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When ordering parts from Cross Technologies, Inc., be sure to include the equipment model number, equipment serial number, and a description of the part.
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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 2115-222 Block Upconverter

1.0 General

1.1 Equipment Description

The 2115-222 Block Upconverter converts 2.5 - 3.5 GHz to 21.35 - 22.35 GHz with a local oscillator at 18.85 GHz. Front panel LEDs provide indication of DC Power, External 10 MHz, and PLL Alarm. The RF In to RF Out gain is 0 dB. Connectors are SMA female for the RF In (marked L-band Input on the rear panel) and RF Out and BNC female for the 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, the 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.

![Front and Rear Panels](image1.png)

**FIGURE 1.1 Front and Rear Panels**

![Block Diagram](image2.png)

**FIGURE 1.2 Model 2115-222 Upconverter Block Diagram**
1.2 Technical Characteristics

**TABLE 1.0 2115-222 Upconverter Specifications***

### Input Characteristics
- **Impedance/Return Loss**: 50 Ω/10 dB
- **Frequency**: 2.5 to 3.5 GHz
- **Noise Figure, max.**: 20 dB, max gain
- **Input Level**: -30 to -10 dBm
- **Input 1dB Compression**: +4 dBm

### Output Characteristics
- **Impedance/Return Loss**: 50 Ω/10 dB
- **Frequency**: 21.35 to 22.35 GHz
- **Output Level Range**: -30 to -10 dBm
- **Output 1dB Compression**: +4 dBm

### Channel Characteristics
- **Gain**: 0 dB ± 3 dB
- **Image Rejection**: > 55 dB
- **Spurious, Inband**: SIGNAL RELATED <-50 dBC (-10 dBm output level)
- **Spurious, Out of Band**: < -60 dBm
- **Intermodulation**: < -50 dBC for two carriers each at -13 dBm out
- **Frequency Response**: ±2 dB, 21.35 to 22.35 GHz; ± 1.0 dB, 40 MHz BW
- **Frequency Sense**: Non-inverting

### LO Characteristics
- **LO Frequency**: 18.85 GHz
- **Frequency Accuracy**: ± 0.01 ppm max over temp internal reference
- **10 MHz Level**: +3 dBm ± 3 dB, External In or 10MHz Out

<table>
<thead>
<tr>
<th>Phase Noise @ Freq</th>
<th>10Hz</th>
<th>1kHz</th>
<th>10kHz</th>
<th>100kHz</th>
<th>1MHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>dBC/Hz</td>
<td>-55</td>
<td>-70</td>
<td>-80</td>
<td>-100</td>
<td>-110</td>
</tr>
</tbody>
</table>

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

### Other
- **RF In Connector**: SMA (female)
- **RF Out Connector**: SMA (female)
- **10 MHz Connectors**: BNC (female) 75Ω connector; Works with 50Ω or 75Ω.
- **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, 25 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 2115-222 consists of a PCB and an RF assembly 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 2115-222 can be secured to a rack using the 4 holes on the front panel. Figure 2.0 shows how the 2115-222 is assembled.
2.2 Rear Panel Input/Output Signals - Figure 2.1 shows the input and output connectors on the rear panel.

![Figure 2.1 2115-222 Rear Panel I/O's](image)

**TABLE 2.1 J11 Pinouts (DB9)**

<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 2.2 Connector Options**

<table>
<thead>
<tr>
<th>Option</th>
<th>RF</th>
<th>L-Band</th>
</tr>
</thead>
<tbody>
<tr>
<td>SN</td>
<td>SMA, 50Ω</td>
<td>Type N, 50Ω</td>
</tr>
<tr>
<td>SS</td>
<td>SMA, 50Ω</td>
<td>SMA, 50Ω</td>
</tr>
</tbody>
</table>

2.3 Front Panel Indicators - The following are the front panel indicators.

![Figure 2.2 2115-222 Front Panel Controls and Indicators](image)
2.4 Installation / Operation

2.4.1 Installing and Operating the 2115-222 Upconverter

1. Connect a -30 dBm to -10 dBm 2.5 to 3.5 GHz 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.

FIGURE 2.3 Fuse Location and Spare Fuse
2.5 Environmental Use Information

A. **Rack-Mounting** - To mount this equipment in a rack, please refer to the installation instructions located in the user manual furnished by the manufacturer of your equipment rack.

B. **Mechanical loading** - Mounting of equipment in a rack should be such that a hazardous condition does not exist due to uneven weight distribution.

C. **Elevated operating ambient temperature** - If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack may be greater than room ambient temperature. Therefore, consideration should be given to Tmra.

D. **Reduced air flow** - Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised. Additional space between units may be required.

E. **Circuit Overloading** - Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of circuits could have on over current protection and supply wiring. Appropriate consideration of equipment name plate rating should be used, when addressing this concern.

F. **Reliable Earthing** - Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connection to the Branch (use of power strips).

G. **Top Cover** - There are no servicable parts inside the product so, the Top Cover should not be removed. If the Top Cover is removed the ground strap and associated screw MUST BE RE-INSTALLED prior to Top Cover screw replacement. FAILURE TO DO this may cause INGRESS and/or EGRESS emission problems.