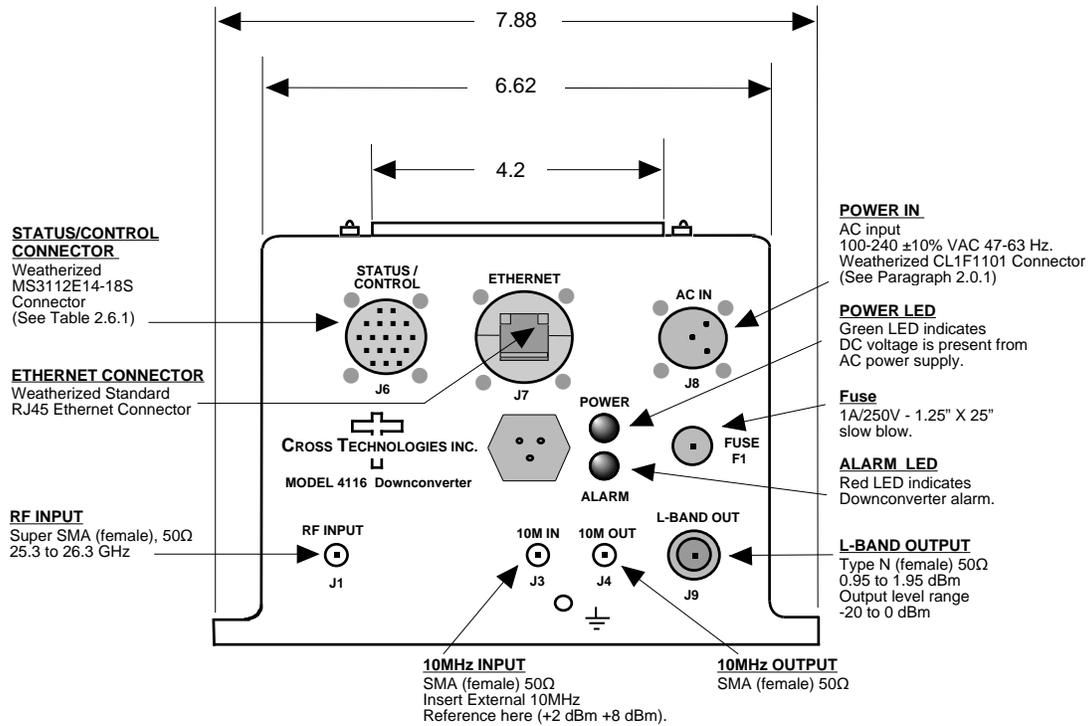
***** SNMP Configuration *****
SNMP community name for read: public
SNMP community name for write: public
Trap IP addresses:
1: 192.168.123.1
2: 0.0.0.0
3: 0.0.0.0

Change Setup:
0 Server configuration
1 Channel 1 configuration
3 SNMP configuration
6 Security
7 factory defaults
8 exit without save
9 save and exit

Your choice ?

Connected 0:00:20 ANSIW TCP/IP SCROLL CAPS NUM Capture Print
```

**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 an 18-pin MS3112E14-18S connector as shown in Table 2.6.1. The Ethernet signals connect via a standard RJ45 connector (RJF6G).

**Table 2.6.1 - Monitor and Control Connector**

<b>Monitor and Control Connector Pinout</b>	
<b>Mating connector part number MS3112E14-18S</b>	
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 4116-253 Ka-Band Block Downconverter:

1. Connect a -50 dBm to -30 dBm signal to RF INPUT J1), (Figure 2.5).
2. Connect the L-BAND 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 so that the output level is always within the range of -20 to 0 dBm.  
(See Table 2.0 and 2.6.1).
7. Select either INT. (for internal 10 MHz ref), AUTO (for internal 10 MHz ref UNLESS an external 10 MHz, +2 to +8 dBm signal is connected to J2), or EXT (for external 10 MHz, +2 to +8 dBm reference that is inserted at J2) via Ethernet or serial command. (See Table 2.0 and 2.6.1).
8. Check that a 10 MHz, signal is present at the 10 MHz REF OUTPUT at the same level as the input,  $\pm$ 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.

<b>* 4116-253 AC Power Input Connections</b>	
<b>Mating Connector, FCI Clipper Series, CL1M1102 and crimp pins</b>	
<b>Pin</b>	<b>Input Connector Pin Description</b>
1	100-240 $\pm$ 10% VAC, 47-63 Hz, 20 watts max.
2	Neutral
3	Ground



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