Data, drawings, and other material contained herein are proprietary to Cross Technologies, Inc., but may be reproduced or duplicated without the prior permission of Cross Technologies, Inc. for purposes of operating the equipment.

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

| Warranty                             | 2 |
| 1.0 General                          | 3 |
| 1.1 Equipment Description            | 3 |
| 1.2 Technical Characteristics        | 4 |
| 2.0 Installation                     | 5 |
| 2.1 Mechanical                       | 5 |
| 2.2 Rear Inputs and Outputs          | 6 |
| 2.3 Front Panel Indicators           | 6 |
| 2.4 Operation                        | 7 |

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.
MODEL 2115-139 Block Upconverter

1.0 General

1.1 Equipment Description
The 2115-139 Block Upconverter converts 1.20 - 1.70 GHz to 13.95 - 14.45 GHz with low phase noise and flat frequency response. Frequency translation is via a 12.75 GHz local oscillator. Front panel LEDs provide indication of DC Power, External 10 MHz, and PLL Alarm. The gain is +20 dB. Connectors are SMA female for the RF and BNC female for the L-Band and external reference input and reference output. A three-way switch controls which 10 MHz reference is being used. In the INT position, the internal reference is used, in the EXT position, an external reference is used, and in the AUTO position, the internal reference is used unless a 3 dBm ± 3 dB, 10MHz reference signal is connected to the external reference input. The 2115 is powered by a 100-240± 10% VAC power supply, and mounted in a 1 3/4” X 19” X 14” rack mount chassis.

FIGURE 1.1  Front and Rear Panels

FIGURE 1.2  Block Diagram
1.2 Technical Characteristics

**TABLE 1.0 2115-139 Upconverter Specifications**

### Input Characteristics
- **Impedance/Return Loss**: 50 Ω / 14 dB (see TABLE 2.2 for connector options)
- **Frequency**: 1.20 to 1.70 GHz
- **Noise Figure, max.**: 20 dB, max gain
- **Input Level**: -40 to -25 dBm
- **Input 1dB Compression**: -10 dBm

### Output Characteristics
- **Impedance/Return Loss**: 50 Ω / 14 dB (see TABLE 2.2 for connector options)
- **Frequency**: 13.95 to 14.45 GHz
- **Output Level Range**: -20 to -5 dBm
- **Output 1dB Compression**: +10 dBm

### Channel Characteristics
- **Gain**: +20 dB ± 1 dB
- **Image Rejection**: > 60 dB
- **Spurious, Inband**: < -60 dBC (0 dBm output level)
- **Spurious, Out of Band**: LO < -70 dBm
- **Intermodulation**: < -55 dBC for two carriers each at -10 dBm out
- **Frequency Response**: ±1 dB, 13.95 to 14.45 GHz; ± 0.5 dB, 40 MHz BW
- **Frequency Sense**: Non-inverting

### LO Characteristics
- **LO Frequency**: 12.75 GHz
- **Frequency Accuracy**: ± 0.01 ppm max over temp internal reference
- **10 MHz Input/Output Level**: +3 dBm ± 3 dB

<table>
<thead>
<tr>
<th>Phase Noise @ Freq</th>
<th>100 MHz</th>
<th>1kHz</th>
<th>10kHz</th>
<th>100kHz</th>
<th>1MHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>dBC/Hz</td>
<td>-65</td>
<td>-80</td>
<td>-85</td>
<td>-100</td>
<td>-110</td>
</tr>
</tbody>
</table>

### Controls, Indicators
- **Power**: Green LED
- **PLL Alarm**: Red LED, External contact closure
- **Ext 10 MHz**: Yellow LED, Indicates Ext 10 MHz reference is selected (rear panel sw)

### Other
- **RF Connector**: SMA 50Ω female (see TABLE 2.2 for other options)
- **L-Band Connector**: BNC 50Ω, female (see TABLE 2.2 for other options)
- **10 MHz Connectors**: BNC 50/75Ω, female
- **Alarm Connector**: DB9, female - NO or NC contact closure on Alarm
- **Size**: 19 inch, 1RU standard chassis 1.75”high X 14.0” deep
- **Power**: 100-240±10% VAC, 47-63 Hz, 45 watts max.

### Options
- **Connector options**: see TABLE 2.2

*+10°C to +40°C; Specifications subject to change without notice.*
2.0 Installation

2.1 Mechanical - The 2115-139 consists of one RF PCB housed in a 1 RU (1 3/4 inch high) by 12 inch deep chassis. A switching, ± 12, +24, +5 VDC power supply provides power for the assemblies. The 2115-139 can be secured to a rack using the 4 holes on the front panel. Figure 2.0 shows how the 2115-139 is assembled.

**FIGURE 2.0 2115-139 Mechanical Assembly**
2.2 Rear Panel Input/Output Signals

Figure 2.1 shows the input and output connectors on the rear panel.

![FIGURE 2.1 2115-139 Rear Panel I/O's](image)

<table>
<thead>
<tr>
<th>Pin</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Not Used</td>
</tr>
<tr>
<td>2</td>
<td>Not Used</td>
</tr>
<tr>
<td>3</td>
<td>Not Used</td>
</tr>
<tr>
<td>4</td>
<td>Not Used</td>
</tr>
<tr>
<td>5</td>
<td>GND</td>
</tr>
<tr>
<td>6</td>
<td>Alarm Relay: Common</td>
</tr>
<tr>
<td>7</td>
<td>Alarm Relay: Normally Open</td>
</tr>
<tr>
<td>8</td>
<td>Not Used</td>
</tr>
<tr>
<td>9</td>
<td>Alarm Relay: Normally Closed</td>
</tr>
</tbody>
</table>

**TABLE 2.1 J11 Pinouts (DB9)**

<table>
<thead>
<tr>
<th>Connector Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>L-Band</td>
</tr>
<tr>
<td>BNC, 50Ω (STD)</td>
</tr>
<tr>
<td>BNC, 75Ω</td>
</tr>
<tr>
<td>Type F, 75Ω</td>
</tr>
<tr>
<td>SMA, 50Ω</td>
</tr>
</tbody>
</table>

2.3 Front Panel Indicators

The following are the front panel indicators.

![FIGURE 2.2 2115-139 Front Panel Controls and Indicators](image)
2.4 Installation / Operation

2.4.1 Installing and Operating the 2115-139 Upconverter

1. Connect a -40 dBm to -25 dBm signal to L-BAND INPUT, J1 (Figure 2.1).
2. Connect the RF OUTPUT, J101, to the external equipment.
3. Connect 100-240± 10% VAC, 47 - 63 Hz to AC connector on the back panel.
4. Be sure DS1 (green, DC Power) is on and DS2 (red, Alarm) is off (Figure 2.2).
5. Select either INT (for internal 10MHz ref), AUTO (for internal 10MHz ref UNLESS a external 10MHz, 3 dBm signal is connected to J2), or EXT (for external 10MHz, 3 dBm ref that is inserted at J2) on rear panel switch S1 (Figure 2.1).
6. If EXT is selected or AUTO is selected and there is a 10MHz, 3 dBm signal at J2, check that DS3 (yellow, Ext 10MHZ) is on (Figure 2.2).
7. Check that a 10MHz, 3 dBm ±3 dB signal is present at the 10MHZ REF OUTPUT (J8) (Figure 2.1).
8. AC Fuse - The fuse is a 5 mm X 20 mm, 2 amp slow blow (Type T) and is inserted in the far slot in the drawer below the AC input as shown in Figure 2.3. There is a spare fuse in the near slot. If a fuse continues to open, the power supply is most likely defective.

![Fuse Location and Spare Fuse](image)

**FIGURE 2.3** Fuse Location and Spare Fuse