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INSTRUCTION MANUAL

MODEL 2116-105 Block Downconverter

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MODEL 2116-105 Block Downconverter

1.0 General

1.1 Equipment Description

The 2116-105 Downconverter converts 10.55 - 11.70 GHz to 0.95 - 2.10 GHz with a local oscillator at 9.6 GHz. Front panel LEDs provide indication of DC Power, External 10 MHz, and PLL Alarm. The gain is +35 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, 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 2116 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 Model 2116-105 Front and Rear Panels

FIGURE 1.2 Model 2116-105 Downconverter Block Diagram
1.2 Technical Characteristics

**TABLE 1.0 2116-105 Downconverter Specifications**

**Input Characteristics**
- Impedance/Return Loss: 50 Ω/14 dB (see TABLE 2.2 for connector options)
- Frequency: 10.55 to 11.7 GHz
- Noise Figure, max.: 20 dB, max gain
- Input Level: -55 to -35 dBm
- Input 1dB Compression: -25 dBm

**Output Characteristics**
- Impedance/Return Loss: 50 Ω/14 dB (see TABLE 2.2 for connector options)
- Frequency: 0.95 to 2.10 GHz
- Output Level Range: -20 to 0 dBm
- Output 1dB Compression: +10 dBm

**Channel Characteristics**
- Gain: +35 dB ± 2 dB
- Image Rejection: >60 dB, min.
- Spurious, In Band: SIGNAL RELATED < -60 dBC (0 dBm output level)
- Spurious, Out of Band: < -50 dB
- Intermodulation: < -55 dB for two carriers each at -10 dBm out
- Frequency Response: ±1.5 dB, 0.95 to 2.10 GHz out; ± 0.5 dB, 40 MHz BW
- Frequency Sense: Non-inverting

**LO Characteristics**
- LO Frequency: 9.6 GHz
- Frequency Accuracy: ± 0.01 ppm max over temp internal reference
- 10 MHz In/Out Level: +3 dBm ± 3 dB

<table>
<thead>
<tr>
<th>Phase Noise @ Freq</th>
<th>100 Hz</th>
<th>1kHz</th>
<th>10kHz</th>
<th>100kHz</th>
<th>1MHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>dBC/Hz</td>
<td>-70</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 ref is selected (rear panel switch)
- 10 MHz Reference: 3-way Switch (selects INTERNAL, EXTERNAL, or AUTO mode)

**Other**
- RF Connector: SMA (female) (see TABLE 2.2 for other options)
- L-Band Connector: BNC (female) (see TABLE 2.2 for other options)
- 10 MHz Connectors: BNC (female) 50Ω/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, 45 watts max

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

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

2.1 Mechanical

The 2116-105 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 2116-105 can be secured to a rack using the 4 holes on the front panel. Figure 2.0 shows how the 2116-105 is assembled.

![FIGURE 2.0 2116-105 Mechanical Assembly](image-url)
2.2 Rear Panel Input/Output Signals
Figure 2.1 shows the input and output connectors on the rear panel.

![FIGURE 2.1 2116-105 Rear Panel I/O's]

The input and output connectors include:

- **AC INPUT**: 100-240 ±10% VAC, 47-60 Hz. Uses 2 amp Slow Blow, 5mm fuse.
- **J8 - 10MHZ REF OUTPUT**: BNC (female) 75 Ω. Outputs currently selected 10MHz ref signal (3 dBm ±3 dB).
- **J101 - RF INPUT**: SMA (female) 50 Ω, 10.55 to 11.7 GHz, -35 dBm max input signal. See Table 2.2 for other connector options.

### 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>L-Band</th>
<th>RF</th>
</tr>
</thead>
<tbody>
<tr>
<td>STD</td>
<td>BNC, 50Ω</td>
<td>SMA, 50Ω</td>
</tr>
<tr>
<td>NS</td>
<td>Type N, 50Ω</td>
<td>SMA, 50Ω</td>
</tr>
<tr>
<td>FS</td>
<td>Type F, 75Ω</td>
<td>SMA, 50Ω</td>
</tr>
<tr>
<td>M</td>
<td>BNC, 50Ω</td>
<td>Type N, 50Ω</td>
</tr>
<tr>
<td>N</td>
<td>BNC, 75Ω</td>
<td>Type N, 50Ω</td>
</tr>
<tr>
<td>FN</td>
<td>Type F, 75Ω</td>
<td>Type N, 50Ω</td>
</tr>
<tr>
<td>NN</td>
<td>Type N, 50Ω</td>
<td>Type N, 50Ω</td>
</tr>
</tbody>
</table>

2.3 Front Panel Indicators
Figure 2.2 shows the front panel indicators.

![FIGURE 2.2 2116-105 Front Panel Controls and Indicators]

The front panel indicators include:

- **DS2 - ALARM LED**: Lights RED when PLL comes out of lock.
- **DS3 - EXT 10MHZ LED**: Lights YELLOW when external 10MHz reference is active.
- **DS1 - POWER LED A**: Lights GREEN when DC voltage is present from AC power supply.
2.4 Installation / Operation

2.4.1 Installing and Operating the 2116-105 Downconverter

1. Connect a -55 dBm to -35 dBm signal to RF INPUT, J101 (Figure 2.1).
2. Connect the L-BAND OUTPUT, J1, 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 an external 10MHz, 3 dBm signal is connected to J2), or EXT (for external 10MHz, 3 dBm ref that is inserted at J2) using the rear panel 3-way 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_url)