



# 2008 Product Catalog

<b>I. Agile Upconverters</b> . . . . .	<b>4</b>
<b>II. Agile Downconverters</b> . . . . .	<b>14</b>
<b>III. Agile Up/Down Converter Combos</b> . . . . .	<b>24</b>
<b>IV. Frequency Translators</b> . . . . .	<b>24</b>
<b>V. Options, Agile Converters</b> . . . . .	<b>32</b>
<b>VI. Block Converters</b> . . . . .	<b>34</b>
<b>VII. Precision Frequency Sources</b> . . . . .	<b>46</b>
<b>VIII. RF Protection Switches</b> . . . . .	<b>54</b>
<b>IX. Data, Other Switches</b> . . . . .	<b>66</b>
<b>X. Splitters/Combiners</b> . . . . .	<b>74</b>
<b>XI. Test Converters</b> . . . . .	<b>82</b>
<b>XII. Test Converter Application Note</b> . . . . .	<b>83</b>
<b>XIII. Subcarrier Products</b> . . . . .	<b>96</b>
<b>XIV. Other Products</b> . . . . .	<b>98</b>

**CROSS TECHNOLOGIES, INC.**

6170 Shiloh Road

Alpharetta, GA 30005 USA

770.886.8005 (phone) • 770.886.7964 (fax)

1.888.900.5588 (Toll Free)

[www.crosstechnologies.com](http://www.crosstechnologies.com)

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.

©2008 Cross Technologies, Inc.

REV 2 JUNE 2008

## AGILE UP CONVERTERS

MODEL NUMBER	PAGE# OR WEB	BAND	RF RANGE (GHz)	IF FREQ (MHz)	IF BW (MHz)	FREQ INCR (Hz)	GAIN RANGE (dB)	10 kHz $\phi$ NOISE dBc/Hz
2015-75	5	UHF	0.25-0.75	70	36	1M	-10to+30	-80
2015-95	WEB	UHF	0.25-0.95	70	36	1M	-10to+30	-80
2015-02	6	L	0.95-2.150	70	36	1M	-10to+30	-80
2015-03	WEB	L	0.95-1.525	70	36	1M	-10to+30	-80
2015-04	WEB	L	0.95-2.150	140	72	1M	-10to+30	-80
2015-05	WEB	L	0.95-1.525	140	72	1M	-10to+30	-80
2015-22	7	L	0.95-2.150	70	36	1K	-10to+30	-90
2015-24	7	L	0.95-2.150	140	72	1K	-10to+30	-90
2015-25	8	S	2.0-2.5	70	36	1M	-10to+30	-80
2015-26	8	S	2.0-2.5	140	72	1M	-10to+30	-80
2015-27	WEB	S	2.2-2.7	70	36	1M	-10to+30	-80
2015-225	9	S	2.0-2.5	70	36	1K	-10to+30	-90
2015-58	10	C	5.85-6.425	70	36	125K	0to+20	-80
2015-59	11	C	5.85-6.425	70	36	1K	0to+20	-90
2015-145	12	Ku	14.0-14.5	70	36	125K	0to+20	-80
2015-146	WEB	Ku	14.0-14.5	140	72	125K	0to+20	-80

**SEE PAGE 32 FOR OPTIONS**

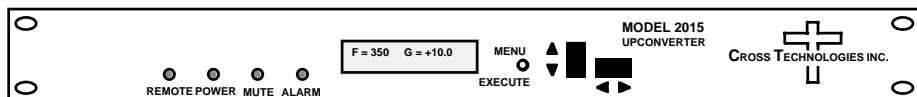
**CONTACT US IF YOU DON'T SEE WHAT YOU NEED HERE!**

**CUSTOM PRODUCTS ARE OUR SPECIALTY!**

Current pricing for most products can be found on our website at  
**[www.crosstechnologies.com](http://www.crosstechnologies.com)**

## 2015-75 Upconverter, 70 MHz IF to 250 - 750 MHz

The 2015-75 Upconverter converts  $70 \pm 18$  MHz to 250 to 750 MHz in 1 MHz steps with low group delay and flat frequency response. Synthesized local oscillators (LO) provide frequency selection. Multi-function push button switches select the RF frequency, gain, and other parameters. Front panel LEDs provide indication of DC power (green), PLL alarm (red), Remote operation (yellow) or the TX carrier is muted (yellow). Variable attenuators for the IF input and output provide a gain range of -10 to +30 dB as adjusted by the front panel multi-function pushbutton switches. Remote operation allows selection of frequency and gain. Parameter selection and frequency and gain settings appear on the LCD display. Connectors are BNC (female) for IF and 10MHz reference input and output (optional) and Type F (female) for the RF output. Powered by a  $100\text{-}240 \pm 10\%$  VAC power supply, and housed in a 1 3/4" X 19" X 16" rack mount chassis.



### Front Panel

### Technical Specifications\*

#### **Input Characteristics**

Impedance/Return Loss	75 $\Omega$ /18 dB
Frequency	$70 \pm 18$ MHz
Input Level	-40 to -10 dBm

#### **Output Characteristics**

Impedance/Return Loss	75 $\Omega$ /12 dB
Frequency	250 to 750 MHz
Output level	-20 to 0 dBm
Output 1 dB compression	+5 dBm

#### **Channel Characteristics**

Gain range (adjustable)	-10 to +30.0 dB
Spurious Response	<-50 dBC
Frequency Response	$\pm 1.5$ dB, 250-750 MHz ; $\pm 0.5$ dB, 36 MHz BW
Group Delay, max	0.01 ns/MHz <sup>2</sup> parabolic, 0.03 ns/MHz linear, 1 ns ripple
Frequency Sense	Non-inverting

#### **Synthesizer Characteristics**

Frequency Accuracy	$\pm 1.0$ ppm max over temp ( $\pm 0.01$ ppm <b>option H</b> )					
Frequency Step	1.0 MHz minimum					
10 MHz level In/Out	3 dBm $\pm 3$ dB ( <b>option E</b> )					
Phase Noise	@ Freq	100Hz	1kHz	10kHz	100kHz	1MHz
	dBC/Hz	-70	-70	-80	-95	-105

#### **Controls, Indicators**

Frequency Selection	direct readout LCD; pushbutton switches or remote selection
Gain Selection	direct readout LCD; pushbutton switches or remote selection
Power	Green LED
Alarm	Red LED
Remote	Yellow LED; RS232C, 9600 baud
Mute	Yellow LED

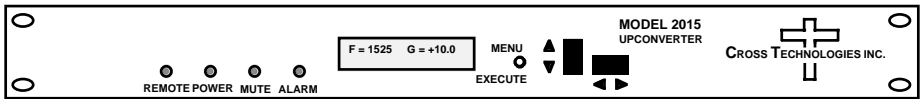
#### **Other**

RF Connector	Type F (female), others optional
IF Connector	BNC (female)
10 MHz In & Out Connector	BNC (female), 50/75 $\Omega$ ( <b>option E</b> )
Alarm/Remote (RS232)	DB9 - NO or NC contact closure on Alarm
Size	19 inch, 1RU standard chassis 1.75" high X 16.0" deep
Power	100-240 $\pm 10\%$ VAC, 47-63 Hz, 25 W max

\*  $+10^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$ ; Specifications subject to change without notice.

# 2015-02 Upconverter, 70 MHz IF to 950 - 2150 MHz

The 2015-02 L-Band Upconverter converts  $70 \pm 18$  MHz to 950 to 2150 MHz in 1 MHz steps with low group delay and flat frequency response. Synthesized local oscillators (LO) provide frequency selection. Multi-function push button switches select the RF frequency, gain, and other parameters. Front panel LEDs provide indication of DC power (green), PLL alarm (red), remote operation (yellow) or the TX carrier is muted (yellow). Variable attenuators for the IF input and output provide a gain range of -10 to +30 dB as adjusted by the front panel multi-function push-button switches. Remote operation allows selection of frequency and gain. Parameter selection and frequency and gain settings appear on the LCD display. Connectors are BNC female for IF and the optional external reference input and output, and Type F female for the RF output. SSPB +24 VDC, 2.5 Amps and 10 MHz reference can be inserted on the RF line as added options. The 10 MHz option also includes a 10 MHz output connector which contains either the internal or external 10 MHz reference signal. A high stability ( $\pm 0.01$ ppm) option is also available. The unit is powered by a 100-240  $\pm 10\%$  VAC power supply, and housed in a 1 3/4" X 19" X 16" rack mount chassis.



## Front Panel

### Technical Specifications\*

#### Input Characteristics

Impedance/Return Loss	75 $\Omega$ /18 dB
Frequency	$70 \pm 18$ MHz
Input Level	-40 to -10 dBm

#### Output Characteristics

Impedance/Return Loss	75 $\Omega$ /12 dB
Frequency	950 to 2150 MHz
Output level	0 to -20 dBm
Output 1 dB compression	+5 dBm

#### Channel Characteristics

Gain range (adjustable)	-10.0 to +30.0dB
Spurious Response	< -50 dBc
Frequency Response	$\pm 1.5$ dB, 950 -2150 MHz; $\pm 0.5$ dB, 36 MHz BW
Group Delay, max	0.01 ns/MHz <sup>2</sup> parabolic, 0.03 ns/MHz linear, 1 ns ripple
Frequency Sense	Non-inverting

#### Synthesizer Characteristics

Frequency Accuracy	$\pm 1.0$ ppm max over temp ( $\pm 0.01$ ppm <b>option H</b> ) internal. reference												
Frequency Step	1.0 MHz minimum												
10 MHz level In/Out	3 dBm $\pm$ 3 dB ( <b>option E</b> )												
Phase Noise	<table border="1"> <thead> <tr> <th>@ Freq</th> <th>100Hz</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>-70</td> <td>-80</td> <td>-95</td> <td>-105</td> </tr> </tbody> </table>	@ Freq	100Hz	1kHz	10kHz	100kHz	1MHz	dBc/Hz	-70	-70	-80	-95	-105
@ Freq	100Hz	1kHz	10kHz	100kHz	1MHz								
dBc/Hz	-70	-70	-80	-95	-105								

#### Controls, Indicators

Frequency Selection	direct readout LCD; pushbutton switches or remote selection
Gain Selection	direct readout LCD; pushbutton switches or remote selection
Power	Green LED
Alarm	Red LED
Remote	Yellow LED; RS232C, 9600 baud
Mute	Yellow LED

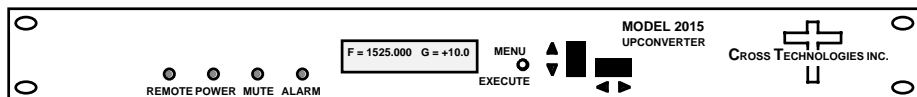
#### Other

RF Connector	Type F (female), others optional
IF Connector	BNC (female)
10 MHz In & Out Connector	BNC (female), 50/75 $\Omega$ ( <b>option E</b> )
Alarm/Remote (RS232)	DB9 - NO or NC contact closure on Alarm
Size	19 inch, 1RU standard chassis 1.75" high X 16.0" deep
Power	100-240 $\pm 10\%$ VAC, 47-63 Hz, 25 W max
SSPB Power ( <b>option -V</b> )	+24 VDC, 2.5 amp, maximum

\*  $+10^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$ ; Specifications subject to change without notice

## 2015-22, -24 Upconverter, IF to 950 - 2150 MHz

The 2015-22 (-24) L-band Upconverter converts  $70 \pm 18$  MHz ( $140 \pm 36$  MHz) to 950 to 2150 MHz in 1, 10, 100 or 125 kHz steps (user selectable) with low group delay and flat frequency response. Synthesized local oscillators (LO) provide very low phase noise and  $\pm 0.01$  ppm stability frequency selection. Multi-function push button switches select the RF frequency, gain, and other parameters. Front panel LEDs provide indication of DC power (green), PLL alarm (red), remote operation (yellow) or the TX carrier is muted (yellow). Variable attenuators for the IF input and output provide a gain range of -10 to +30 dB as adjusted by the front panel multi-function push-button switches. Remote operation allows selection of frequency and gain. Parameter selection and frequency and gain settings appear on the LCD display. Connectors are BNC female for IF and the optional external reference input and output, and Type F female for the RF output. SSPB +24 VDC, 2.5 Amps and 10 MHz reference can be inserted on the RF line as added options. The 10 MHz option also includes a 10 MHz output connector, which contains either the internal or external 10 MHz reference signal. The unit is powered by a  $100\text{-}240 \pm 10\%$  VAC power supply, and housed in a  $1\ 3/4" \times 19" \times 16"$  rack mount chassis.



**Front Panel**

### Technical Specifications\*

#### Input Characteristics

Impedance/Return Loss	75 $\Omega$ /18 dB
Frequency	$70 \pm 18$ MHz
Input Level	-40 to -10 dBm

#### Output Characteristics

Impedance/Return Loss	75 $\Omega$ /12 dB
Frequency	950 to 2150 MHz
Output level	-20 to 0 dBm
Output 1 dB compression	+5 dBm

#### Channel Characteristics

Gain range (adjustable)	-10.0 to 30.0 dB
Spurious Response < -50 dBC	
Frequency Response	$\pm 1.5$ dB, 950 - 2150 MHz; $\pm 0.5$ dB, 36 MHz BW
Group Delay, max	0.01 ns/MHz <sup>2</sup> parabolic, 0.03 ns/MHz linear, 1 ns ripple
Frequency Sense	Non-inverting

#### Synthesizer Characteristics

Frequency Accuracy	$\pm 0.01$ ppm internal reference
Frequency Step	1, 10, 100, or 125 kHz (user selectable)
10 MHz level In/Out	3 dBm $\pm 3$ dB ( <b>option E</b> )
Phase Noise	@ Freq
	100Hz    1kHz    10kHz    100kHz    1MHz
	dBc/Hz         -75    -85    -80    -110    -120

#### Controls, Indicators

Frequency Selection	direct readout LCD; pushbutton switches or remote selection
Gain Selection	direct readout LCD; pushbutton switches or remote selection
Power; Alarm; Rem; Mute	Green LED; Red LED; Yellow LED; Yellow LED
Remote	RS232C, 9600 baud ( <b>RS485, option Q</b> )

#### Other

RF Connector	Type F (female), others optional
IF Connector	BNC (female)
10 MHz In & Out Connector	BNC (female), 50/75 $\Omega$ ( <b>option E</b> )
Alarm/Remote (RS232)	DB9 - NO or NC contact closure on Alarm
Size	19 inch, 1RU standard chassis 1.75" high X 16.0" deep
Power	100-240 $\pm 10\%$ VAC, 47-63 Hz, 25 W max
SSPB Power ( <b>option -V</b> )	+24 VDC, 2.5 amp, maximum

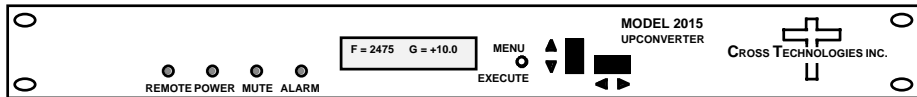
#### Models

2015-22	$70 \pm 18$ MHz IN
2015-24	$140 \pm 36$ MHz IN

\*  $+10^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$ ; Specifications subject to change without notice.

## 2015-25, -26 Upconverter, IF to 2.0 - 2.5 GHz

The 2015-25, -26 Upconverter converts  $70 \pm 18$  MHz ( $140 \pm 36$  MHz) to 2000 to 2500 MHz in 1 MHz steps with low group delay and flat frequency response. Synthesized local oscillators (LO) provide frequency selection. Multi-function push button switches select the RF frequency and gain. Front panel LEDs provide indication of DC power (green), carrier Mute (yellow), and PLL alarm (red). Variable attenuators for the IF input and output provide a gain range of -10 to +30 dB as adjusted by the front panel multi-function pushbutton switches. Frequency and gain settings appear on the LCD display. Connectors are BNC female for RF and IF signals. Powered by a  $100\text{-}240 \pm 10\%$  VAC power supply; 1 3/4" X 19" X 16" rack mount chassis.



**Front Panel**

### Technical Specifications\*

#### Input Characteristics

Impedance/Return Loss	75 $\Omega$ /18 dB
Frequency	$70 \pm 18$ MHz
Input Level	- 40 to -10 dBm

#### Output Characteristics

Impedance/Return Loss	50 $\Omega$ /12 dB
Frequency	2.0 to 2.5 GHz
Output level	0 to -20 dBm
Output 1 dB compression	+5 dBm

#### Channel Characteristics

Gain range (adjustable)	-10 to 30 dB
Spurious Response	<-50 dBC, in band
Frequency Response	$\pm 1.5$ dB, 2000 - 2500 MHz ; $\pm 1.0$ dB, 36 MHz BW
Group Delay, max	0.01 ns/MHz <sup>2</sup> parabolic, 0.03 ns/MHz linear, 1 ns ripple
Frequency Sense	Non-inverting

#### Synthesizer Characteristics

Frequency Accuracy	$\pm 1.0$ ppm max over temp ( $\pm 0.01$ ppm <b>option H</b> )												
Frequency Step	1.0 MHz minimum												
10 MHz level In/Out	3 dBm $\pm 3$ dB ( <b>option E</b> )												
Phase Noise	<table border="1" style="display: inline-table; vertical-align: middle;"> <thead> <tr> <th>@ Freq</th> <th>100Hz</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>-70</td> <td>-80</td> <td>-95</td> <td>-105</td> </tr> </tbody> </table>	@ Freq	100Hz	1kHz	10kHz	100kHz	1MHz	dBC/Hz	-70	-70	-80	-95	-105
@ Freq	100Hz	1kHz	10kHz	100kHz	1MHz								
dBC/Hz	-70	-70	-80	-95	-105								

#### Controls, Indicators

Frequency Selection	direct readout LCD; pushbutton switches or remote selection
Gain Selection	direct readout LCD; pushbutton switches or remote selection
Power	Green LED
Alarm	Red LED
Remote	Yellow LED; RS232C, 9600 baud
Mute	Yellow LED

#### Other

RF, IF Connectors	BNC (female)
10 MHz In & Out Connector	BNC (female), 50/75 $\Omega$ ( <b>option E</b> )
Alarm/Remote (RS232)	DB9 - NO or NC contact closure on Alarm
Size	19 inch, 1RU standard chassis 1.75" high X 16.0" deep
Power	$100\text{-}240 \pm 10\%$ VAC, 47-63 Hz, 25 W max

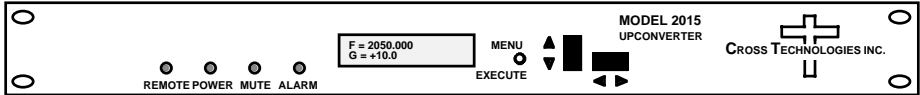
#### Models

2015-25	$70 \pm 18$ MHz Input, 2000 - 2500 MHz Output
2015-26	$140 \pm 36$ MHz Input, 2000 - 2500 MHz Output

\*  $+10^\circ\text{C}$  to  $+40^\circ\text{C}$ ; Specifications subject to change without notice.

# 2015 225 Upconverter, 70 MHz IF to 2.0 - 2.5 GHz

The 2015-225 Upconverter converts  $70 \pm 18$  MHz to 2000 to 2500 MHz in 1, 10, 100, or 125 kHz steps (user selectable) with low group delay and flat frequency response. Synthesized local oscillators (LO) provide very low phase noise and  $\pm 0.01$  ppm stability frequency selection. Multi-function push button switches select the RF frequency, gain, and other parameters. Front panel LEDs provide indication of DC power (green), PLL alarm (red), remote operation (yellow) or the TX carrier is muted (yellow). Variable attenuators for the IF input and output provide a gain range of -10 to +30 dB as adjusted by the front panel multi-function pushbutton switches. Remote operation allows selection of frequency and gain. Parameter selection and frequency and gain settings appear on the LCD display. Connectors are BNC female for IF Input, RF output and the optional external reference input and output, The External 10 MHz option includes a 10 MHz output connector that has either the internal or external 10 MHz reference signal on it. The unit is powered by a 100-240  $\pm 10\%$  VAC power supply, and housed in a 1 3/4" X 19" X 16" rack mount chassis.



**Front Panel**

## Technical Specifications\*

### Input Characteristics

Impedance/Return Loss	50 $\Omega$ /18 dB
Frequency	70 $\pm$ 18 MHz
Input Level	-40 to -10 dBm

### Output Characteristics

Impedance/Return Loss	50 $\Omega$ /12 dB
Frequency	2.0 to 2.5 GHz
Output level	-20 to 0 dBm
Output 1 dB compression	+5 dBm

### Channel Characteristics

Gain range (adjustable)	-10 to 30 dB
Spurious Response	< -50 dBc
Frequency Response	$\pm 1.5$ dB, 2025 - 2500 MHz ; $\pm 0.5$ dB, 36 MHz BW
Group Delay, max	0.01 ns/MHz <sup>2</sup> parabolic, 0.03 ns/MHz linear, 1 ns ripple
Frequency Sense	Non-inverting

### Synthesizer Characteristics

Frequency Accuracy	$\pm 0.01$ ppm max over temp
Frequency Step	1, 10, 100, or 125 kHz (user selectable)
10 MHz level In/Out	3 dBm $\pm$ 3 dB (option E)
Phase Noise	@ Freq   100Hz   1kHz   10kHz   100kHz   1MHz
	dBc/Hz   -70   -80   -88   -110   -120

### Controls, Indicators

Frequency Selection	direct readout LCD; pushbutton switches or remote selection
Gain Selection	direct readout LCD; pushbutton switches or remote selection
Power	Green LED
Alarm	Red LED
Remote	Yellow LED; RS232C, 9600 baud
Mute	Yellow LED

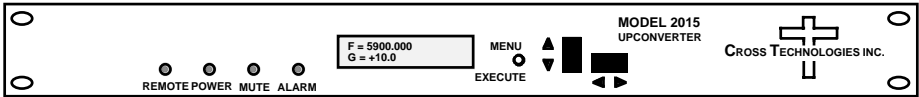
### Other

RF,IF Connectors	BNC (female), 50 $\Omega$ , others optional
10 MHz Connectors	BNC (female), 50/75 $\Omega$
Alarm/Remote (RS232)	DB9 - NO or NC contact closure on Alarm
Size	19 inch, 1RU standard chassis 1.75" high X 16.0" deep
Power	100-240 $\pm 10\%$ VAC, 47-63 Hz, 25 W max

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

# 2015-58 Upconverter, 70 MHz IF to 5.850 - 6.425 GHz

The Model 2015-58 Upconverter converts  $70 \pm 18$  MHz to 5.85 to 6.425 GHz in 125 kHz steps with low group delay and flat frequency response. Synthesized local oscillators (LO) provide low phase noise,  $\pm 1.0$  ppm stability frequency selection. Push button switches select the RF frequency, gain, and other parameters. Front panel LEDs provide indication of PLL alarm (red), remote operation (yellow) or the TX carrier is muted (yellow). Variable attenuators for the IF input and RF output provide a gain range of 0 to +20 dB as adjusted by the front panel pushbutton switches. Remote operation allows selection of frequency and gain. Parameter selection and frequency and gain settings appear on the LCD display. Connectors are BNC (female) for IF and 10MHz reference input and output, and Type N (female) for the RF output (others optional). The unit is powered by a  $100\text{-}240 \pm 10\%$  VAC power supply, and housed in a 1.75" X 19" X 16" 1RU chassis.



## Front Panel

### Technical Specifications\*

#### Input Characteristics

Impedance/Return Loss	75 $\Omega$ / 18 dB
Frequency	$70 \pm 18$ MHz
Input Level	-40 to -10 dBm

#### Output Characteristics

Impedance/Return Loss	50 $\Omega$ /14 dB
Frequency	5.85 to 6.425 GHz
Output level	-20 to 0 dBm
Output 1 dB compression	+10 dBm

#### Channel Characteristics

Gain range (adjustable)	0 to +20 dB
Spurious Response	< -50 dBc
Frequency Response	$\pm 1.5$ dB, 5.85-6.425 GHz; $\pm 0.5$ dB, 36 MHz BW
Group Delay, max	0.01 ns/MHz <sup>2</sup> parabolic, 0.03 ns/MHz linear, 1 ns ripple
Frequency Sense	Non-inverting

#### Synthesizer Characteristics

Frequency Accuracy	$\pm 1.0$ ppm internal reference					
Frequency Step	125 kHz minimum					
10 MHz level In/Out	3 dBm $\pm$ 3 dB					
Phase Noise	@ Freq	100Hz	1kHz	10kHz	100kHz	1MHz
	dBc/Hz	-70	-70	-80	-95	-105

#### Controls, Indicators

Frequency Selection	direct readout LCD; pushbutton switches or remote selection
Gain Selection	direct readout LCD; pushbutton switches or remote selection
Power; Alarm; Rem; Mute	Green LED; Red LED; Yellow LED; Yellow LED
Remote	RS232C, 9600 baud

#### Other

RF Connector	Type N (female)
IF Connector	BNC (female)
10 MHz In & Out Connector	BNC (female), 50/75 $\Omega$
Alarm/Remote (RS232)	DB9 - NO or NC contact closure on Alarm
Size	19 inch, 1RU standard chassis 1.75" high X 16.0" deep
Power	100-240 $\pm 10\%$ VAC, 47-63 Hz, 25 W max

#### Options

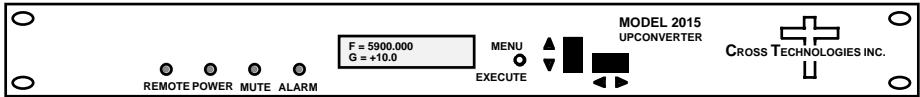
Connector options available

**CONTACT CROSS FOR OTHER C-BAND MODELS or REQUESTS**

\*  $+10^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$ ; Specifications subject to change without notice.

# 2015-59 Upconverter, 70 MHz IF to 5.850 - 6.425 GHz

The Model 2015-59 Upconverter converts  $70 \pm 18$  MHz to 5.85 to 6.425 GHz in 1, 10, 100 or 125 kHz steps (user selectable) with low group delay and flat frequency response. Synthesized local oscillators (LO) provide low phase noise,  $\pm 0.01$  ppm high stability frequency selection. Push button switches select the RF frequency, gain, and other parameters. Front panel LEDs provide indication of PLL alarm (red), remote operation (yellow) or the TX carrier is muted (yellow). Variable attenuators for the IF input and RF output provide a gain range of 0 to +20 dB as adjusted by the front panel pushbutton switches. Remote operation allows selection of frequency and gain. Parameter selection and frequency and gain settings appear on the LCD display. Connectors are BNC (female) for IF and 10MHz reference input and output, and Type N (female) for the RF output (others optional). The unit is powered by a 100-240  $\pm 10\%$  VAC power supply, and housed in a 1.75" X 19" X 16" 1RU chassis.



## Front Panel

### Technical Specifications\*

#### Input Characteristics

Impedance/Return Loss	75 $\Omega$ / 18 dB
Frequency	$70 \pm 18$ MHz
Input Level	-30 to -10 dBm

#### Output Characteristics

Impedance/Return Loss	50 $\Omega$ /18 dB
Frequency	5.85 to 6.425 GHz
Output level	-20 to 0 dBm
Output 1 dB compression	+10 dBm

#### Channel Characteristics

Gain range (adjustable)	0 to +20 dB
Spurious Response	< -50 dBc
Frequency Response	$\pm 1.5$ dB, 5.85-6.425 GHz; $\pm 0.5$ dB, 36 MHz BW
Group Delay, max	0.01 ns/MHz <sup>2</sup> parabolic, 0.03 ns/MHz linear, 1 ns ripple
Frequency Sense	Non-inverting

#### Synthesizer Characteristics

Frequency Accuracy	$\pm 0.01$ ppm internal reference					
Frequency Step	1, 10, 100, or 125 kHz					
10 MHz level In/Out	3 dBm $\pm 3$ dB					
Phase Noise	@ Freq	100Hz	1kHz	10kHz	100kHz	1MHz
	dBc/Hz	-70	-80	-90	-110	-120

#### Controls, Indicators

Frequency Selection	direct readout LCD; pushbutton switches or remote selection
Gain Selection	direct readout LCD; pushbutton switches or remote selection
Power; Alarm; Rem; Mute	Green LED; Red LED; Yellow LED; Yellow LED
Remote	RS232C, 9600 baud

#### Other

RF Connector	Type N (female)
IF Connector	BNC (female)
10 MHz In & Out Connector	BNC (female), 50/75 $\Omega$
Alarm/Remote (RS232)	DB9 - NO or NC contact closure on Alarm
Size	19 inch, 1RU standard chassis 1.75" high X 16.0" deep
Power	100-240 $\pm 10\%$ VAC, 47-63 Hz, 25 W max

#### Options

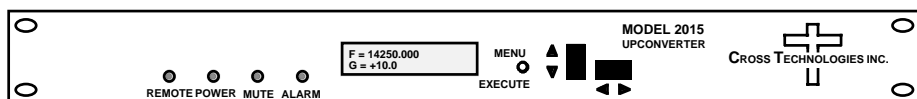
Connector options available

**CONTACT CROSS FOR OTHER C-BAND MODELS or REQUESTS**

\*  $+10^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$ ; Specifications subject to change without notice.

# 2015-145 Upconverter, 70 MHz IF to 14.0 - 14.5 GHz

The Model 2015-145 Upconverter converts  $70 \pm 18$  MHz to 14.0 to 14.5 GHz in 125 kHz steps with low group delay and flat frequency response. Synthesized local oscillators (LO) provide very low phase noise,  $\pm 0.01$  ppm stability frequency selection. Push button switches select the RF frequency, gain, and other parameters. Front panel LEDs provide indication of PLL alarm (red), remote operation (yellow) or the TX carrier is Muted (red). Variable attenuators for the IF input and RF output provide a gain range of 0 to +20 dB as adjusted by the front panel pushbutton switches. Remote operation allows selection of frequency and gain. Parameter selection and frequency and gain settings appear on the LCD display. Connectors are BNC (female) for IF and external reference input and SMA (female) for the RF output. The unit is powered by a  $100\text{-}240 \pm 10\%$  VAC power supply, and housed in a 1.75" X 19" X 16" 1RU chassis.



## Front Panel

### Technical Specifications\*

#### Input Characteristics

Impedance/Return Loss	75 $\Omega$ / 18 dB
Frequency	$70 \pm 18$ MHz
Input Level	-30 to -10 dBm

#### Output Characteristics

Impedance/Return Loss	50 $\Omega$ / 15 dB
Frequency	14.0 to 14.5 GHz
Output level	-30 to -10 dBm
Output 1 dB compression	+5 dBm

#### Channel Characteristics

Gain range (adjustable)	0 to +20 dB
Spurious Response	< -50 dBc
Frequency Response	$\pm 1.5$ dB, 14.0 - 14.5 GHz; $\pm 0.5$ dB, 36 MHz BW
Group Delay, max	0.01 ns/MHz <sup>2</sup> parabolic, 0.03 ns/MHz linear, 1 ns ripple
Frequency Sense	Non-inverting

#### Synthesizer Characteristics

Frequency Accuracy	$\pm 0.01$ ppm internal reference					
Frequency Step	125 kHz minimum					
10 MHz level In/Out	3 dBm $\pm 3$ dB					
Phase Noise	@ Freq	100Hz	1kHz	10kHz	100kHz	1MHz
	dBc/Hz	-70	-70	-80	-95	-105

#### Controls, Indicators

Frequency Selection	direct readout LCD; pushbutton switches or remote selection
Gain Selection	direct readout LCD; pushbutton switches or remote selection
Power; Alarm; Rem; Mute	Green LED; Red LED; Yellow LED; Yellow LED
Remote	RS232C, 9600 baud

#### Other

RF Connector	SMA (female)
IF Connector	BNC (female)
10 MHz In & Out Connector	BNC (female), 50/75 $\Omega$
Alarm/Remote (RS232)	DB9 - NO or NC contact closure on Alarm
Size	19 inch, 1RU standard chassis 1.75" high X 16.0" deep
Power	100-240 $\pm 10\%$ VAC, 47-63 Hz, 25 W max

#### Models

2015-145	14.0 to 14.5 GHz Output, $70 \pm 18$ MHz Input
2015-146	14.0 to 14.5 GHz Output, $140 \pm 36$ MHz Input

**CONTACT CROSS FOR OTHER Ku-BAND MODELS or REQUESTS**

\*  $+10^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$ ; Specifications subject to change without notice.



## **AGILE IF DOWNCONVERTERS**

<b>MODEL NUMBER</b>	<b>PAGE# OR WEB</b>	<b>BAND</b>	<b>RF RANGE (GHz)</b>	<b>IF FREQ (MHz)</b>	<b>IF BW (MHz)</b>	<b>FREQ INCR (Hz)</b>	<b>GAIN RANGE (dB)</b>	<b>10 kHz <math>\phi</math> NOISE dBc/Hz</b>
2016-02	15	L	0.95-2.150	70	36	1M	0to+50	-80
2016-03	WEB	L	0.95-1.525	70	36	1M	0to+50	-80
2016-04	WEB	L	0.95-2.150	140	72	1M	0to+50	-80
2016-05	WEB	L	0.95-1.525	140	72	1M	0to+50	-80
2016-22	16	L	0.95-2.150	70	36	1K	0to+50	-90
2016-24	16	L	0.95-2.150	140	72	1K	0to+50	-90
2016-25	17	S	2.0-2.5	70	36	1M	0to+50	-80
2016-26	17	S	2.0-2.5	140	72	1M	0to+50	-80
2016-27	WEB	S	2.2-2.7	70	36	1M	0to+50	-80
2016-225	18	S	2.0-2.5	70	36	1K	0to+50	-90
2016-34	19	C	3.400-4.20	70	36	1K	+30to+50	-90
2016-37	20	C	3.625-4.20	70	36	125K	+30to+50	-80
2016-38	WEB	C	3.400-4.20	140	72	1K	+30to+50	-90
2016-107	WEB	Ku	10.7-11.7	70	36	125K	+30to+50	-80
2016-117	21	Ku	11.7-12.2	70	36	125K	+30to+50	-80

**SEE PAGE 32 FOR OPTIONS**

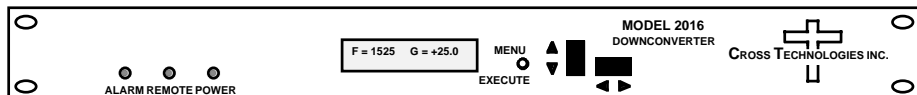
**CONTACT US IF YOU DON'T SEE WHAT YOU NEED HERE!**

**CUSTOM PRODUCTS ARE OUR SPECIALTY!**

Current pricing for most products can be found on our website at  
**[www.crosstechnologies.com](http://www.crosstechnologies.com)**

## 2016-02 Downconverter, 950 - 2150 MHz to 70 MHz IF

The 2016-02 L-band Downconverter converts 950 to 2150 MHz in 1 MHz steps to  $70 \pm 18$  MHz with low group delay and flat frequency response. Synthesized local oscillators (LO) provide frequency selection. Multi-function push button switches select the RF frequency, gain, and other parameters. Front panel LEDs provide indication of DC power (green), PLL alarm (red), and remote operation (yellow). Gain is adjustable manually over a 0 to +50 dB range as adjusted by the front panel multi-function push-button switches. Remote operation allows selection of frequency and gain. Parameter selection and frequency and gain settings appear on the LCD display. Connectors are BNC female for IF output and the optional external reference input and output, and Type F female for the RF input. LNB +24 VDC, 0.4 Amps and 10 MHz reference can be inserted on the RF line as added options. The 10 MHz option also includes a 10 MHz output connector, which contains either the internal or external 10 MHz reference signal. A high stability ( $\pm 0.01$ ppm) option is also available. The unit is powered by a 100-240  $\pm 10\%$  VAC power supply, and housed in a 1 3/4" X 19" X 16" rack mount chassis.



Front Panel

### Technical Specifications\*

#### Input Characteristics

Impedance/Return Loss	75 $\Omega$ /12 dB
Frequency	950 to 2150 MHz
Noise Figure, Max.	15 dB (max gain)
Input Level range	-20 to -70 dBm
Input 1 dB compression	-15 dBm

#### Output Characteristics

Impedance/Return Loss	75 $\Omega$ /18 dB
Frequency	70 $\pm 18$ MHz
Output Level/max linear	-20/-10 dBm
Output 1 dB compression	-5 dBm

#### Channel Characteristics

Gain range (adjustable)	0.0 to 50.0 dB, 1dB steps
Image Rejection	> 50 dB, min
Spurious Response < -50 dBC	in band
Frequency Response	$\pm 1.5$ dB, 950 - 2150 MHz; $\pm 0.5$ dB, 36 MHz BW
Group Delay, max	0.01 ns/MHz <sup>2</sup> parabolic, 0.03 ns/MHz linear, 1 ns ripple
Frequency Sense	Non-inverting or Inverting (selectable)

#### Synthesizer Characteristics

Frequency Accuracy	$\pm 1.0$ ppm max over temp ( $\pm 0.01$ ppm <b>option H</b> ) int. ref					
Frequency Step	1.0 MHz minimum					
10 MHz level In/Out	3 dBm $\pm 3$ dB ( <b>option E</b> )					
Phase Noise	@ Freq	100Hz	1kHz	10kHz	100kHz	1MHz
	dBC/Hz	-70	-70	-80	-95	-105

#### Controls, Indicators

Frequency Selection	direct readout LCD; pushbutton switches or remote selection
Gain Selection	direct readout LCD; pushbutton switches or remote selection
Power	Green LED
Alarm	Red LED
Remote	Yellow LED; RS232C, 9600 baud

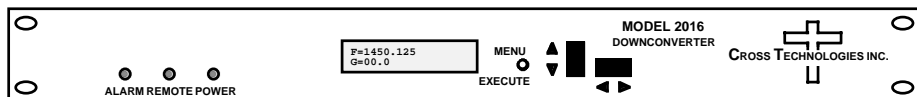
#### Other

RF Connector	Type F (female), others optional
IF Connector	BNC (female)
10 MHz Connectors	BNC (female), 50/75 $\Omega$ ( <b>option E</b> )
Alarm/Remote (RS232)	DB9 - NO or NC contact closure on Alarm
Size	19 inch standard chassis 1.75" high X 16.0" deep
Power	100-240 $\pm 10\%$ VAC, 47-63 Hz, 25 W max

\*  $+10^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$ ; Specifications subject to change without notice.

## 2016-22,-24 Downconverter, 950 - 2150 MHz to IF

The 2016-22 (-24) L-band Downconverter converts 950 to 2150 MHz in 1 kHz, 10 kHz, or 125 kHz steps (user selectable) to  $70 \pm 18$  MHz ( $140 \pm 36$  MHz) with low group delay and flat frequency response. Synthesized local oscillators (LO) provide very low phase noise and  $\pm 0.01$  ppm stability frequency selection. Multi-function push button switches select the RF frequency, gain, and other parameters. Front panel LEDs provide indication of DC power (green), PLL alarm (red), and remote operation (yellow). Gain is adjustable manually over a 0 to +50 dB range as adjusted by the front panel multi-function push-button switches. Remote operation allows selection of frequency and gain. Parameter selection and frequency and gain settings appear on the LCD display. Connectors are BNC female for IF output and the optional external reference input and output, and Type F female for the RF input. LNB +24 VDC, 0.4 Amps and 10 MHz reference can be inserted on the RF line as added options. The 10 MHz option also includes a 10 MHz output connector, which contains either the internal or external 10 MHz reference signal. The unit is powered by a 100-240  $\pm 10\%$  VAC power supply, and housed in a 1 3/4" X 19" X 16" rack mount chassis.



**Front Panel**

### Technical Specifications\*

#### Input Characteristics

Impedance/Return Loss	75 $\Omega$ /12 dB
Frequency	950 to 2150 MHz
Noise Figure, Max.	15 dB (max gain)
Input Level range	-20 to -70 dBm
Input 1 dB compression	-15 dBm

#### Output Characteristics

Impedance/Return Loss	75 $\Omega$ /18 dB
Frequency	$70 \pm 18$ MHz (-22); $140 \pm 36$ MHz (-24)
Output Level/max linear	-20/-10 dBm
Output 1 dB compression	-5 dBm

#### Channel Characteristics

Gain range (adjustable)	0.0 to 50.0 dB, 1dB steps
Image Rejection	> 50 dB, min
Spurious Response < -50 dBc	in band
Frequency Response	$\pm 1.5$ dB, 950 - 2150 MHz; $\pm 0.5$ dB, 36 MHz BW
Group Delay, max	0.01 ns/MHz <sup>2</sup> parabolic, 0.03 ns/MHz linear, 1 ns ripple (-22)
	0.0035 ns/MHz <sup>2</sup> parabolic, 0.025 ns/MHz linear, 1 ns ripple (-24)
Frequency Sense	Non-inverting or Inverting (selectable)

#### Synthesizer Characteristics

Frequency Accuracy	$\pm 0.01$ ppm internal ref					
Frequency Step	1, 10, 100, or 125 kHz (user selectable)					
10 MHz level In/Out	3 dBm $\pm$ 3 dB ( <b>option E</b> )					
Phase Noise	@ Freq	100Hz	1kHz	10kHz	100kHz	1MHz
	dBc/Hz	-75	-85	-90	-110	-120

#### Controls, Indicators

Frequency/Gain Selection	direct readout LCD; pushbutton switches or remote selection
Power, Alarm, Remote	Green LED, Red LED, Yellow LED (RS232C, 9600 baud)

#### Other

RF Connector	Type F (female), others optional
IF Connector	BNC (female)
10 MHz Connectors	BNC (female), 50/75 $\Omega$ ( <b>option E</b> )
Alarm/Remote (RS232)	DB9 - NO or NC contact closure on Alarm
Size	19 inch standard chassis 1.75" high X 16.0" deep
Power	100-240 $\pm 10\%$ VAC, 47-63 Hz, 25 W max

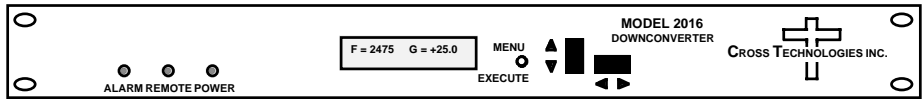
#### Models

2016-22	$70 \pm 18$ MHz OUT
2016-24	$140 \pm 36$ MHz OUT

\*  $+10^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$ ; Specifications subject to change without notice.

# 2016-25,-26 Downconverter, 2.0 - 2.5 GHz to IF

The 2016-25 (-26) Downconverter converts 2000 to 2500 MHz to  $70 \pm 18$  MHz ( $140 \pm 36$  MHz) in 1 MHz steps with low group delay and flat frequency response. Synthesized local oscillators (LO) provide frequency selection. Multi-function push button switches select the RF frequency and gain. Front panel LEDs provide indication of DC power (green) and PLL alarm (red). Variable attenuators for the RF input provide a gain range of 0 to +50 dB as adjusted by the front panel multi-function pushbutton switches. Frequency and gain settings appear on the LCD display. Connectors are BNC female for RF and IF signals. The unit is powered by a 100-240  $\pm 10\%$  VAC power supply, and housed in a 1 3/4" X 19" X 16" rack mount chassis.



**Front Panel**

## Technical Specifications\*

### Input Characteristics

Impedance/Return Loss	50 $\Omega$ /12 dB
Frequency	2.0 - 2.5 GHz
Noise Figure, Max.	15 dB (max gain)
Input Level range	-70 to -20 dBm
Input 1 dB compression	-15 dBm, min gain

### Output Characteristics

Impedance/Return Loss	75 $\Omega$ /18 dB
Frequency	70 $\pm 18$ MHz (-25), 140 $\pm 36$ MHz (-26)
Output Level	-30 / -20 dBm
Output 1 dB compression	-15 dBm

### Channel Characteristics

Gain Range (adjustable)	0.0 to 50.0 dB, 1.0 dB steps
Image Rejection	> 50 dB, min
Spurious Response	< -45 dBC in band
Frequency Response	$\pm 1.5$ dB, 2.0 - 2.5 GHz; $\pm 0.5$ dB, 36 MHz BW
Group Delay, max	0.01 ns/MHz <sup>2</sup> parabolic, 0.03 ns/MHz linear, 1 ns ripple (-25) 0.0035 ns/MHz <sup>2</sup> parabolic, 0.025 ns/MHz linear, 1 ns ripple (-26)
Frequency Sense	Inverting or Non-inverting (selectable)

### Synthesizer Characteristics

Frequency Accuracy	$\pm 1.0$ ppm max over temp
Frequency Step	1.0 MHz minimum (125 kHz, <b>option X</b> )
10 MHz level In/Out	3 dBm $\pm 3$ dB ( <b>option E</b> )
Phase Noise	@ Freq   100Hz    1kHz    10kHz    100kHz    1MHz
	dBc/Hz          -70        -70        -80        -95        -105

### Controls, Indicators

Frequency Selection	direct readout LCD; pushbutton switches or remote selection
Gain Selection	direct readout LCD; pushbutton switches or remote selection
Power	Green LED
Alarm	Red LED

### Other

RF,IF Connectors	BNC (female)
Alarm/Remote (RS232)	DB9 - NO or NC contact closure on Alarm
Size	19 inch standard chassis 1.75" high X 16.0" deep
Power	100-240 $\pm 10\%$ VAC, 47-63 Hz, 25 W max

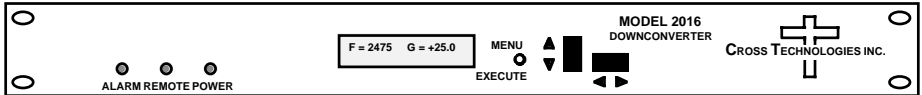
### Models

2016-25	2000 - 2500 MHz Input, 70 $\pm 18$ MHz Output
2016-26	2000 - 2500 MHz Input, 140 $\pm 36$ MHz Output

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

# 2016-225 Downconverter, 2.0 - 2.5 GHz to 70 MHz IF

The 2016-225 Downconverter converts 2000 to 2500 MHz in 1 kHz, 10 kHz, or 125 kHz steps (user selectable) to  $70 \pm 18$  MHz with low group delay and flat frequency response. Synthesized local oscillators (LO) provide very low phase noise and  $\pm 0.01$  ppm stability frequency selection. Multi-function push button switches select the RF frequency, gain, and other parameters. Front panel LEDs provide indication of DC power (green), PLL alarm (red), and remote operation (yellow). Gain is adjustable manually over a 0 to +50 dB range as adjusted by the front panel multi-function push-button switches. Remote operation allows selection of frequency and gain. Parameter selection and frequency and gain settings appear on the LCD display. Connectors are BNC female for RF Input, IF output and the optional external reference input and output. The External 10 MHz option includes a 10 MHz output connector, along with the ability to send either the internal or external 10 MHz reference signal out the RF and/or Output connector. The units are each powered by a 100-240  $\pm 10\%$  VAC power supply, and housed in a 1 3/4" X 19" X 16" rack mount chassis.



**Front Panel**

## Technical Specifications\*

### Input Characteristics

Impedance/Return Loss	50 $\Omega$ /12 dB
Frequency	2.0 to 2.5 GHz
Input Level range	-70 to -20 dBm
Input 1 dB compression	-15 dBm, min gain

### Output Characteristics

Impedance/Return Loss	50 $\Omega$ /18 dB
Frequency	$70 \pm 18$ MHz
Output Level/Max Linear	-20/-10 dBm
Output 1 dB compression	-5 dBm

### Channel Characteristics

Gain Range (adjustable)	0.0 to 50.0 dB, 1.0 dB steps
Image Rejection	> 50 dB, min
Spurious Response	< -50 dBC
Frequency Response	$\pm 1.5$ dB, 2.0-2.5 GHz; $\pm 0.5$ dB, 36 MHz BW
Group Delay, max	0.01 ns/MHz <sup>2</sup> parabolic, 0.03 ns/MHz linear, 1 ns ripple
Frequency Sense	Non-inverting/Inverting (selectable 2016-225); Non-inverting (2016-125)

### Synthesizer Characteristics

Frequency Accuracy	$\pm 0.01$ ppm max over temp					
Frequency Step	1, 10, 100, or 125 kHz (user selectable)					
10 MHz level In/Out	3 dBm $\pm 3$ dB (option E)					
Phase Noise	@ Freq	100Hz	1kHz	10kHz	100kHz	1MHz
	dBC/Hz	-75	-85	-90	-110	-120

### Controls, Indicators

Frequency Selection	direct readout LCD; pushbutton switches or remote selection
Gain Selection	direct readout LCD; pushbutton switches or remote selection
Power	Green LED
Alarm	Red LED
Remote	Yellow LED, RS232C, 9600 baud (RS485/RS422 option Q)

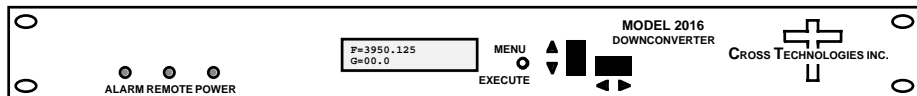
### Other

RF, IF Connectors	BNC (female), 50 $\Omega$
10 MHz Connectors	BNC (female), 50/75 $\Omega$ (option E)
Alarm/Remote (RS232)	DB9 - NO or NC contact closure on Alarm
Size	19 inch standard chassis 1.75" high X 16.0" deep
Power	100-240 $\pm 10\%$ VAC, 47-63 Hz, 25 W max

\*  $+10^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$ ; Specifications subject to change without notice.

# 2016-34 Downconverter, 3.4 - 4.2 GHz to 70 MHz IF

The 2016-34 Downconverter converts 3.4 to 4.2 GHz in 1 kHz steps to  $70 \pm 18$  MHz with low group delay and flat frequency response. Synthesized local oscillators (LO) provide very low phase noise and  $\pm 0.01$  ppm stability frequency selection. Multi-function push button switches select the RF frequency, gain, and other parameters. Front panel LEDs provide indication of DC power (green), PLL alarm (red), and remote operation (yellow). Gain is adjustable manually over a +30 to +50 dB range as adjusted by the front panel multi-function push-button switches. Remote operation allows selection of frequency and gain. Parameter selection and frequency and gain settings appear on the LCD display. Connectors are BNC female for IF output and the optional external reference input and output, and Type N female for the RF input. External 10 MHz is standard. A 10 MHz output connector contains either the internal or external 10 MHz reference signal. The unit is powered by a 100-240  $\pm 10\%$  VAC power supply, and housed in a 1 3/4" X 19" X 16" rack mount chassis.



**Front Panel**

## Technical Specifications\*

### Input Characteristics

Impedance/Return Loss	50 $\Omega$ /14 dB
Frequency	3.4 to 4.2 GHz
Noise Figure, max. 15 dB (max gain)	
Input Level range	-70 to -30 dBm
Input 1 dB compression	-15 dBm

### Output Characteristics

Impedance/Return Loss	75 $\Omega$ /18 dB
Frequency	$70 \pm 18$ MHz
Output Level	-25 to -5 dBm
Output 1 dB compression	+5 dBm

### Channel Characteristics

Gain Range (adjustable)	+30.0 to +50.0 dB
Image Rejection	> 50 dB, min
Spurious Response < -50 dBC, in band	
Frequency Response	$\pm 1.5$ dB, 3.4 to 4.2 GHz; $\pm 0.6$ dB, 36 MHz BW
Group Delay, max	0.01 ns/MHz <sup>2</sup> parabolic, 0.03 ns/MHz linear, 1 ns ripple
Frequency Sense	Non-inverting

### Synthesizer Characteristics

Frequency Accuracy	$\pm 0.01$ ppm internal reference					
Frequency Step	1, 10, 100, or 125 kHz (user selectable)					
10 MHz level In/Out	3 dBm $\pm 3$ dB					
Phase Noise	@ Freq	100Hz	1kHz	10kHz	100kHz	1MHz
	dBc/Hz	-70	-80	-90	-110	-120

### Controls, Indicators

Frequency Selection	direct readout LCD; pushbutton switches or remote selection
Gain Selection	direct readout LCD; pushbutton switches or remote selection
Power	Green LED
Alarm	Red LED
Remote	Yellow LED, RS232C, 9600 baud

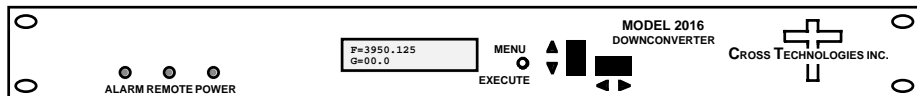
### Other

RF Connector	Type N (female)
IF Connector	BNC (female)
10MHz Connectors	BNC (female), 50/75 $\Omega$
Alarm/Remote (RS232)	DB9 - NO or NC contact closure on Alarm
Size	19 inch standard chassis 1.75" high X 16.0" deep
Power	100-240 $\pm 10\%$ VAC, 47-63 Hz, 25 W max

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

## 2016-37 Downconverter, 3.625 - 4.2 GHz to 70 MHz IF

The 2016-37 Downconverter converts 3.625 to 4.2 GHz in 125 kHz steps to  $70 \pm 18$  MHz with low group delay and flat frequency response. Synthesized local oscillators (LO) provide very low phase noise and  $\pm 1.0$  ppm stability frequency selection. Multi-function push button switches select the RF frequency, gain, and other parameters. Front panel LEDs provide indication of DC power (green), PLL alarm (red), and remote operation (yellow). Gain is adjustable manually over a +30 to +50 dB range as adjusted by the front panel multi-function push-button switches. Remote operation allows selection of frequency and gain. Parameter selection and frequency and gain settings appear on the LCD display. Connectors are BNC (female) for IF output and the 10MHz reference input and output, and Type N (female) for the RF input. External 10 MHz is standard. A 10 MHz output connector contains either the internal or external 10 MHz reference signal. The unit is powered by a 100-240  $\pm 10\%$  VAC power supply, and housed in a 1 3/4" X 19" X 16" rack mount chassis.



**Front Panel**

### Technical Specifications\*

#### Input Characteristics

Impedance/Return Loss	50 $\Omega$ /14 dB
Frequency	3.625 to 4.2 GHz
Noise Figure, max. 15 dB (max gain)	
Input Level range	-70 to -30 dBm
Input 1 dB compression	-15 dBm

#### Output Characteristics

Impedance/Return Loss	75 $\Omega$ /18 dB
Frequency	$70 \pm 18$ MHz
Output Level	-25 to -5 dBm
Output 1 dB compression	+5 dBm

#### Channel Characteristics

Gain Range (adjustable)	+30.0 to +50.0 dB
Image Rejection	> 50 dB, min
Spurious Response < -50 dBC, in band	
Frequency Response	$\pm 1.5$ dB, 3.625 to 4.2 GHz; $\pm 0.6$ dB, 36 MHz BW
Group Delay, max	0.01 ns/MHz <sup>2</sup> parabolic, 0.03 ns/MHz linear, 1 ns ripple
Frequency Sense	Non-inverting

#### Synthesizer Characteristics

Frequency Accuracy	$\pm 1.0$ ppm internal reference					
Frequency Step	125 kHz minimum					
10 MHz level In/Out	3 dBm $\pm$ 3 dB					
Phase Noise	@ Freq	100Hz	1kHz	10kHz	100kHz	1MHz
	dBc/Hz	-60	-70	-80	-100	-100

#### Controls, Indicators

Frequency Selection	direct readout LCD; pushbutton switches or remote selection
Gain Selection	direct readout LCD; pushbutton switches or remote selection
Power	Green LED
Alarm	Red LED
Remote	Yellow LED, RS232C, 9600 baud

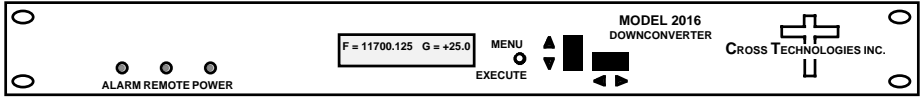
#### Other

RF Connector	Type N (female)
IF Connector	BNC (female)
10MHz Connectors	BNC (female), 50/75 $\Omega$
Alarm/Remote (RS232)	DB9 - NO or NC contact closure on Alarm
Size	19 inch standard chassis 1.75" high X 16.0" deep
Power	100-240 $\pm 10\%$ VAC, 47-63 Hz, 25 W max

\*  $+10^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$ ; Specifications subject to change without notice.

# 2016-117 Downconverter, 11.7 - 12.2 GHz to 70 MHz IF

The 2016-117 Downconverter converts 11.7 to 12.2 GHz in 125 kHz steps to 70 ± 18 MHz with low group delay and flat frequency response. Synthesized local oscillators (LO) provide low phase noise and ±1.0 ppm stability frequency selection. Multi-function push button switches select the RF frequency, gain, and other parameters. Front panel LEDs provide indication of DC power (green), PLL alarm (red), and remote operation (yellow). Gain is adjustable manually over a +30 to +50 dB range as adjusted by the front panel multi-function push-button switches. Remote operation allows selection of frequency and gain. Parameter selection and frequency and gain settings appear on the LCD display. Connectors are BNC female for IF output and the external reference input and output, and SMA female for the RF input. External 10 MHz is standard. A 10 MHz output connector contains either the internal or external 10 MHz reference signal. The unit is powered by a 100-240 ±10% VAC power supply, and housed in a 1 3/4" X 19" X 16" rack mount chassis.



**Front Panel**

## Technical Specifications\*

### Input Characteristics

Impedance/Return Loss	50 Ω/14 dB
Frequency	11.7 to 12.2 GHz
Input Level range	-70 to -40 dBm
Input 1 dB compression	-30 dBm at +30 dB gain

### Output Characteristics

Impedance/Return Loss	75 Ω/18 dB
Frequency	70 ± 18 MHz
Output Level range	-25 to -5 dBm
Output 1 dB compression	+5 dBm

### Channel Characteristics

Gain Range (adjustable)	+30 to +50 dB, 1 dB steps
Image Rejection	> 50 dB, min
Spurious Response < -50 dBC, in band	
Frequency Response	± 1.5 dB, 11.7-12.2 GHz; ± 0.6 dB, 36 MHz BW
Group Delay, max	0.01 ns/MHz <sup>2</sup> parabolic, 0.03 ns/MHz linear, 1 ns ripple
Frequency Sense	Non-inverting

### Synthesizer Characteristics

Frequency Accuracy	± 1.0 ppm max over temp					
Frequency Step	125 kHz					
10 MHz level In/Out	3 dBm ± 3 dB					
Phase Noise	@ Freq	100Hz	1kHz	10kHz	100kHz	1MHz
	dBc/Hz	-60	-70	-80	-90	-100

### Controls, Indicators

Frequency Selection	direct readout LCD; pushbutton switches or remote selection
Gain Selection	direct readout LCD; pushbutton switches or remote selection
Power	Green LED
Alarm	Red LED
Remote	Yellow LED, RS232C, 9600 baud (RS485/RS422 option Q)

### Other

RF Connector	SMA (female)
IF Connector	BNC (female)
10 MHz Connectors	BNC (female), 50/75 Ω
Alarm/Remote (RS232)	DB9 - NO or NC contact closure on Alarm
Size	19 inch standard chassis 1.75" high X 16.0" deep

### Options

**CONTACT CROSS FOR OTHER Ku-BAND MODELS or REQUESTS**

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





## **AGILE UP/DOWNCONVERTER COMBOS**

MODEL NUMBER	PAGE# OR WEB	BAND	RF RANGE (GHz)	IF FREQ (MHz)	IF BW (MHz)	FREQ INCR (Hz)	GAIN RANGE (dB)	10 kHz $\emptyset$ NOISE dBC/Hz
2017-02	WEB	L,L	0.95-2.15	70	36	1M	L-band	-80
2017-03	25	L,L	0.95-1.525	70	36	1M	L-band	-80
2017-03A	26	L,L	0.95-1.525	70	36	1M	L-band	-80
2017-35	27	S, UP	2.-2.5	70	36	1M	-10to+30	-80
		L, DN	0.95-1.525	70	36	1M	0to+50	-80
2017-36	WEB	L, UP	0.95-1.525	70	36	1M	-10to+30	-80
		S, DN	2.-2.5	70	36	1M	0to+50	-80
2017-64	28	C, UP	5.85-6.425	70	36	125K	0to+30	-80
		C, DN	3.625-4.20	70	36	125K	+30to+50	-80

## **FREQUENCY TRANSLATORS**

MODEL NUMBER	PAGE# OR WEB	TRANS-LATION	IN RANGE (MHz)	OUT RANGE (MHz)	IF BW (MHz)	FREQ INCR (Hz)	GAIN RANGE (dB)	10 kHz $\emptyset$ NOISE dBC/Hz
2083-714A IF to IF	29	70>140	70	110-170	36	1M	-10 to 0	-85
		140>70	110-170	70	36	1M	-10 to 0	-85
2083-1222 L to L	30	L>L,LO	950-1200	1650-1900	300	FIXED	0to+20	-85
		L>L,HI	950-1200	1900-2150	300	FIXED	0to+20	-85

### **SEE PAGE 32 FOR OPTIONS**

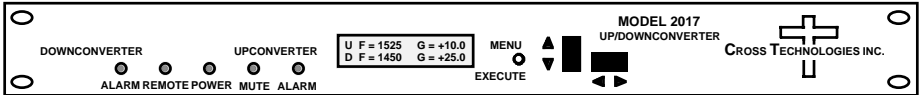
**CONTACT US IF YOU DON'T SEE WHAT YOU NEED HERE!**

**CUSTOM PRODUCTS ARE OUR SPECIALTY!**

Current pricing for most products can be found on our website at  
[www.crosstechnologies.com](http://www.crosstechnologies.com)

# 2017-03 Up/Downconverter, 950 - 1525 MHz, 70 MHz IF

The 2017-03 L-band Up/Downconverter converts  $70 \pm 18$  MHz to 950-1525 MHz (Up) and 950-1525 MHz to  $70 \pm 18$  MHz (Down) in 1 MHz steps with low group delay and flat frequency response. Synthesized local oscillators (LO) provide frequency selection. Multi-function push button switches select the RF frequency, gain, and other parameters. Front panel LEDs provide indication of DC power (green), PLL alarm for up and downconverters (red), remote operation (yellow), and Upconverter mute (yellow). Gain is manually controlled over a -10 to +30 dB range for the upconverter and over a 0 to +50 dB range for the downconverter as adjusted by the front panel multi-function push-button switches. Remote operation allows selection of frequency and gain. Parameter selection and frequency and gain settings appear on the LCD display. Connectors are BNC female for IF and the optional external reference input and output, and Type F female for RF. LNB or SSPB +24 VDC and 10 MHz reference can be inserted on the RF lines as added options. A high stability ( $\pm 0.01$ ppm) option is also available. The unit is powered by a 100-240  $\pm 10\%$  VAC power supply and housed in a 1.75" X 19" X 16" rack mount chassis. A 140  $\pm 36$  MHz model is also available (2017-05).



**Front Panel**

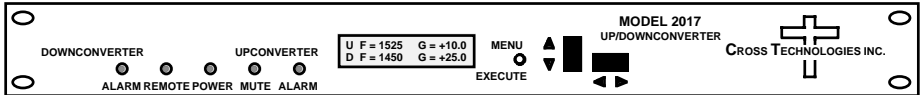
## Technical Specifications\*

Upconverter		Downconverter				
<b>Input Characteristics (IF)</b>		<b>Input Characteristics (RF)</b>				
Impedance/Return Loss	75 $\Omega$ /18 dB	Impedance/Return Loss	75 $\Omega$ /12 dB			
Frequency	70 MHz $\pm$ 18 MHz	Frequency	950 to 1525 MHz			
Input Level	-40 to -10 dBm	Noise Figure, Max	15 dB (max gain)			
<b>Output Characteristics (RF)</b>		Input Level range	-70 to -20 dBm			
Impedance/Return Loss	75 $\Omega$ /12 dB	Input 1 dB compression	-15 dBm			
Frequency	950 to 1525 MHz	<b>Output Characteristics (IF)</b>				
Output Level	-20 to 0 dBm	Impedance/Return Loss	75 $\Omega$ /18 dB			
Output 1 dB compression	+5 dBm	Frequency	70 $\pm$ 18 MHz			
<b>Channel Characteristics</b>		Output Level/Max Linear	-20/-10 dBm			
Gain Range (adjustable)	-10.0 to +30.0 dB	Output 1 dB compression	-5 dBm			
Frequency Sense	Non-inverting	<b>Channel Characteristics</b>				
<b>Up and Downconverter</b>		Gain Range (adjustable)	0.0 to +50.0 dB			
<b>Channel Characteristics</b>		Image Rejection	> 50 dB, min			
Frequency Response	$\pm 1.5$ dB, 950 - 1525 MHz; $\pm 0.5$ dB, 36 MHz BW	Frequency Sense (selectable)	Inverting or Non-inverting			
Spurious Response < -50 dBc	in band					
Group Delay, max	0.01 ns/MHz <sup>2</sup> parabolic, 0.03 ns/MHz linear, 1 ns ripple					
<b>Synthesizer Characteristics</b>						
Frequency Accuracy	$\pm 1.0$ ppm ( $\pm 0.01$ ppm <b>option H</b> )					
Frequency Step	1.0 MHz minimum (as low as 1 kHz steps available)					
10 MHz Level In/Out	+3 dBm $\pm$ 3 dB (option E)					
Phase Noise	@ Freq	100Hz	1kHz	10kHz	100kHz	1MHz
	dBc/Hz	-75	-75	-85	-100	-120
<b>Controls, Indicators</b>						
Frequency Selection	direct readout LCD; pushbutton switches or remote selection					
Gain Selection	direct readout LCD; pushbutton switches or remote selection					
Pwr; Alarm; Rem; Tx Mute	Green LED; Red LED; Yellow LED; Yellow LED					
Remote	RS232C, 9600 baud					
<b>Other</b>						
RF,IF Connectors	Type F (female), BNC (female), Others optional					
10 MHz Connectors	BNC (female), 50/75 $\Omega$ ( <b>option E</b> )					
Alarm/Remote (RS232)	DB9 - NO or NC contact closure on Alarm					
Size	19 inch standard chassis 1.75" high X 16.0" deep					
<b>Options</b>						
See options for 2015-03 and 2016-03						

\*  $+10^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$ ; Specifications subject to change without notice.

# 2017-03A Up/Downconverter, 950 - 1525 MHz, 70 MHz IF

The 2017-03A L-band Up/Downconverter converts 70 MHz to 950-1525 MHz (Up) and 950-1525 MHz to 70 MHz (Down) in 1 MHz steps with low group delay and flat frequency response. The 2017-03A has lower RF level out of the upconverter and higher RF level into the downconverter than the 2017-03 and is typically used to interface an L-band modem to a 70 MHz IF upconverter and downconverter. Multi-function push button switches select the RF frequency, gain, and other parameters. Front panel LEDs provide indication of DC power (green), PLL alarm for up and downconverters (red), remote operation (yellow), and Upconverter mute (yellow). Gain can be manually adjusted over a -25 to +15 dB range for the upconverter and over a 0 to +50 dB range for the downconverter by the front panel multi-function push-button switches. Remote operation allows selection of frequency and gain. Parameter selection and frequency and gain settings appear on the LCD display. Connectors are BNC female for IF and the optional external reference input and output, and Type F female for RF. A high stability ( $\pm 0.01$  ppm) option is also available. It is powered by a 100-240  $\pm$  10% VAC power supply and housed in a 1.75" X 19" X 16" 1RU chassis.



**Front Panel**

## Technical Specifications\*

Upconverter		Downconverter	
<b>Input Characteristics (IF)</b>		<b>Input Characteristics (RF)</b>	
Impedance/Return Loss	75 $\Omega$ /18 dB	Impedance/Return Loss	75 $\Omega$ /12 dB
Frequency	70 MHz $\pm$ 18 MHz	Frequency	950 to 1525 MHz
Input Level	-40 to -15 dBm	Noise Figure, Max	15 dB (max gain)
<b>Output Characteristics (RF)</b>		<b>Input Level range</b>	
Impedance/Return Loss	75 $\Omega$ /12 dB	Input 1 dB compression	-60 to -10 dBm
Frequency	950 to 1525 MHz	<b>Output Characteristics (IF)</b>	
Output Level	-35 to -15 dBm	Impedance/Return Loss	75 $\Omega$ /18 dB
Output 1 dB compression	-10 dBm	Frequency	70 $\pm$ 18 MHz
<b>Channel Characteristics</b>		Output Level	-10 to 0 dBm
Gain	-25 to +15 1dB steps	Output 1 dB compression	+5 dBm
Frequency Sense	Non-inverting	<b>Channel Characteristics</b>	
		Gain Range (adjustable)	0.0 to +50.0 dB
		Image Rejection	> 50 dB, min
		Frequency Sense (selectable)	Inverting or Non-inverting

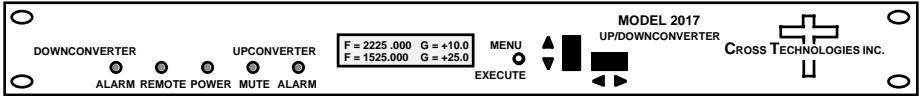
### Up and Downconverter

<b>Channel Characteristics</b>	
Frequency Response	$\pm 1.5$ dB, 950 - 1525 MHz; $\pm 0.5$ dB, 36 MHz BW
Spurious Response < -50 dBc	in band
Group Delay, max	0.01 ns/MHz <sup>2</sup> parabolic, 0.03 ns/MHz linear, 1 ns ripple
<b>Synthesizer Characteristics</b>	
Frequency Accuracy	$\pm 1.0$ ppm ( $\pm 0.01$ ppm <b>option H</b> )
Frequency Step	1.0 MHz minimum (as low as 1 kHz steps available)
10 MHz Level In/Out	+3 dBm $\pm$ 3 dB ( <b>option X</b> )
Phase Noise	@ Freq   100Hz   1kHz   10kHz   100kHz   1MHz
	dBc/Hz   -75   -75   -85   -100   -120
<b>Controls, Indicators</b>	
Frequency Selection	direct readout LCD; pushbutton switches or remote selection
Gain Selection	direct readout LCD; pushbutton switches or remote selection
Pwr; Alarm; Rem; Tx Mute	Green LED; Red LED; Yellow LED; Yellow LED
Remote	RS232C, 9600 baud
<b>Other</b>	
RF,IF Connectors	Type F (female), BNC (female), Others optional
10 MHz Connectors	BNC (female), 50/75 $\Omega$ ( <b>option E</b> )
Alarm/Remote (RS232)	DB9 - NO or NC contact closure on Alarm
Size	19 inch standard chassis 1.75" high X 16.0" deep
<b>Options</b>	
See options for 2015-03 and 2016-03	

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

# 2017-35 Up/Downconverter, 2.0 - 2.5 GHz, 950 - 1525 MHz

The 2017-35 Up/Downconverter converts 70 MHz to 2000-2500 MHz (Up) and 950-1525 MHz to 70 MHz (Down) in 1 MHz steps with low group delay and flat frequency response. Synthesized local oscillators (LO) provide frequency selection. Multi-function push button switches select the RF frequency, gain, and other parameters. Front panel LEDs provide indication of DC power (green), PLL alarm for up and downconverters (red), remote operation (yellow), and upconverter mute (yellow). Gain is manually controlled over a -10 to +30 dB range for the upconverter and over a 0 to +50 dB range for the downconverter as adjusted by the front panel multi-function push-button switches. Remote operation allows selection of frequency and gain. Parameter selection and frequency and gain settings appear on the LCD display. Connectors are BNC female for IF and the optional external reference input and output, and Type F female for RF. LNB or SSPB +24 VDC and 10 MHz reference can be inserted on the RF lines as added options. A high stability ( $\pm 0.01$ ppm) option is also available. The unit is powered by a 100-240  $\pm 10\%$  VAC power supply and housed in a 1.75" X 19" X 16" rack mount chassis.



## Front Panel

### Technical Specifications\*

#### Upconverter

##### Input Characteristics (IF)

Impedance/Return Loss	75 $\Omega$ /18 dB
Frequency	70 MHz $\pm$ 18 MHz
Input Level	-40 to -10 dBm

##### Output Characteristics (RF)

Impedance/Return Loss	50 $\Omega$ /12 dB
Frequency	2000 to 2500 MHz
Output Level	-20 to 0 dBm
Output 1 dB compression	+5 dBm

##### Channel Characteristics

Gain Range (adjustable)	-10.0 to +30.0 dB
Frequency Sense	Non-inverting

#### Up and Downconverter

##### Channel Characteristics

Frequency Response	$\pm 1.5$ dB, in band; $\pm 0.5$ dB, 36 MHz BW
Spurious Response < -50 dBc	in band
Group Delay, max	0.01 ns/MHz <sup>2</sup> parabolic, 0.03 ns/MHz linear, 1 ns ripple

##### Synthesizer Characteristics

Frequency Accuracy	$\pm 1.0$ ppm ( $\pm 0.01$ ppm <b>option H</b> )
Frequency Step	1.0 MHz (125 kHz <b>option -X</b> )
10 MHz Level In/Out	+3 dBm $\pm$ 3 dB ( <b>option E</b> )

Phase Noise	@ Freq	100Hz	1kHz	10kHz	100kHz	1MHz
	dBc/Hz	-70	-70	-80	-95	-110

##### Controls, Indicators

Frequency Selection	direct readout LCD; pushbutton switches or remote selection
Gain Selection	direct readout LCD; pushbutton switches or remote selection
Pwr; Alarms; Rem; Tx Mute	Green LED; Red LED; Yellow LED; Yellow LED
Remote	RS232C, 9600 baud

##### Other

RF/IF Connectors	Type F (female), BNC (female), others optional
10 MHz Connectors	BNC (female), 50/75 $\Omega$ ( <b>option E</b> )
Alarm/Remote (RS232)	DB9 - NO or NC contact closure on Alarm
Size	19 inch standard chassis 1.75" high X 16.0" deep

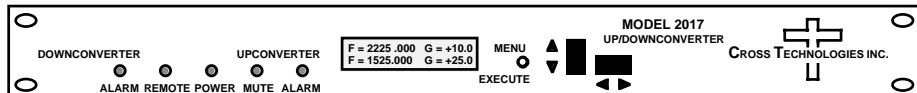
##### Options

See options for 2015-03 and 2016-03

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

## 2017-64 Up/Downconverter, C-Band, Common LO

The 2017-64 C-band Up/Downconverter converts 70 MHz to 5.85-6.425 MHz (Up) and 3.625-4.2 MHz to 70 MHz (Down) in 0.125 MHz steps with low group delay and flat frequency response. A common synthesized local oscillator (LO) provides frequency selection for the Up and Down converter simultaneously. Multi-function push button switches select the RF frequency, gain, and other parameters. Front panel LEDs provide indication of DC power (green), PLL alarm for up and downconverters (red), remote operation (yellow), and Upconverter mute (yellow). Gain can be manually controlled over a 0 to +30 dB range for the upconverter and over a +30 to +50 dB range for the downconverter as adjusted by the front panel multi-function push-button switches. Remote operation allows selection of frequency and gain. Parameter selection and frequency and gain settings appear on the LCD display. Connectors are BNC female for IF and the optional external reference input and output, and N female for RF. A high stability ( $\pm 0.01$  ppm) option is also available. It is powered by a 100-240  $\pm 10\%$  VAC power supply and housed in a 1.75" X 19" X 16" 1RU chassis.



### Front Panel

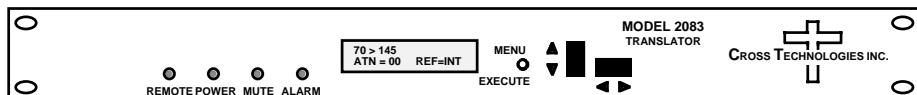
#### Technical Specifications\*

Upconverter		Downconverter													
<b>Input Characteristics (IF)</b>		<b>Input Characteristics (RF)</b>													
Impedance/Return Loss	75 $\Omega$ /18 dB	Impedance/Return Loss	75 $\Omega$ /12 dB												
Frequency	70 MHz $\pm$ 18 MHz	Frequency	3.625 to 4.2 MHz												
Input Level	- 40 to -10 dBm	Noise Figure, Max	15 dB (max gain)												
<b>Output Characteristics (RF)</b>		Input Level range	- 60 to -30 dBm												
Impedance/Return Loss	50 $\Omega$ /14 dB	Input 1 dB compression	-10dBm(min gain)												
Frequency	5.85 to 6.425 MHz	<b>Output Characteristics (IF)</b>													
Output Level	-20 to 0 dBm	Impedance/Return Loss	75 $\Omega$ /18 dB												
Output 1 dB compression	+10 dBm	Frequency	70 $\pm$ 18 MHz												
<b>Channel Characteristics</b>		Output Level	- 20 to 0 dBm												
Gain Range (adjustable)	0 to +30dB, 1dB steps	Output 1 dB compression	+ 10 dBm												
Frequency Sense	Non-inverting	<b>Channel Characteristics</b>													
		Gain Range (adjustable)	30.0 to + 50.0 dB												
		Image Rejection	> 50 dB, min												
		Frequency Sense (selectable)	Non-inverting												
<b>Up and Downconverter</b>															
<b>Channel Characteristics</b>															
Frequency Response	$\pm 1.5$ dB, in band; $\pm 0.5$ dB, 36 MHz BW														
Spurious Response < -50 dBC															
Group Delay, max	0.015 ns/MHz <sup>2</sup> parabolic; 0.05 ns/MHz linear; 1 ns ripple														
<b>Synthesizer Characteristics</b>															
Frequency Accuracy	$\pm 1.0$ ppm internal reference ( $\pm 0.01$ ppm, <b>option H</b> )														
Frequency Step	1 MHz (as low as 1 kHz steps available)														
10 MHz Level In/Out	3 dBm $\pm$ 3 dB ( <b>option E</b> )														
Phase Noise	<table border="1"> <thead> <tr> <th>@ Freq</th> <th>100Hz</th> <th>1kHz</th> <th>10kHz</th> <th>100kHz</th> <th>1MHz</th> </tr> </thead> <tbody> <tr> <td>dBc/Hz</td> <td>-60</td> <td>-70</td> <td>-80</td> <td>-90</td> <td>-100</td> </tr> </tbody> </table>			@ Freq	100Hz	1kHz	10kHz	100kHz	1MHz	dBc/Hz	-60	-70	-80	-90	-100
@ Freq	100Hz	1kHz	10kHz	100kHz	1MHz										
dBc/Hz	-60	-70	-80	-90	-100										
<b>Controls, Indicators</b>															
Frequency Selection	direct readout LCD; pushbutton switches or remote selection														
Gain Selection	direct readout LCD; pushbutton switches or remote selection														
Pwr; Alarms; Rem;	Green LED; Red LED; Yellow LED														
Remote	RS232C, 9600 baud														
<b>Other</b>															
RF,IF Connectors	N (female), BNC (female)														
10 MHz Connectors	BNC (female), 50 $\Omega$ /75 $\Omega$														
Alarm/Remote Connector	DB9 - NO or NC contact closure on Alarm														
Size	19 inch, 1RU standard chassis 1.75"high X 16.0" deep														
Power	100-240 $\pm 10\%$ VAC, 47-63 Hz, 25 W max														
<b>Options</b>															
	See options for 2015-03 and 2016-03														

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

## 2083-714A Agile IF to IF Translator

The 2083-714A Frequency Translator converts 70 MHz to 110-170 MHz to 70 MHz with no spectrum inversion, low group delay, and flat frequency response. The 140 MHz end center frequency is adjustable from 110 to 170 MHz in 1 MHz steps. The 70 MHz or 140 MHz IF input is mixed with synthesized local oscillator (LO) signals, first to 1750 MHz and finally to 140 MHz or 70 MHz. Multi-function push button switches select the translation, gain, and the 140 MHz end center frequency (adjustable from 110 to 170 MHz). Frequency translation and gain (-10 to 0 dB, adjustable in 1 dB steps) settings appear on the LCD display. Front panel LEDs light when DC power is applied (green), a PLL alarm occurs (red), the signal is muted (yellow), or remote control is active (yellow). A 10 MHz input allows for connection of an external 10 MHz reference. The 10 MHz output contains the 10 MHz reference signal (be it internal or external). Connectors are BNC female for the IF and 10 MHz input and output. The 2083-714A Translator is housed in a 1 3/4" X 19" X 16" deep rack mount chassis. **Option -H** provides a 0.01 ppm high stability reference.



**Front Panel**

### Technical Specifications\*

#### Input Characteristics

Input Impedance/RL	75 Ω /18 dB
Frequency, 70 to 140	70 ± 18 MHz
Frequency, 140 to 70	110 to 170 MHz
Input Level	-20 to -10 dBm
Input 1 dB compression	0 dBm

#### Output Characteristics

Impedance/RL	75Ω/18 dB
Frequency, 70 to 140	110 to 170 MHz
Frequency, 140 to 70	70 ± 18 MHz
Output 1 dB compression	+5 dBm

#### Channel Characteristics

Gain	-10 to 0 dB ± 0.5 dB (adjustable in 1dB steps)
Spurious Response < -50 dBC	
Frequency Response	± 0.3 dB, ± 12 MHz; ± 0.5 dB, ± 18 MHz
Group Delay, max	0.01 ns/MHz <sup>2</sup> parabolic, 0.03 ns/MHz linear, 1 ns ripple
10 MHz In/Out Level	3 dB ± 3 dB
Frequency Sense	Non-inverting

#### Synthesizer Characteristics

Frequency Accuracy	±1.0ppm internal reference (±0.01 ppm - <b>option H</b> )				
Step Size	1 MHz, 110 to 170 MHz center frequency (140 MHz side)				
Phase Noise	@ Freq	1kHz	10kHz	100kHz	1MHz
	dBc/Hz	-80	-85	-100	-110

#### Controls, Indicators

Frequency Translation	pushbutton switches; setting shown on LCD display
Gain Selection	pushbutton switches; setting shown on LCD display
Power	Green LED
Alarm	Red LED
Remote	Yellow LED; RS232C, 9600 baud
Mute	Yellow LED

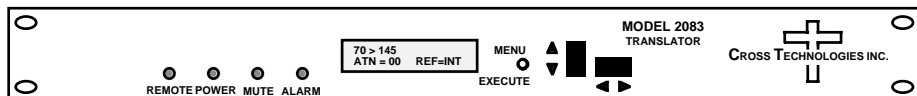
#### Other

IF Connectors	BNC (female), 75Ω
10 MHz Connectors	BNC (female), 50/75 Ω
Alarm Connector	DB9 - NO or NC contact closure on alarm
Size	19 inch standard chassis 1.75" high X 16.0" deep
Power	100-240 ±10% VAC, 47-63 Hz, 25 W max

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

## 2083-1222 Agile L to L Translator

The 2083-1222 Agile L to L Translator converts a 950-1200 MHz block to 1650-1900 MHz or 1900-2150 MHz block (selectable) with spectrum inversion, low group delay and flat frequency response. The 950-1200 MHz input is mixed with synthesized local oscillator (LO) of 2850 MHz to 1650-1900 MHz or with an LO signal of 3100 MHz to 1900-2150 MHz output. Multi-function push button switches select the translation, input level, and gain. Frequency translation, input level, and gain (0 to +20 dB, selectable in 1 dB steps) settings appear on the LCD display. Front panel LEDs light when DC power is applied (green) or a PLL alarm occurs (red). Connectors are BNC female for IF input and output and for (optional) external 10 MHz reference (+3± 3 dBm in). The 2083-1222 Translator is housed in an 1 3/4" X 19" X 16" deep rack mount chassis. **Option -H** provides a 0.01 ppm reference.



**Front Panel**

### Technical Specifications\*

#### Input Characteristics

Input Impedance/RL	75 Ω /12 dB
Frequency	950-1200 MHz
Input Level	-30 to -10 dBm
Input 1 dB compression	0 dBm

#### Output Characteristics

Impedance/RL	75Ω/12 dB
Frequency	1650-1900 MHz OR 1900-2150 MHz
Output Level	-30 to -10

#### Channel Characteristics

Gain	0 to +20 ± 0.5 dB, selectable in 1 dB steps
Frequency Response	± 1.0 dB, 250 MHz bandwidth; ± 0.5 dB, any 36 MHz increment
Intermodulation	<-50 dBC for two carriers each at -13 dBm out
Spurious Response	<-60 dBm in band; < -50 dBm out of band <-40 dBC, 0.95 to 1.2 GHz out; <-45 dBC, 1.9 to 2.4 GHz out; <-50 dBm, LQ out
Group Delay, max	0.01 ns/MHz <sup>2</sup> , parabolic, 0.03ns/MHz, linear, 1 ns ripple any 36 MHz BW
10 MHz In/Out Level	3 dB ± 3 dB
Frequency Sense	Non-inverting

#### Synthesizer Characteristics

Frequency Accuracy	± 1 ppm max over temp: Optional, High Stability (± 0.01 ppm) <b>option H</b>					
Reference	10 MHz Internal or External (selectable)					
Phase Noise	@ Freq	100Hz	1kHz	10kHz	100kHz	1MHz
	dBC/Hz	-65	-75	-85	-95	-110

#### Controls, Indicators

Frequency Translation	pushbutton; shown on LCD display; Set for low or high block
Input Level Selection	pushbutton; shown on LCD display; Set to composite input level
Gain Selection	pushbutton; shown on LCD display; Set to 0 to +20 dB (-10 dBm max out)
DC Power; PLL Alarm	Green LED; Red LED

#### Other

Connectors	RF and (optional) external 10 MHz reference In, BNC, female, 75 Ω
Alarm Connector	DB9 - NO or NC contact closure on alarm
Size	19 inch standard chassis 1.75" high X 16.0" deep
Power	100-240 ±10% VAC, 47-63 Hz, 25 W max

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



## OPTIONS, AGILE CONVERTERS

<b>FEATURE OPTIONS</b>		
<b>#</b>	<b>DESCRIPTION</b>	<b>2015-16-17</b>
<b>E</b>	The External 10 MHz reference	<b>Y Y Y</b>
<b>H</b>	High Stability ( $\pm 0.01$ ppm) internal reference	<b>Y Y Y</b>
<b>L</b>	LNB Power, +24 VDC, 0.5 Amps	<b>N Y Y</b>
<b>V</b>	SSPB Voltage, +24 VDC, 2.5 Amps	<b>Y N Y</b>
<b>V41</b>	SSPB, +48 VDC, 2.1 Amps, 100 W	<b>Y N Y</b>
<b>V48</b>	SSPB, +48 VDC, 1.25 Amps, 60 W	<b>Y N Y</b>
<b>Q</b>	RS-485 M&C Interface, incl. RS232	<b>Y Y Y</b>
<b>R</b>	Redundant Power Supply	<b>Y Y Y</b>
<b>X</b>	125 KHz Frequency Step Size	<b>Y Y Y</b>
<b>Z</b>	Attenuator, 0.1 dB Steps	<b>Y N Y</b>
<b>SAWx</b>	SAW Filter Option where x=bandwidth	<b>N Y Y</b>
<b>W8</b>	Ethernet M & C Remote Interface	<b>Y Y Y</b>
<b>CONNECTOR OPTIONS</b>		
<b>#</b>	<b>DESCRIPTION</b>	<b>2015-16-17</b>
<b>B</b>	ALL RF & IF Connectors 75 $\Omega$ BNC	<b>Y Y Y</b>
<b>C</b>	RF - 50 $\Omega$ BNC / IF - 75 $\Omega$ BNC	<b>Y Y Y</b>
<b>D</b>	ALL RF & IF Connectors 50 $\Omega$ BNC	<b>Y Y Y</b>
<b>F</b>	RF - 75 $\Omega$ F-type / IF - 75 $\Omega$ F-type	<b>Y Y Y</b>
<b>J</b>	RF - 75 $\Omega$ F-type / IF - 50 $\Omega$ BNC	<b>Y Y Y</b>
<b>K</b>	RF - 75 $\Omega$ BNC / IF - 50 $\Omega$ BNC	<b>Y Y Y</b>
<b>M</b>	RF - 50 $\Omega$ N-type / IF - 50 $\Omega$ BNC	<b>Y Y Y</b>
<b>N</b>	RF - 50 $\Omega$ N-type / IF - 75 $\Omega$ BNC	<b>Y Y Y</b>
<b>NF</b>	RF - 50 $\Omega$ N-type / IF - 75 $\Omega$ F-type	<b>Y Y Y</b>
<b>NN</b>	ALL RF & IF Connectors 50 $\Omega$ N-type	<b>Y Y N</b>
<b>NS</b>	RF - 50 $\Omega$ N-type / IF - 50 $\Omega$ SMA	<b>Y Y Y</b>
<b>SN</b>	RF - 50 $\Omega$ SMA / IF - 50 $\Omega$ N-type	<b>Y Y Y</b>
<b>SS</b>	ALL RF & IF Connectors 50 $\Omega$ SMA	<b>Y Y Y</b>
<b>S</b>	RF - 50 $\Omega$ SMA / IF - 50 $\Omega$ BNC	<b>Y Y Y</b>
<b>S7</b>	RF - 50 $\Omega$ SMA / IF - 75 $\Omega$ BNC	<b>Y Y Y</b>
<b>SF</b>	RF - 50 $\Omega$ SMA / IF - 75 $\Omega$ F-type	<b>Y Y Y</b>

**CONTACT US IF YOU DON'T SEE WHAT YOU NEED HERE!**

**CUSTOM PRODUCTS ARE OUR SPECIALTY!**

Current pricing for most products can be found on our website at  
[www.crosstechnologies.com](http://www.crosstechnologies.com)



## **BLOCK UP CONVERTERS**

MODEL NUMBER	PAGE# OR WEB	BAND	RF OUT RANGE (GHz)	RF IN RANGE (GHz)	LO FREQ (GHz)	GAIN (dB)	10 kHz $\varnothing$ NOISE dBC/Hz
2115-58	35	<b>C</b>	5.85-6.425	0.95-1.525	7.375	20	-85
2115-59	WEB	<b>C</b>	5.85-6.65	0.95-1.75	4.9	20	-85
2115-109	WEB	<b>Ku</b>	10.95-11.7	0.95-1.7	10	20	-85
2115-114	36	<b>Ku</b>	11.45-12.25	0.95-1.75	10.5	20	-85
2115-122	WEB	<b>Ku</b>	12.2-12.7	0.95-1.45	11.25	20	-85
2115-125	WEB	<b>Ku</b>	12.2-12.75	0.95-1.5	11.25	20	-85
2115-140	37	<b>Ku</b>	14.0-14.5	0.95-1.45	13.05	20	-85
2115-202	38	<b>Ka</b>	19.7-20.2	UHF, LBAND	18.05	0	-85
2115-222	39	<b>Ka</b>	21.35-22.35	2.5-3.5	18.85	0	-85

## **BLOCK DOWN CONVERTERS**

MODEL NUMBER	PAGE# OR WEB	BAND	RF IN RANGE (GHz)	RF OUT RANGE (GHz)	LO FREQ (GHz)	GAIN (dB)	10 kHz $\varnothing$ NOISE dBC/Hz
2116-34	40	<b>C</b>	3.4-4.2	0.95-1.750	5.15	35	-85
2116-109	WEB	<b>Ku</b>	10.95-11.7	0.95-1.7	10	35	-85
2116-114	WEB	<b>Ku</b>	11.45-12.25	0.95-1.75	10.5	35	-85
2116-117	41	<b>Ku</b>	11.7-12.75	0.95-2.00	10.75	35	-85
2116-125	WEB	<b>Ku</b>	12.2-12.75	0.95-1.5	11.25	35	-85
2116-126	WEB	<b>Ku</b>	12.25-12.75	0.95-1.5	11.3	35	-85
2116-137	42	<b>Ku</b>	13.75-14.5	0.95-1.70	12.8	35	-85
2116-184	43	<b>Ka</b>	17.3-18.4	0.95-2.05	16.35	25	-85
2116-222	44	<b>Ka</b>	21.35-22.35	2.5-3.5	18.85	20	-85

## **OPTIONS, BLOCK CONVERTERS**

	CONNECTOR OPTIONS	
#	DESCRIPTION	2115-2116
<b>NN</b>	ALL RF & IF Connectors 50 $\Omega$ N-type	Y Y
<b>NS</b>	RF - 50 $\Omega$ N-type / IF - 50 $\Omega$ SMA	Y Y
<b>SN</b>	RF - 50 $\Omega$ SMA / IF - 50 $\Omega$ N-type	Y Y
<b>SS</b>	ALL RF& IF Connectors 50 $\Omega$ SMA	Y Y

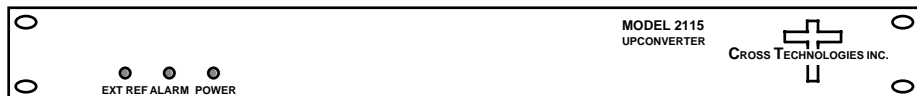
**CONTACT US IF YOU DON'T SEE WHAT YOU NEED HERE!**

**CUSTOM PRODUCTS ARE OUR SPECIALTY!**

Current pricing for most products can be found on our website at  
[www.crosstechnologies.com](http://www.crosstechnologies.com)

# 2115-58 Block Upconverter, L-Band to 5.850 - 6.425 GHz

The 2115-58 Block Upconverter converts 0.95 - 1.525 GHz to 6.425 GHz with low phase noise and flat frequency response. Frequency translation is via a 7.375 GHz local oscillator. Front panel LEDs provide indication of DC Power, External 10 MHz, and PLL Alarm. The gain is +20 dB. Connectors are Type N 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  $\pm$  3 dB, 10 MHz reference signal is connected to the external reference input. The 2115 is powered by a 100-240  $\pm$ 10% VAC power supply, and mounted in a 1 3/4" X 19" X 14" rack mount chassis.



**Front Panel**

## Technical Specifications\*

### Input Characteristics

Impedance/Return Loss	50 $\Omega$ /14 dB
Frequency	950 to 1525 MHz
Noise Figure, Max.	20 dB (max gain)
Input Level	-40 to -20 dBm
Input 1 dB compression	-10 dBm

### Output Characteristics

Impedance/Return Loss	50 $\Omega$ /14 dB
Frequency	5.850 to 6.425 GHz
Output level	-20 to 0 dBm
Output 1 dB compression	+10 dBm

### Channel Characteristics

Gain	+20dB $\pm$ 1 dB
Image Rejection	> 60 dB, min
Spurious, In band	< -60 dBC, 0 dBm out; <-60 dBm (signal independent)
Spurious, Out of band	< -50 dBm
Intermodulation	< -55 dBC for two carriers each at -10dBm out
Frequency Response	$\pm$ 1 dB, 5.850-6.425 MHz; $\pm$ 0.5 dB, 40 MHz BW
Frequency Sense	Inverting

### LO Characteristics

LO Frequency	7.375 GHz					
Frequency Accuracy	$\pm$ 0.01 ppm max over temp internal ref					
10 MHz Level In/Out	3 dBm $\pm$ 3 dB					
Phase Noise	@ Freq	100Hz	1kHz	10kHz	100kHz	1MHz
	dBc/Hz	-70	-80	-85	-100	-105

### Controls, Indicators

Power	Green LED
PLL Alarm	Red LED, External contact closure
Ext 10 MHz	Yellow LED, indicates external 10 MHz reference is active

### Other

RF Connector	Type N (female), 50 $\Omega$
IF Connector	BNC (female), 50 $\Omega$
10 MHz Connectors	BNC (female), 50/75 $\Omega$
Alarm Connector	DB9 - NO or NC contact closure on Alarm
Size	19 inch, 1RU standard chassis 1.75" high X 14.0" deep
Power	100-240 $\pm$ 10% VAC, 47-63 Hz, 25 W max

### Options

Connectors	Contact Cross Sales for connector options
------------	---

\* +10°C to +40°C; Specifications subject to change without notice

# 2115-114 Block Upconverter, 11.45 - 12.25 GHz

The 2115-114 Block Upconverter converts 0.95 - 1.75 GHz to 11.45 - 12.25 GHz with a local oscillator at 10.5 GHz. Front panel LEDs provide indication of DC Power, External 10 MHz, and PLL Alarm. The L-band to RF 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, the external reference is used, and in the AUTO position, the internal reference is used unless a +3 dBm  $\pm$  3 dB, 10MHz reference signal is connected to the external reference input. The 2115 is powered by a 100-240  $\pm$  10% VAC power supply, and mounted in a 1 3/4" X 19" X 14" rack mount chassis.



## Front Panel

### Technical Specifications\*

#### Input Characteristics

Impedance/Return Loss	50 $\Omega$ / 14 dB
Frequency	0.95 to 1.7 GHz
Noise Figure, Max.	20 dB max gain
Input Level	-40 to -25 dBm
Input 1 dB compression	15 dBm

#### Output Characteristics

Impedance/Return Loss	50 $\Omega$ / 14 dB
Frequency	11.45 to 12.25 GHz
Output level Range	-20 to -5 dBm
Output 1 dB compression	+5 dBm

#### Channel Characteristics

Gain	+20 $\pm$ 1 dB, (+15 to 0 dB continuously variable with Variable Attenuator Option)
Image Rejection	> 60 dB
Spurious, Inband	SIGNAL RELATED < -60 dBc in band, 0 dBm out; SIGNAL INDEPENDENT, < -60 dBm
Spurious, Out of band	< -50 dBm
Intermodulation	< -50 dBc for two carriers each at -10 dBm out
Frequency Response	$\pm$ 1 dB, 10.95 - 11.7 GHz out; $\pm$ 0.5 dB, 40 MHz BW
Frequency Sense	Non-Inverting

#### LO Characteristics

LO Frequency	10.5 GHz
Frequency Accuracy	$\pm$ 0.01 ppm max over temp internal reference; ext. ref. input
Phase Noise	@F(Hz) >
	100Hz    1kHz    10kHz    100kHz    1MHz
	dBc/Hz         -70    -80    -85    -100    -110

10 MHz level    3 dBm,  $\pm$  3 dB, 75 ohms, External In or Internal out

#### Controls, Indicators

Power	Green LED
PLL Alarm	Red LED, External contact closure
Ext 10 MHz	Yellow LED, indicates external 10 MHz reference selected (rear panel DPDT switch)

#### Other

RF Connector	SMA/50 $\Omega$
IF Connector	BNC/50 $\Omega$
10 MHz Ref In	BNC/75 $\Omega$
10 MHz Mon Out	BNC/75 $\Omega$
Options	BNC-F/75, N-SMA/50 $\Omega$
Alarm Connector	DB9 - NO or NC contact closure on Alarm
Size	19 inch standard chassis 1.75" high X 13.75" deep
Power	100-240 $\pm$ 10% VAC, 47-63 Hz, 25 W max

#### Options

Option VA	Variable Attenuator, provides +15 to 0 dB continuously variable gain control
Connectors	Contact Cross Sales for connector option numbers

\* +10°C to +40°C; Specifications subject to change without notice

# 2115-140 Block Upconverter, L-Band to 14.0 - 14.5 GHz

The 2115-140 Block Upconverter converts 0.95 - 1.45 GHz to 14.0 - 14.5 GHz with low phase noise and flat frequency response. Frequency translation is via a 13.05 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, the external reference is used, and in the AUTO position, the internal reference is used unless a 3 dBm  $\pm$  3 dB, 10MHz reference signal is connected to the external reference input. The 2115 is powered by a 100-240  $\pm$ 10% VAC power supply, and mounted in a 1 3/4" X 19" X 14" rack mount chassis.



**Front Panel**

## Technical Specifications\*

### Input Characteristics

Impedance/Return Loss	50 $\Omega$ / 14 dB
Frequency	0.95 to 1.45 MHz
Noise Figure, Max.	20 dB (max gain)
Input Level	-40 to -20 dBm
Input 1 dB compression	-10 dBm

### Output Characteristics

Impedance/Return Loss	50 $\Omega$ / 14 dB
Frequency	14.0 to 14.5 GHz
Output level	-20 to -5 dBm
Output 1 dB compression	+10 dBm

### Channel Characteristics

Gain	+20dB $\pm$ 1 dB
Image Rejection	> 60 dB
Spurious, In band	< -60 dBC, 0 dBm out; <-60 dBm (signal independent)
Spurious, Out of band	< -50 dBm
Intermodulation	< -55 dBC for two carriers each at -10dBm out
Frequency Response	$\pm$ 1 dB, 14.0-14.5 MHz; $\pm$ 0.5 dB, 40 MHz BW
Frequency Sense	Non-Inverting

### LO Characteristics

LO Frequency	13.05 GHz
Frequency Accuracy	$\pm$ 0.01ppm max over temp internal ref
10 MHz Level In/Out	3 dBm $\pm$ 3 dB
Phase Noise	@ Freq   100Hz   1kHz   10kHz   100kHz   1MHz
	dBc/Hz   -70   -80   -90   -100   -110

### Controls, Indicators

Power	Green LED
PLL Alarm	Red LED, External contact closure
Ext 10 MHz	Yellow LED, indicates external 10 MHz reference is active

### Other

RF Connector	SMA (female), 50 $\Omega$
IF Connector	BNC (female), 50 $\Omega$
10 MHz Connectors	BNC (female), 50/75 $\Omega$
Alarm Connector	DB9 - NO or NC contact closure on Alarm
Size	19 inch, 1RU standard chassis 1.75" high X 14.0" deep
Power	100-240 $\pm$ 10% VAC, 47-63 Hz, 25 W max

### Options

Connectors	Contact Cross Sales for connector options
------------	---

\* +10°C to +40°C; Specifications subject to change without notice

# 2115-202 Block Upconverter, 19.7 - 20.2 GHz

**2115-202 Block Upconverter** - Converts 250 - 750 MHz to 18.3 - 18.8 GHz and 1650 - 2150 MHz to 19.7 - 20.2 GHz with low phase noise and flat frequency response. Frequency translation is via a 18.05 GHz local oscillator. Front panel LEDs provide indication of DC power, external 10 MHz, and PLL alarm. Gain is  $-10 \pm 3$  dB. Connectors are SMA female for the RF and BNC female for the IF and external reference input and reference output. Powered by a 100-240  $\pm 10\%$  VAC power supply; 1 3/4" X 19" X 14" rack mount chassis.



**Front Panel**

## Technical Specifications\*

### Input Characteristics

Impedance/Return Loss	50 $\Omega$ /14 dB
Frequency, Input 1	250 to 750 MHz
Frequency, Input 2	1650 to 2150 MHz
Noise Figure, Max.	20 dB max gain
Input Level	-11 to -31 dBm
Input 1 dB compression	+ 4 dBm

### Output Characteristics

Impedance/Return Loss	50 $\Omega$ /10 dB
Frequency	18.3 to 20.2 GHz
Output level Range-Comp	-11 to -31 dBm
Output level Range-Carrier	-22 to -42 dBm
Output 1 dB compression	+ 4 dBm

### Channel Characteristics

Gain	0 + 3 dB
Image Rejection	> 50 dB
Spurious, Inband	< -70 dB, min
Spurious, Out of band, LO	< -60 dBm
Intermodulation	< -50 dBc for two carriers each at -14 dBm out
Frequency Response	$\pm 2.0$ dB, 18.3 - 18.8 GHz and 19.7 - 20.2 GHz out; $\pm 1$ dB, 40 MHz BW
Frequency Sense	Non-Inverting

### LO Characteristics

LO Frequency	18.05 GHz
Frequency Accuracy	$\pm 0.01$ ppm max over temp internal reference; ext. ref. input
Phase Noise	@ Freq   100Hz   1kHz   10kHz   100kHz   1MHz
	dBc/Hz   -55   -65   -80   -100   -115

10 MHz level +3 dBm,  $\pm 3$  dB, 75 ohms, External In or Internal out

### Controls, Indicators

Power	Green LED
PLL Alarm	Red LED, External contact closure
Ext 10 MHz	Yellow LED, indicates external 10 MHz reference selected (rear panel DPDT switch)

### Other

RF Connector	SMA/50 $\Omega$
IF Connector	BNC/50 $\Omega$
10 MHz Ref In	BNC/75 $\Omega$
10 MHz Mon Out	BNC/75 $\Omega$
Options	BNC/75, F/75, N/50 $\Omega$
Alarm Connector	DB9 - NO or NC contact closure on Alarm
Size	19 inch standard chassis 1.75" high X 13.75" deep
Power	100-240 $\pm 10\%$ VAC, 47-63 Hz, 25 W max

### Options

Option VA	Variable Attenuator, provides +15 to 0 dB continuously variable gain control
Connectors	Contact Cross Sales for connector option numbers

\* +10°C to +40°C; Specifications subject to change without notice

# 2115-222 Block Upconverter, 21.35 - 22.35 GHz

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 Out and BNC female for the RF In 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  $\pm$  3 dB, 10MHz reference signal is connected to the external reference input. The 2115 is powered by a 100-240  $\pm$ 10% VAC power supply, and mounted in a 1 3/4" X 19" X 14" rack mount chassis.



**Front Panel**

## Technical Specifications\*

### Input Characteristics

Impedance/Return Loss	50 $\Omega$ /10 dB
Frequency, Input 1	2.5 to 3.5 MHz
Noise Figure, Max.	20 dB max gain
Input Level	-10 to -30 dBm
Input 1 dB compression	+4 dBm

### Output Characteristics

Impedance/Return Loss	50 $\Omega$ /10 dB
Frequency	21.35 to 22.35 GHz
Output level Range	-10 dBm to -30 dBm

### Channel Characteristics

Gain	0 $\pm$ 3 dB
Image Rejection	> 55 dB
Spurious, Inband	SIGNAL RELATED < -50 dBC in band, -10 dBm out; SIGNAL INDEPENDENT, < -70 dBm
Spurious, Out of band	< -60 dBm
Intermodulation	< -50 dBC for two carriers each at -13 dBm out
Frequency Response	$\pm$ 2.0 dB, 21.35 - 22.35 GHz out; $\pm$ 1 dB, 40 MHz BW
Frequency Sense	Non-Inverting

### LO Characteristics

LO Frequency	18.85 GHz
Frequency Accuracy	$\pm$ 0.01 ppm max over temp internal reference; external reference input
Phase Noise	@F(Hz) >   100Hz    1kHz    10kHz    100kHz    1MHz
	dBC/Hz         -55       -70       -80       -100      -115
10 MHz level	+3 dBm, $\pm$ 3 dB

### Controls, Indicators

Ext 10 MHz	Yellow LED, indicates external 10 MHz reference selected (rear panel DPDT switch)
PLL Alarm	Red LED, External contact closure
Power	Green LED

### Other

RF Out Connector	SMA (female), 50 $\Omega$
RF In Connector	BNC (female), 50 $\Omega$
10 MHz Connector	BNC (female), 75 $\Omega$ connector; Works for 50 $\Omega$ or 75 $\Omega$
Alarm Connector	DB9 - NO or NC contact closure on Alarm
Size	19 inch standard chassis 1.75" high X 13.75" deep
Power	100-240 $\pm$ 10% VAC, 47-63 Hz, 25 W max

### Available Connector Options

SN	- 50 $\Omega$ SMA (RF Out), 50 $\Omega$ N-type (RF In)
SS	- 50 $\Omega$ SMA (RF Out), 50 $\Omega$ SMA (RF In)

\*  $\pm$ 10°C to +40°C; Specifications subject to change without notice

## 2116-34 Block Downconverter, 3.4 - 4.2 GHz to L-Band

The 2116-34 Downconverter converts 3.4 - 4.2 GHz to 0.95 - 1.75 MHz with low phase noise and flat frequency response. Frequency translation is via a 5.15 GHz local oscillator. Front panel LEDs provide indication of DC Power, External 10 MHz, and PLL Alarm. The gain is +35 dB. Connectors are Type N 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  $\pm$  3 dB, 10 MHz reference signal is connected to the external reference input. The 2116 is powered by a 100-240  $\pm$ 10% VAC power supply, and mounted in a 1 3/4" X 19" X 14" rack mount chassis.



**Front Panel**

### Technical Specifications\*

#### Input Characteristics

Impedance/Return Loss	50 $\Omega$ /14 dB
Frequency	3.4 to 4.2 GHz
Noise Figure, Max.	12 dB max gain
Input Level range	-55 to -35 dBm
Input 1 dB compression	-25 dBm

#### Output Characteristics

Impedance/Return Loss	50 $\Omega$ /14 dB
Frequency	0.95 to 1.75 MHz
Output Level Range	-20 to 0 dBm
Output 1 dB compression	+10 dBm

#### Channel Characteristics

Gain	+35 dB $\pm$ 2 dB
Image Rejection	> 60 dB
Spurious, In band	< -60 dBC, 0 dBm out; < -60 dBm (signal independent)
Spurious, Out of band	< -50 dBm
Frequency Response	$\pm$ 1.5 dB, 950 - 1750 MHz out; $\pm$ 0.5 dB, 40 MHz BW
Frequency Sense	Inverting

#### LO Characteristics

LO Frequency	5.15 GHz					
Frequency Accuracy	$\pm$ 0.01 ppm max over temp internal ref					
10 MHz level In/Out	3 dBm $\pm$ 3 dB					
Phase Noise	@ Freq	100Hz	1kHz	10kHz	100kHz	1MHz
	dBC/Hz	-70	-80	-85	-100	-110

#### Controls, Indicators

Power	Green LED
Alarm	Red LED, External contact closure
Ext 10 MHz	Yellow LED, indicates external 10 MHz reference is active

#### Other

RF Connector	Type N (female), 50 $\Omega$
IF Connector	BNC (female), 50 $\Omega$
10 MHz Connectors	BNC (female), 50/75 $\Omega$
Alarm Connector	DB9 - NO or NC contact closure on Alarm
Size	19 inch standard chassis 1.75" high X 14.0" deep
Power	100-240 $\pm$ 10% VAC, 47-63 Hz, 25 W max

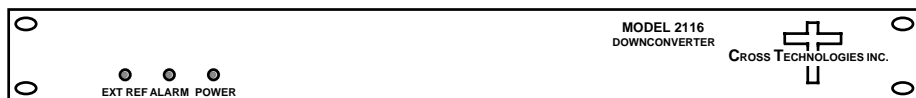
#### Options

Connectors	Contact Cross Sales for connector options
------------	---

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

## 2116-117 Block Downconverter, 11.7 - 12.75 GHz

The **2116-117 Downconverter** converts 11.7 - 12.75 GHz to 0.95 - 2.00 GHz with a local oscillator at 10.75 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  $\pm$  3 dB, 10MHz reference signal is connected to the external reference input. The 2116 is powered by a 100-240  $\pm$ 10% VAC power supply, and mounted in a 1 3/4" X 19" X 14" rack mount chassis.



**Front Panel**

### Technical Specifications\*

#### Input Characteristics

Impedance/Return Loss	50 $\Omega$ /14 dB
Frequency	11.7 to 12.75 GHz
Noise Figure, Max.	12 dB
Input Level range	-55 to -35 dBm
Input 1 dB compression	-25 dBm

#### Output Characteristics

Impedance/Return Loss	50 $\Omega$ /14 dB
Frequency	0.95 to 2.00 GHz
Output Level Range	-20 to 0 dBm

#### Channel Characteristics

Gain	+35 dB $\pm$ 2 dB
Image Rejection	> 60 dB
Spurious, In band	Signal Related < -60 dBC in band, 0 dBm out; Signal Independent) < -60 dBm
Spurious, Out of band	< -50 dBC
Intermodulation	< -55 dBC for two carriers each at -10 dBm output
Frequency Response	$\pm$ 1.5 dB, 950 - 1500 MHz out; $\pm$ 0.5 dB, 40 MHz BW
Frequency Sense	Non-inverting

#### LO Characteristics

LO Frequency	10.75 GHz					
Frequency Accuracy	$\pm$ 0.01 ppm max over temp internal reference; ext. ref. input					
10 MHz level	3 dBm, $\pm$ 3 dB 75 ohms, External in or Monitor out					
Phase Noise	@ Freq	100Hz	1kHz	10kHz	100kHz	1MHz
	dBC/Hz	-70	-80	-85	-100	-110

#### Controls, Indicators

Power	Green LED
PLL Alarm	Red LED, External contact closure
Ext 10 MHz	Yellow LED, indicates external 10 MHz reference selected (rear panel DPDT switch)

#### Other

RF Connector	SMA/50 $\Omega$
IF Connector	BNC/50 $\Omega$
10 MHz Ref. In	BNC/75 or 50 $\Omega$
10 OM Mon Out	BNC/75 or 50 $\Omega$
Options	BNC-F/75, N-SMA/50 $\Omega$
Alarm Connector	DB9 - NO or NC contact closure on Alarm
Size	19 inch standard chassis 1.75" high X 14.0" deep
Power	100-240 $\pm$ 10% VAC, 47-63 Hz, 25 W max

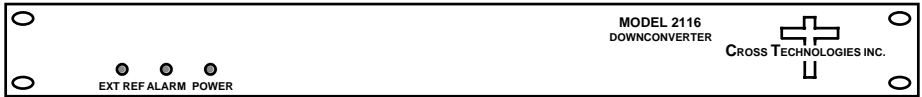
#### Options

Connectors	Contact Cross Sales for connector options
------------	---

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

# 2116-137 Block Downconverter, 13.75 - 14.5 GHz

The 2116-137 Downconverter converts 13.75 - 14.5 GHz to 0.95 - 1.70 GHz with a local oscillator at 12.8 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  $\pm$  3 dB, 10MHz reference signal is connected to the external reference input. The 2116 is powered by a 100-240  $\pm$ 10% VAC power supply, and mounted in a 1 3/4" X 19" X 14" rack mount chassis.



## Front Panel

### Technical Specifications\*

#### Input Characteristics

Impedance/Return Loss	50 $\Omega$ /14 dB
Frequency	13.75 to 14.55 GHz
Noise Figure, Max.	12 dB
Input Level range	-55 to -35 dBm
Input 1 dB compression	-25 dBm

#### Output Characteristics

Impedance/Return Loss	50 $\Omega$ /14 dB
Frequency	0.95 to 1.7 MHz
Output Level Range	-20 to 0 dBm

#### Channel Characteristics

Gain	+35 dB $\pm$ 2 dB
Image Rejection	> 60 dB
Spurious, In band	Signal Related < -60 dBC, 0 dBm out; Signal Independent < -60 dBm
Spurious, Out of band	< -50 dBm
Frequency Response	$\pm$ 1.5 dB, 950 - 1500 MHz out; $\pm$ 0.5 dB, 40 MHz BW
Frequency Sense	Non-inverting

#### LO Characteristics

LO Frequency	12.8 GHz
Frequency Accuracy	$\pm$ 0.01 ppm max over temp internal ref
10 MHz level In/Out	3 dBm $\pm$ 3 dB, 75 ohms, External contact closure
Phase Noise	@ Freq   100Hz   1kHz   10kHz   100kHz   1MHz
	dBc/Hz   -70   -80   -85   -100   -110

#### Controls, Indicators

Power	Green LED
Alarm	Red LED, External contact closure
Ext 10 MHz	Yellow LED, indicates external 10 MHz reference selected (rear panel DPDT switch)

#### Other

RF Connector	SMA/50 $\Omega$
IF Connector	BNC/50 $\Omega$
10 M Ref. In	BNC/75 $\Omega$
10M Mon Out	BNC/75 $\Omega$
Options	IF BNC-F/75, N-SMA/50, $\Omega$
Alarm Connector	DB9 - NO or NC contact closure on Alarm
Size	19 inch standard chassis 1.75" high X 14.0" deep
Power	100-240 $\pm$ 10% VAC, 47-63 Hz, 25 W max

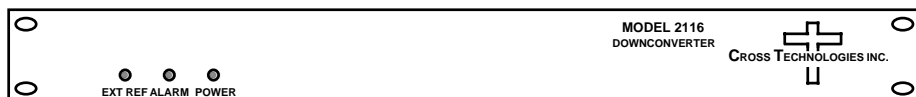
#### Options

Connectors	Contact Cross Sales for connector options
------------	---

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

## 2116-184 Block Downconverter

**2116-184 Block Downconverter** - Converts 17.3 - 18.4 GHz to 0.95 - 2.05 GHz with low phase noise and flat frequency response. Frequency translation is via a 16.35 GHz local oscillator. Front panel LEDs provide indication of DC power, external 10 MHz, and PLL alarm. The gain is +25 dB. Connectors are SMA female for the RF and BNC female for the IF and external reference input and reference output. Powered by a 100-240  $\pm$ 10% VAC power supply; 1 3/4" X 19" X 14" rack mount chassis.



### Front Panel

#### **Input Characteristics**

Impedance/Return Loss	50 $\Omega$ /14 dB
Frequency	17.3 to 18.45 GHz
Noise Figure, Max.	20 dB (max gain)
Input Level range	-55 to -35 dBm
Input 1 dB compression	-25 dBm

#### **Output Characteristics**

Impedance/Return Loss	50 $\Omega$ /14 dB
Frequency	0.95 to 2.05 GHz
Output Level Range	-30 to -10 dBm
Output 1 dB compression	0 dBm

#### **Channel Characteristics**

Gain	+25 dB $\pm$ 2 dB
Image Rejection	> 50 dB
Spurious, In band	Signal Related < -50 dBc in band, -10 dBm out; Signal Independent < -60 dBm
Spurious, Out of band	< -50 dBm
Frequency Response	$\pm$ 2.0 dB, 17.3 - 18.4 GHz out; $\pm$ 0.75 dB, 40 MHz BW
Frequency Sense	Non-inverting

#### **LO Characteristics**

LO Frequency	16.35 GHz
Frequency Accuracy	$\pm$ 0.01 ppm max over temp internal ref
10 MHz level	3 dBm $\pm$ 3 dB, 75 ohms, External in or Internal out
Phase Noise	@ Freq   100Hz   1kHz   10kHz   100kHz   1MHz
	dBc/Hz   -60   -70   -80   -100   -115

#### **Controls, Indicators**

Power	Green LED
Alarm	Red LED, External contact closure
Ext 10 MHz	Yellow LED, indicates external 10 MHz reference selected (rear panel DPDT switch)

#### **Other**

RF Connector	SMA/50 $\Omega$
IF Connector	BNC/50 $\Omega$
10 M Ref. In	BNC/75 $\Omega$
10M Mon Out	BNC/75 $\Omega$
Options	BNC-F/75, N-SMA/50, $\Omega$
Alarm Connector	DB9 - NO or NC contact closure on Alarm
Size	19 inch standard chassis 1.75" high X 14.0" deep
Power	100-240 $\pm$ 10% VAC, 47-63 Hz, 25 W max

#### **Options**

Connectors	Contact Cross Sales for connector options
------------	---

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





## Precision Frequency Sources

<b><u>MODEL</u></b>	<b><u>DESCRIPTION</u></b>	<b><u>PAGE</u></b>
2099-10	Frequency Source, Dual 10 MHz Reference	47
2099-10XX	Frequency Source, Multi-Port 10 MHz Reference	48
2099-17	Source/Inserter	49
2099-1748	Source/Inserter	50
2099-25XX	Frequency Source, Multi-Port 25 MHz Reference	51
2099-100XX	Frequency Source, Multi-Port 100 MHz Reference	52

**CONTACT US IF YOU DON'T SEE WHAT YOU NEED HERE!**

**CUSTOM PRODUCTS ARE OUR SPECIALTY!**

Current pricing for most products can be found on our website at  
**[www.crosstechnologies.com](http://www.crosstechnologies.com)**

# 2099-10 Frequency Source, 10 MHz Reference

The 2099-10 provides two 10 MHz outputs from a  $\pm 0.01$  ppm high stability oven controlled crystal oscillator. Front panel LEDs provide indication of DC power and oven warm-up. The level is +7 dBm and the 2099-10 can be specified as either 75 or 50 ohm impedance. Connectors are BNC female A relay contact closure or open indicates when the oscillator oven is stabilized. Powered by a 100-240  $\pm 10\%$  VAC power supply; 1 3/4" X 19 " X 14" rack mount chassis.



**Front Panel**

## Technical Specifications\*

### Output Characteristics

Number of Outputs	2
Impedance	50/75 $\Omega$
Return Loss	> 18 dB
Frequency	10.0000 MHz
Level	+7 to $\pm 2$ dBm
Harmonics	< -30 dBC, < -40 dBC typ.
Spurious	< -75 dBC

### Oscillator Stability

Oven Temperature	$\pm 0.01$ ppm max (0°C to +50°C)
Aging per day	$\pm 0.001$ ppm
Aging per year	$\pm 0.1$ ppm
Warm up, in 4 minutes	$\pm 0.1$ ppm
Warm up, in 1 hour	$\pm 0.01$ ppm
Mechanical adjustment	$\pm 1$ ppm

### Oscillator Phase Noise

Phase Noise	@ Freq	10Hz	100Hz	1kHz	10kHz
	dBc/Hz	-110	-140	-155	-160

### Indicators

Power	Green LED
Oven Warm-Up	Yellow LED, External contact closure

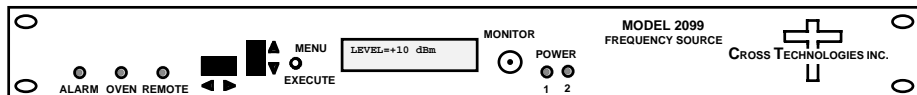
### Other

10 MHz Connectors	BNC (female), 50 and 75 $\Omega$ impedance, customer to specify on order
Alarm Connector	DB9 (female) - NO or NC contact closure on alarm
Size	19 inch standard chassis 1.75" high X 14.0" deep
Power	100-240 $\pm 10\%$ VAC, 47-63 Hz, 20 W max

\* +10°C to +40°C; Specifications subject to change without notice

# 2099-10XX Frequency Source, Multi-Port 10 MHz Reference

The Model 2099-10XX Frequency Source provides four (xx=04), eight (xx=08) or twelve (xx=12) 10MHz reference outputs from a  $\pm 0.01$  ppm high stability oven controlled crystal oscillator (OCXO). Front panel LEDs indicate alarm (red), oven warm-up (yellow), remote (yellow), and power from the two redundant power supplies (green). The output level is +13 dBm (max), and the 2099-10XX works into either a 75 $\Omega$  or 50 $\Omega$  load. An available External Reference option (Option E) provides an external reference input which can be used to lock the internal 10 MHz source to a high stability external frequency reference or it may be redistributed with an adjustable pass-through gain of -10 to +10 dB. An LCD display shows the 10MHz output level (and mode setting, lock reference frequency, and AUTO fault (Option E only)). Connectors are BNC female. A relay contact closure or open indicates when an alarm occurs. The 2099-10XX is mounted in a 1RU rack mountable chassis, and is powered by redundant power supplies fed by separate fused 100-240  $\pm 10\%$  VAC AC input connectors. An RS232/422/485 (selectable) M&C interface provides remote control of the unit.



**Front Panel**

## Technical Specifications\*

### Output Characteristics

Number of Outputs	4, 8, or 12 (plus front panel monitor)
Impedance	50 $\Omega$ /75 $\Omega$
Return Loss	> 18 dB
Frequency	10.0000 MHz
Level	-7 to +13 dBm
Harmonics	< -30 dBC, < -40 dBC typ.
Spurious	< -75 dBC

### External Reference Input Characteristics

Impedance	50 $\Omega$ /75 $\Omega$
Return Loss	> 18 dB
Level	+3 dBm $\pm$ 3 dB

### Oscillator Characteristics

Oven Temperature	$\pm 0.01$ ppm max (0°C to +50°C)				
Aging per day	$\pm 0.001$ ppm				
Aging per year	$\pm 0.1$ ppm				
Warm up, in 4 minutes	$\pm 0.1$ ppm				
Warm up, in 1 hour	$\pm 0.01$ ppm				
Mechanical adjustment	$\pm 1$ ppm				
Phase Noise	@ Freq	10Hz	100Hz	1kHz	10kHz
	dBC/Hz	-110	-140	-149	-149

### Controls, Indicators

Output Level Adjust	direct readout LCD; push-button switches or remote selection
Power	Green LEDs
Oven Warm-Up	Yellow LED
Alarm	Red LED, External contact closure
Remote	Yellow LED, RS232C/RS422/RS485

### Other

10 MHz Connectors	BNC (female), 50 $\Omega$ /75 $\Omega$ impedance
Alarm Connector	DB9 (female) - NO or NC contact closure on alarm
Size	19 inch standard chassis 1.75" high X 12.0" deep
Power	Redundant 100-240 $\pm 10\%$ VAC, 47-63 Hz, 20 W max. power supplies

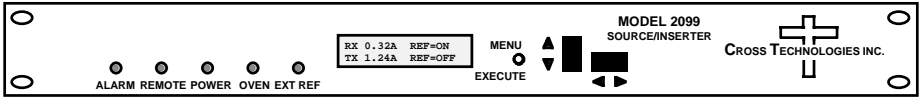
### Options

-E	External Ref. Input (includes INTERNAL, EXTERNAL LOCK, and EXTERNAL LOCK-AUTO modes)
----	--

\* +10°C to +40°C; Specifications subject to change without notice

## 2099-17 Source/Inserter

The 2099-17 10 MHz Source/Inserter is a 10 MHz,  $\pm 0.01$  ppm oven controlled crystal oscillator (OCXO) with circuitry to insert the 10 MHz signal and DC voltage on L-band lines for an LNB and SSPB. Multi-function push-button switches select internal or external 10 MHz and insertion of 10 MHz on the L-band lines. LEDs indicate DC power (green), alarm (red), remote operation (yellow), and OCXO oven warm-up (yellow). Remote control allows remote configuration of front panel commands and monitoring LNB and SSPB current. Parameter selection and LNB and SSPB current appear on the LCD display. Connectors are BNC female for RF and 10 MHz external input and output signals. LNB or SSPB +24 VDC can be inserted on the RF lines by installing the fuses. AC power is 100-240  $\pm 10\%$  VAC, 47-63 Hz. The chassis is 1 RU, 16" deep.



**Front Panel**

### Technical Specifications\*

-----10 MHz Reference-----

#### Output Characteristics (on L-band RF)

Level	+2 dBm $\pm$ 2 dB
Harmonics	<-30 dBC, <-40 dBC typ
Level to non-insert end	<-20 dBm, <-30 dBm typ

#### Input/Output Characteristics (on BNC connectors)

Impedance, Return Loss	50 $\Omega$ /75 $\Omega$ , 18 dB
Level	+3 dBm $\pm$ 3 dB
Harmonics (Output)	< -30 dBC, < -40 dBC typ.

#### 10MHz Ref Oscillator Characteristics

Stability	$\pm 0.01$ ppm max over temp.				
Aging	$\pm 0.001$ ppm per day; $\pm 0.1$ ppm per year				
Warm up	$\pm 0.1$ ppm in 4 minutes; $\pm 0.01$ ppm in 1 hour				
Tuning adjustment	$\pm 1$ ppm				
Phase Noise	@ Freq	10Hz	100Hz	1kHz	10kHz
	dBC/Hz	-110	-140	-149	-149

#### LNB, SSPB DC Power Characteristics

Voltage/Current	LNB +24VDC, 0.5A max.; SSPB +24VDC, 2.5A max. (call for others)
Load Regulation	$\pm 0.5\%$

#### Controls, Indicators

INT/EXT/Insert 10MHz	direct readout LCD; manual or remote selection
LNB,SSPB current	direct readout LCD; remote monitor
Power, Alarm, Remote	Green LED, Red LED, Yellow LED
Oven Warm-Up, Ext Ref	Yellow LED, Yellow LED
Alarm	Red LED, External contact closure
Remote	RS232C, 9600 baud (RS485 <b>option -Q</b> )

#### Other

RF Connectors	BNC (female), 50 $\Omega$ impedance
IF, 10 MHz Connectors	BNC (female), 50 $\Omega$ /75 $\Omega$ impedance
Alarm/Remote Connector	DB9 (female) - NO or NC contact closure on alarm
Size	19 inch standard chassis 1.75"high X 16.0" deep
Power	100-240 $\pm 10\%$ VAC, 47-63 Hz, 95 W max.

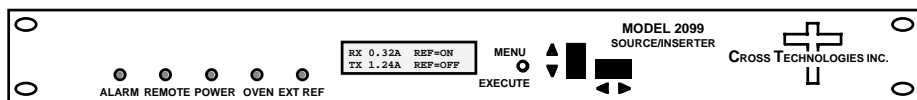
#### Options

RF Connectors	BNC 75 $\Omega$ (female) or Type F (female)
-Q	RS485 Remote Interface

\* +10°C to +40°C; Specifications subject to change without notice

## 2099-1748 10 MHz Source/Inserter

The 2099-1748 10 MHz Source / Inserter is a 10 MHz, 0.01 ppm oven controlled crystal oscillator (OCXO) with circuitry to insert the 10 MHz signal and DC voltage (PS1) on the L-band, RF1 line. A DC connector also provides 48 VDC (PS2) at up to 5 amps. A rear panel switch selects internal, external or auto10 MHz. Insertion of 10 MHz on the L-band RF1 line is always enabled. LEDs indicate DC power (green), alarm (red), External 10 MHz (yellow), and OCXO oven warm-up (yellow). A summary alarm contact closure or open on alarm is available on a terminal strip. Connectors are BNC female for RF and 10 MHz external input and output signals. +24 VDC can be inserted on the RF1 line by installing the fuse. AC power is 100-240 ±10% VAC, 47-63 Hz. The chassis is 1 RU, 15" deep.



**Front Panel**

### Technical Specifications\*

#### -----10 MHz Reference-----

##### Oscillator

Frequency	10 MHz
Stability	± 0.01 ppm max over temp
Aging, per day	± 0.001 ppm
Aging, per year	± 0.1 ppm
Warm up, 4 minutes	± 0.1 ppm
Warm up, 1 hour	± 0.01 ppm
Tuning Adjustment	± 1 ppm

##### 10MHz Ref Oscillator Characteristics

Stability	±0.01 ppm max over temp.
Aging	±0.001 ppm per day; ±0.1 ppm per year
Warm up	±0.1 ppm in 4 minutes; ±0.01 ppm in 1 hour
Tuning adjustment ± 1 ppm	

Phase Noise	@ Freq	10Hz	100Hz	1kHz	10kHz
	dBC/Hz	-110	-140	-149	-149

##### LNB, SSPB DC Power Characteristics

Voltage/Current	LNB +24VDC, 0.5A max.; SSPB +24VDC, 2.5A max. (call for others)
Load Regulation	±0.5%

##### Controls, Indicators

INT/EXT/Insert 10MHz	direct readout LCD; manual or remote selection
LNB,SSPB current	direct readout LCD; remote monitor
Power, Alarm, Remote	Green LED, Red LED, Yellow LED
Oven Warm-Up, Ext Ref	Yellow LED, Yellow LED
Alarm	Red LED, External contact closure
Remote	RS232C, 9600 baud (RS485 <b>option -Q</b> )

##### Other

RF Connectors	BNC (female), 50 Ω impedance
IF, 10 MHz Connectors	BNC (female), 50 Ω/75 Ω impedance
Alarm/Remote Connector	DB9 (female) - NO or NC contact closure on alarm
Size	19 inch standard chassis 1.75" high X 16.0" deep
Power	100-240 ±10% VAC, 47-63 Hz, 95 W max.

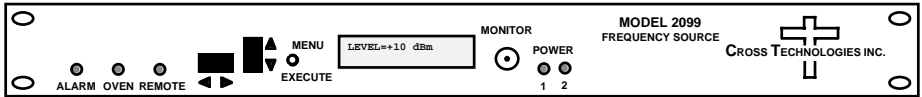
##### Options

RF Connectors	BNC 75Ω (female) or Type F (female)
-Q	RS485 Remote Interface

\* +10°C to +40°C; Specifications subject to change without notice

# 2099-25XX Frequency Source, Multi-Port 25 MHz Reference

The Model 2099-25XX Frequency Source provides four (xx=04), eight (xx=08) or twelve (xx=12) 25 MHz reference outputs from a  $\pm 0.03$  ppm high stability oven controlled crystal oscillator (OCXO). Front panel LEDs indicate alarm (red), oven warm-up (yellow), remote (yellow), and power from the two redundant power supplies (green). The output level is +13 dBm (max), and the 2099-25XX works into either a 75 $\Omega$  or 50 $\Omega$  load. An available External Reference option (Option E) provides an external reference input which can be used to lock the internal 25 MHz source to a high stability external reference. An LCD display shows the 25 MHz output level (and mode setting and lock reference frequency (Option E)). Connectors are 50/75 Ohm BNC female. A relay contact closure or open indicates when an alarm occurs. The 2099-25XX is mounted in a 1RU rack mountable chassis, and is powered by redundant power supplies fed by separate fused 100-240  $\pm 10\%$  VAC AC input connectors. An RS232/422/485 (selectable) M&C interface provides remote control of the unit.



**Front Panel**

## Technical Specifications\*

### Output Characteristics

Number of Outputs	4, 8, or 12 (plus front panel monitor)
Impedance	50 $\Omega$ /75 $\Omega$
Return Loss	> 18 dB
Frequency	25.0000 MHz
Level	-7 to +13 dBm
Harmonics	< -30 dBC, < -40 dBC typ.
Spurious	< -75 dBC

### External Reference Input Characteristics

Impedance	50 $\Omega$ /75 $\Omega$
Return Loss	> 18 dB
Level	+3 dBm $\pm$ 3 dB

### Oscillator Characteristics

Oven Temperature	$\pm 0.03$ ppm max (0°C to +50°C)										
Aging per day	$\pm 0.001$ ppm										
Aging per year	$\pm 0.1$ ppm										
Warm up, in 4 minutes	$\pm 0.1$ ppm										
Warm up, in 1 hour	$\pm 0.01$ ppm										
Mechanical adjustment	$\pm 1$ ppm										
Phase Noise	<table border="1"> <thead> <tr> <th>@ Freq</th> <th>10Hz</th> <th>100Hz</th> <th>1kHz</th> <th>10kHz</th> </tr> </thead> <tbody> <tr> <td>dBC/Hz</td> <td>-110</td> <td>-140</td> <td>-155</td> <td>-160</td> </tr> </tbody> </table>	@ Freq	10Hz	100Hz	1kHz	10kHz	dBC/Hz	-110	-140	-155	-160
@ Freq	10Hz	100Hz	1kHz	10kHz							
dBC/Hz	-110	-140	-155	-160							

### Controls, Indicators

Output Level Adjust	direct readout LCD; push-button switches or remote selection
Power	Green LEDs
Oven Warm-Up	Yellow LED
Alarm	Red LED, External contact closure
Remote	Yellow LED, RS232C/RS422/RS485

### Other

10 MHz Connectors	BNC (female), 50 $\Omega$ /75 $\Omega$ impedance
Alarm Connector	DB9 (female) - NO or NC contact closure on alarm
Size	19 inch standard chassis 1.75" high X 12.0" deep
Power	Redundant 100-240 $\pm 10\%$ VAC, 47-63 Hz, 25 W max. power supplies

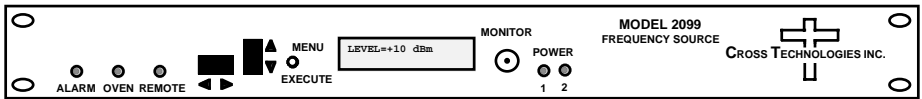
### Options

-E	External Ref. Input (includes INTERNAL, EXTERNAL LOCK, and EXTERNAL LOCK-AUTO modes)
----	--

\* +10°C to +40°C; Specifications subject to change without notice

# 2099-100XX Frequency Source, Multi-Port 100 MHz Ref.

The Model 2099-100XX Frequency Source provides four (xx=04), eight (xx=08) or twelve (xx=12) 100 MHz reference outputs from a  $\pm 0.1$  ppm high stability oven controlled crystal oscillator (OCXO). Front panel LEDs indicate alarm (red), oven warm-up (yellow), remote (yellow), and power from the two redundant power supplies (green). The output level is +7 dBm (max), and the 2099-100XX works into either a 75  $\Omega$  or 50  $\Omega$  load. An available External Reference option (Option E) provides an external reference input which can be used to lock the internal 100 MHz source to a high stability external reference. An LCD display shows the 100 MHz output level (and mode setting, gain, lock reference frequency - option E only). Connectors are 50/75 Ohm BNC female. A relay contact closure or open indicates when an alarm occurs. The 2099-100XX is mounted in a 1RU rack mountable chassis with redundant power supplies fed by separate fused 100-240  $\pm 10\%$  VAC AC input connectors and provides RS232/422/485 M&C Interface.



**Front Panel**

## Technical Specifications\*

### Output Characteristics

Number of Outputs	4, 8, or 12 (plus front panel monitor)
Impedance	50 $\Omega$ /75 $\Omega$
Return Loss	> 18 dB
Frequency	100 MHz
Level (internal ref.)	-7 to +7 dBm
Gain (external ref.)	-10 to +3 dB (option E only)
Harmonics	< -30 dBC, < -40 dBC typ.
Spurious	< -75 dBC

### External Reference Input Characteristics

Impedance	50 $\Omega$ /75 $\Omega$
Return Loss	> 18 dB
Level	+3 dBm $\pm$ 3 dB

### Oscillator Characteristics

Oven Temperature	$\pm 0.03$ ppm max (0°C to +50°C)				
Aging per day	$\pm 0.01$ ppm				
Aging per year	$\pm 0.5$ ppm				
Warm up, in 4 minutes	$\pm 1.0$ ppm				
Warm up, in 1 hour	$\pm 0.1$ ppm				
Tuning adjustment	$\pm 0.5$ ppm				
Phase Noise	@ Freq	10Hz	100Hz	1kHz	10kHz
	dBC/Hz	-90	-125	-145	-155

### Controls, Indicators

Output Level Adjust	direct readout LCD; push-button switches or remote selection
Power	Green LEDs
Oven Warm-Up	Yellow LED
Alarm	Red LED, External contact closure
Remote	Yellow LED, RS232C/RS422/RS485

### Other

100 MHz Connectors	BNC (female), 50 $\Omega$ /75 $\Omega$ impedance
Alarm Connector	DB9 (female) - NO or NC contact closure on alarm
Size	19 inch standard chassis 1.75"high X 12.0" deep
Power	Redundant 100-240 $\pm 10\%$ VAC, 47-63 Hz, 25 W max. power supplies

### Options

-E	External Reference Input (includes INTERNAL, EXTERNAL LOCK, and EXTERNAL LOCK-AUTO modes)
----	---

\* +10°C to +40°C; Specifications subject to change without notice



## RF PROTECTION SWITCHES

<b>1:1 PROTECTION SWITCHES</b>				
MODEL	PAGE/WEB	SW1 Freq	SW 2 Freq	DC PWR.
1582-22L	55	2.15 GHz	2.15 GHz	24V/2.4A or 48V/1.8A
1582-22L2	WEB	2.15 GHz (x2)	2.15 GHz (x2)	
1582-25L	56	2.5 GHz	2.5 GHz	30V/0.5A
1582-25L2	56	2.5 GHz (x2)	2.5 GHz (x2)	30V/0.5A
1582-70L	57	1.5 GHz	1.5 GHz	NA
1582-70L2	WEB	1.5 GHz (x2)	1.5 GHz (x2)	NA
1582-71	WEB	1.5 GHz	1.5 GHz	NA
1582-72	WEB	1.5 GHz	1.5 GHz	NA
1582-152	58	2.5 GHz	15 GHz	NA
1582-650	59	NA	6.5 GHz	NA
1582-652	WEB	6.5 GHz	6.5 GHz	NA
1582-654	WEB	6.5 GHz (x2)	6.5 GHz (x2)	NA
<b>1:2 PROTECTION SWITCHES</b>				
MODEL	PAGE/WEB	SW1 Freq	SW 2 Freq	Converter Type <sup>a</sup>
2582-122	60	2.2 GHz	2.2 GHz	Agile
2582-123	61	2.2 GHz	15.0 GHz	Block
2582-124	WEB	2.2 GHz	15.0 GHz	Agile
2582-126	62	15.0 GHz	15.0 GHz	Block
2582-324	WEB	2.2 GHz	15.0 GHz	Agile
<b>1:4 PROTECTION SWITCHES</b>				
MODEL	PAGE/WEB	SW1 Freq	SW 2 Freq	Converter Type <sup>a</sup>
2582-142	WEB	2.2 GHz	2.2 GHz	Agile
2582-143	WEB	2.2 GHz	15.0 GHz	Block
2582-144	WEB	2.2 GHz	15.0 GHz	Agile
2582-344	63	2.2 GHz	15.0 GHz	Agile

<sup>a</sup> 1:n Protection Switches which support Agile converters require an integrated controller which provides additional memory and logic necessary to store configuration settings for all of the attached Agile frequency converters.

1:n Protection switches which only support Block converters, do not require this additional controller and memory capability.

**CONTACT US IF YOU DON'T SEE WHAT YOU NEED HERE!  
CUSTOM PRODUCTS ARE OUR SPECIALTY!**

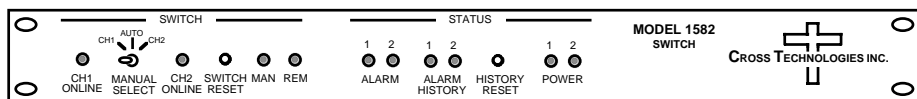
Current pricing for most products can be found on our website at  
[www.crosstechnologies.com](http://www.crosstechnologies.com)

# 1582-22L RF Switch

The 1582-22L RF Protection Switch provides Auto, Manual or Remote latched relay switching between CH1 and CH2 RF signals from .95 to 2.15 GHz including 10 MHz and DC power for attached LNB or SSPB devices. Alarm conditions on CH1 and CH2 are either a contact closure to ground or an open (selectable). The logic controls two separate RF switches. Switching logic can be selected as follows:

1. CH1 Prime Mode - Switches from CH1 to the CH2 only if CH1 alarms and CH2 is good. Switches back when CH1 no longer in alarm or both CH1 and CH2 are bad.
2. Latch to CH2 Mode - Latches to CH2 if CH1 alarms and CH2 is good. Return to CH1 only when Manual Reset switch is pushed or Remote Reset pin is grounded and if no alarm on CH1.
3. Minimum AUTO switching. Initial Channel Select (ICS) Mode - Switch stays on channel last selected by Manual or Remote selection after return to AUTO. AUTO switching occurs only if current channel alarms and other channel is clear.

When power is lost and when power is applied (as alarms at power up dictate), the selected channel remains on. The Manual Select switch and (when in AUTO) contact closures to Remote Select pins select CH1 or CH2 independent of alarms. LEDs indicate alarm and switch conditions for CH1 and CH2 and REMOTE or MANUAL operation. Redundant power supplies are provided.



**Front Panel**

## Technical Specifications\*

### Switch Characteristics

Impedance	75 $\Omega$
Type	Latching Relay
Isolation	$\geq 50$ dB, 10 to 25 MHz; 50 dB min, $\geq 55$ dB typ. 950 to 2150 MHz
Frequency Response	$\pm 0.5$ dB any 40MHz BW, 950 to 2150 MHz
Return Loss	$\geq 12$ dB, $\geq 14$ dB typ. 950 to 1500 MHz $\geq 10$ dB, $\geq 12$ dB typ. 1500 to 2150 MHz
Insertion Loss	$\leq 2$ dB, 10MHz to 25MHz; Not Specified, 26 to 800 MHz; 1.5 dB max, $\leq 1.0$ dB typ. 950 to 1500 MHz; 2.5 dB max, $\leq 2.0$ dB typ. 1500 to 2150 MHz
Configuration	DPDT
Switch time	$\leq 20$ milliseconds
DC switching	24VDC @ 2.4 Amps; 45VDC @ 1.8 Amps

### Controls and Indicators

Manual Select	Manually select CH1, CH2
SWITCH RESET	Resets to CH1 in latch mode, Also Resets REMOTE
HISTORY RESET	Resets alarm history (prior occurrence of alarms now cleared) LEDs only
LEDs	ONLINE (CH1, CH2); ALM; ALM HISTORY; PWR; MAN; REMOTE

### Other

Alarm/Remote Connector	Terminal Strip
RF Connectors	75 $\Omega$ BNC (female); 50 $\Omega$ BNC, N Connectors, Optional
Mechanical	19 inch standard chassis 1.75" high X 12" deep
Power	Redundant power supplies; 100-240 $\pm 10\%$ VAC, 47-63 Hz, 25 W max

### Options

RF Connectors	BNC 50 $\Omega$ (female) or Type N (female)
---------------	---

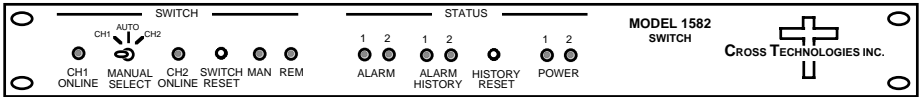
\*  $+10^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$ ; Specifications subject to change without notice

## 1582-25L RF Protection Switch

The 1582-25L,-25L2 RF Switches provide Auto or Manual latched relay switching between CH1 and CH2 IF/RF signals. Alarm conditions on CH1 and CH2 are either a contact closure to ground or an open (selectable). The 1582-25L logic controls two (2) separate RF switches, while the 1582-25L2 logic controls four (4) separate RF switches. Switching logic can be selected as follows:

1. CH1 Prime Mode - Switches from CH1 to the CH2 only if CH1 alarms and CH2 is good. Switches back when CH1 no longer in alarm or both CH1 and CH2 are bad.
2. Latch to CH2 Mode - Latches to CH2 if CH1 alarms and CH2 is good. Return to CH1 only when Manual Reset switch is pushed or Remote Reset pin is grounded and if no alarm on CH1.
3. Minimum AUTO switching. Initial Channel Select (ICS) Mode - Switch stays on channel last selected by Manual or Remote selection after return to AUTO. AUTO switching occurs only if current channel alarms and other channel is clear.

When power is lost, the selected channel remains on. The Manual Select switch and (when in AUTO) contact closures to Remote Select pins, select CH1 or CH2 independent of alarms. LEDs indicate alarm and switch conditions for CH1 and CH2 and REMOTE or MANUAL operation. Redundant power supplies provided.



**Front Panel**

### **Technical Specifications\***

#### **Switch Characteristics**

Impedance	75 $\Omega$
Type	Latching Relay
Isolation	55 dB min, $\geq$ 60 dB typ. DC to 1.5 GHz; 45 dB min, $\geq$ 50 dB typ. 1.5 to 2.5 GHz
Frequency Response	$\pm$ 0.5 dB any 40MHz BW, 950 to 2150 MHz
Return Loss	$\geq$ 12 dB, $\geq$ 14 dB typ. DC to 1.5 GHz $\geq$ 10 dB, $\geq$ 12 dB typ. 1.5 to 2.5 GHz
Insertion Loss	1.5 dB max, $\leq$ 1.0 dB typ. DC to 1.5 GHz; 2.5 dB max, $\leq$ 2.0 dB typ. 1.5 to 2.5 GHz
Configuration	DPDT (-25L), 4PDT (-25L2)
Switch time	$\leq$ 10 milliseconds
DC switching	30VDC max., 0.5 Amps max.

#### **Controls and Indicators**

Manual Select	Manually select CH1, CH2
SWITCH RESET	Resets to CH1 in latch mode, Also Resets REMOTE
HISTORY RESET	Resets alarm history (prior occurrence of alarms now cleared) LEDs only
LEDs	ONLINE (CH1, CH2); ALM; ALM HISTORY; PWR; MAN; REMOTE

#### **Other**

Alarm/Remote Connector	Terminal Strip
RF Connectors	BNC (female)
Mechanical	19 inch standard chassis 1.75"high X 12" deep
Power	Redundant power supplies; 100-240 $\pm$ 10% VAC, 47-63 Hz, 25 W max

#### **Options**

RF Connectors	BNC 50 $\Omega$ (female) or Type N (female)
---------------	---

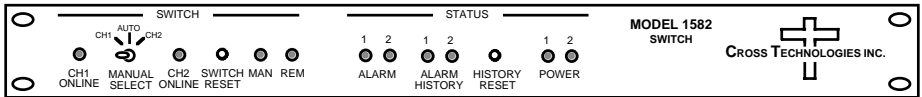
\* +10°C to +40°C; Specifications subject to change without notice

# 1582-70L RF Switch

The 1582-70L provides AUTO or Manual latched relay switching between CH1 and CH2 RF signals. Alarm conditions on CH1 and CH2 are either a contact closure to ground or an open (selectable). The logic controls two (2) separate RF switches. Switching logic can be selected as follows:

1. **CH1 Prime Mode** - Switches from CH1 to the CH2 only if CH1 alarms and CH2 is good. Switches back when CH1 no longer in alarm or both CH1 and CH2 are bad.
2. **Latch to CH2 Mode** - Latches to CH2 if CH1 alarms and CH2 is good. Return to CH1 only when Manual Reset switch is pushed or Remote Reset pin is grounded and if no alarm on CH1.
3. **Minimum AUTO switching. Initial Channel Select (ICS) Mode** - Switch stays on channel last selected by Manual or Remote selection after return to AUTO. AUTO switching occurs only if current channel alarms and other channel is clear.

When power is lost and when power is applied (as alarms at power up dictate), the selected channel remains on. The Manual Select switch and (when in AUTO) contact closures to Remote Select pins, select CH1 or CH2 independent of alarms. LEDs indicate alarm and switch conditions for CH1 and CH2 and REMOTE or MANUAL operation. Redundant power supplies provided.



**Front Panel**

## Technical Specifications\*

### Switch Characteristics

Impedance	75 $\Omega$
Type	Latching Relay
Isolation	>65 dB DC to 10 MHz >50 dB to 1.0 GHz; >40 dB to 1.5 GHz
Switch time	$\leq 10$ milliseconds
Insertion Loss	$\leq 1$ dB to 1.0 GHz; $\leq 1.5$ dB to 2.0 GHz
Configuration	DPDT

### Controls and Indicators

Manual Select	Manually select CH1, CH2
SWITCH RESET	Resets to CH1 in latch mode, Also Resets REMOTE
HISTORY RESET	Resets alarm history (prior occurrence of alarms now cleared) LEDs only
LEDs	ONLINE (CH1, CH2); ALM; ALM HISTORY; PWR; MAN; REMOTE

### Other

Alarm/Remote Connector	Terminal Strip
RF Connectors	BNC (female)
Mechanical	19 inch standard chassis 1.75" high X 12" deep
Power	Redundant power supplies; 100-240 $\pm 10\%$ VAC, 47-63 Hz, 25 W max

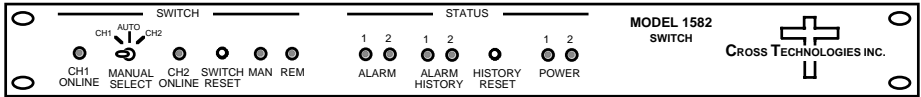
\* +10°C to +40°C; Specifications subject to change without notice

# 1582-152 IF/RF Protection Switch

The 1582-152 provides Auto, Manual or Remote relay switching between CH1 and CH2 for both IF/L-Band signals (DC to 2.5 GHz) and RF signals (DC to 15 GHz). Alarm conditions on CH1 and CH2 are either a contact closure to ground or an open (selectable). The logic controls two separate IF and RF switches, A and B. Switching logic can be selected as follows:

1. **CH1 Prime Mode** - Switches from CH1 to the CH2 only if CH1 alarms and CH2 is good. Switches back when CH1 no longer in alarm or both CH1 and CH2 are bad.
2. **Latch to CH2 Mode** - Latches to CH2 if CH1 alarms and CH2 is good. Return to CH1 only when Manual Reset switch is pushed or Remote Reset pin is grounded and if no alarm on CH1.
3. **Minimum AUTO switching, Initial Channel Select (ICS) Mode** - Switch stays on channel last selected by Manual or Remote selection after return to AUTO. AUTO switching occurs only if current channel alarms and other channel is clear.

When power is lost, CH1 is selected. The Manual Select switch and (when in AUTO) contact closures to Remote Select pins, select CH1 or CH2 independent of alarms. LEDs indicate alarm and switch conditions for CH1 and CH2 and REMOTE or MANUAL operation. The unit is housed in a 1RU x 12" deep chassis, and powered by two redundant power supplies.



## Front Panel

### Technical Specifications\*

#### IF/L-Band Switch Characteristics

Impedance / Connectors	75 $\Omega$ / BNC
Return Loss	$\geq 12$ dB, DC to 1.5 GHz $\geq 10$ dB, to 2.5 GHz
Isolation	$\geq 55$ dB, $\geq 60$ dB typ., DC to 1.5 GHz $\geq 45$ dB, $\geq 50$ dB typ., to 2.5 GHz
Switch time	$\leq 10$ milliseconds
Insertion Loss	$\leq 1.5$ dB, $\leq 1.0$ dB typ., DC to 1.5 GHz $\leq 2.5$ dB, $\leq 2.0$ dB typ., to 2.5 GHz
Type / Configuration	Relay / SPDT

#### RF Switch Characteristics

Impedance / Connectors	50 $\Omega$ / SMA
Return Loss	$\geq 18$ dB, DC to 4 GHz $\geq 15$ dB, to 8 GHz $\geq 12$ dB, to 15 GHz
Isolation	$\geq 70$ dB DC to 4 GHz $\geq 60$ dB to 8 GHz
Switch time	$\leq 10$ milliseconds
Insertion Loss	$\leq 1.0$ dB to 4 GHz; $\leq 1.5$ dB to 8 GHz $\leq 2.0$ dB to 15 GHz
Type / Configuration	RF Relay / SPDT, no termination

#### Controls and Indicators

Manual Select	Manually select CH1, CH2
SWITCH RESET	Resets to CH1 in latch mode, Also Resets REMOTE
HISTORY RESET	Resets alarm history (prior occurrence of alarms now cleared) LEDs only
LEDs (*=Closures)	ON-LINE* (CH1,CH2); ALARM; ALARM HISTORY; POWER; MANUAL*; REMOTE*

#### Other

Alarm/Control Connector	Terminal Strip
Power	Redundant power supplies; 100-240 $\pm 10\%$ VAC, 47-63 Hz, 25 W max

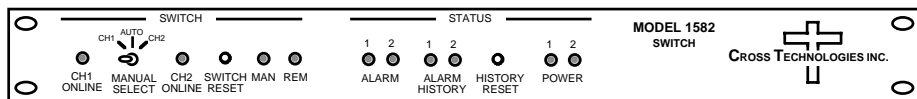
\* +10°C to +40°C; Specifications subject to change without notice

## 1582-650 RF Switch

The 1582-650 provides Auto, Manual or Remote relay switching between CH1 and CH2 RF signals. Alarm conditions on CH1 and CH2 are either a contact closure to ground or an open (selectable). The logic controls one single pole, double throw RF switch. Switching logic can be selected as follows:

1. CH1 Prime Mode - Switches from CH1 to the CH2 only if CH1 alarms and CH2 is good. Switches back when CH1 no longer in alarm or both CH1 and CH2 are bad.
2. Latch to CH2 Mode - Latches to CH2 if CH1 alarms and CH2 is good. Return to CH1 only when Manual Reset switch is pushed or Remote Reset pin is grounded and if no alarm on CH1.
3. Minimum AUTO switching, Initial Channel Select (ICS) Mode - Switch stays on channel last selected by Manual or Remote selection after return to AUTO. AUTO switching occurs only if current channel alarms and other channel is clear.

When power is lost, channel one is selected. The Manual Select switch and (when in AUTO) contact closures to Remote Select pins, select CH1 or CH2 independent of alarms. LEDs indicate alarm and switch conditions for CH1 and CH2 and REMOTE or MANUAL operation. Redundant power supplies provided.



**Front Panel**

### **Technical Specifications\***

#### **Switch Characteristics**

Impedance	50 $\Omega$ , Type N
Return Loss	> 18 dB, DC to 4 GHz > 15 dB, to 6.5 GHz
Type	RF Relay
Isolation	> 70 dB DC to 4 GHz > 60 dB to 6.5 GHz
Switch time	$\leq 10$ milliseconds
Insertion Loss	$\leq 1.0$ dB to 4.0 GHz; $\leq 1.5$ dB to 6.5 GHz
Configuration	SPDT, no termination

#### **Controls and Indicators**

Manual Select	Manually select CH1, CH2
SWITCH RESET	Resets to CH1 in latch mode, Also Resets REMOTE
HISTORY RESET	Resets alarm history (prior occurrence of alarms now cleared) LEDs only
LEDs (*=Closures)	ON-LINE* (CH1,CH2); ALARM; ALARM HISTORY; POWER; MANUAL*; REMOTE*

#### **Other**

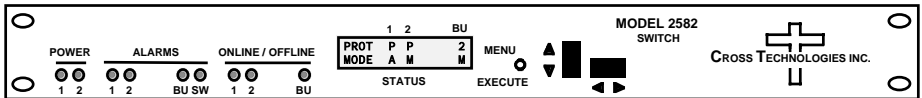
Alarm/Control Connector	Terminal Strip
RF Connector	Type N (female), 50 $\Omega$
Mechanical	19 inch standard chassis 1.75"high X 12" deep
Power	Redundant power supplies; 100-240 $\pm 10\%$ VAC, 47-63 Hz, 25 W max

\* +10°C to +40°C; Specifications subject to change without notice

# 2582-122 Switch, 1 for 2 with Backup Controller

The 2582-122 is a 1 for 2 Switch with Backup Controller for downloading and storing user variable data settings from the active, on-line agile, IF to RF frequency (to 2.2 GHz) converters and controlling the back-up frequency converter. The 2582-122 provides Auto or Manual backup protection for up to 2 up or down converters by relay switching of IF and RF from a backup unit to any of 2 on-line units. The controller in the 2582-122 monitors alarms and settings of the on-line units and sets the backup unit to the parameters of the unit being backed up prior to backing it up. The setting of on-line and backup units can be displayed on the 2582-122 display. The 2582-122 works with standard Cross L-band up and downconverters by polling their monitor and control ports on a periodic basis. Manual polling of units can be done at any time. A defective unit's inputs and outputs are switched from the failed unit to the backup when a failure occurs either automatically or manually. Individual priority levels and "on-line", "off-line" and "not used" modes can be programmed for each on-line converter. Alarms are contact closures to ground. Status of the 2582-122 is via a serial data stream and a contact closure to ground on alarm.

All settings are stored in nonvolatile ROM and on power up the 2582-122 polls all units. Manual Select is controlled by the multi-function switches on the front panel. LEDs indicate alarm and switch conditions. The unit is powered by redundant power supplies, and mounted in a 1RU rack-mount chassis.



**Front Panel**

## Technical Specifications\*

### IF / RF Switch Characteristics

Impedance	75 $\Omega$
Return Loss	$\geq 12$ dB, 0.5 to 2.2 GHz; $\geq 18$ dB, 50 to 200 MHz
Type	Relay
Isolation	$> 55$ dB, DC to 1.5 GHz; $> 50$ dB, to 2.2 GHz;
Switch time	$\leq 100$ milliseconds
Insertion Loss	$\leq 1.5$ dB, to 1.5 GHz; $\leq 2.0$ dB, to 2.2 GHz
Configuration	1 for 2, no termination

### Controls, Indicators

Manual Selection	Push-button switches
Remote Selection	RS 232C (RS 422/485, <b>option Q</b> ), 9600 baud
Power	Green LEDs
Alarms	Red LEDs
Online/Offline	Green LEDs

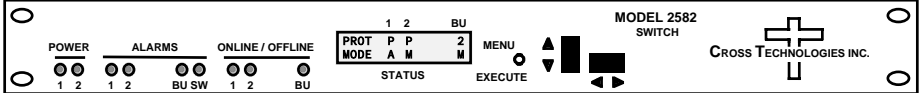
### Other

RF Connectors	Type-F (female) (Option BNC 75 or 50 Ohm)
IF Connectors	BNC (female) (Option BNC 50 Ohm)
Alarm/Remote Conn's	DB9 (female)
Size	19 inch, 1RU standard chassis,
1.75"high X 16.0" deep	
Power	100-240 $\pm 10\%$ VAC , 47-63 Hz, 25 watts max; Redundant power supplies

\*  $+10^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$ ; Specifications subject to change without notice

# 2582-123 Switch, 1 for 2

The 2582-123 1 for 2 Switch provides Auto, Remote, or Manual backup protection for up to 2 block converters by relay switching the L-Band and RF signals from a backup unit to any of the 2 online units. The 2582-123 works with standard Cross block up and downconverters by polling their monitor and control ports on a periodic basis. A defective unit's inputs and outputs are switched from the failed unit to the backup unit either automatically (when an alarm is detected from the failed unit), remotely or manually. Manual switching overrides Remote and Auto switching, while Remote switching overrides Auto switching. Manual selection is made by the front panel multi-function, push-button switches. Remote selection is made via a rear panel female DB9 connector. The 2582-123 is powered by redundant 100-240  $\pm$ 10% VAC power supplies and is housed in a 1 3/4" X 19" X 16" 1RU rack mount chassis.



**Front Panel**

## Technical Specifications\*

### L-Band Switch Characteristics

Impedance	50 $\Omega$
Return Loss	> 12 dB
Type	Relay
Isolation	> 55 dB, DC to 1.5 GHz; > 50 dB, to 2.2 GHz
Switch time	$\leq$ 100 milliseconds
Insertion Loss	$\leq$ 1.5 dB, to 1.5 GHz; $\leq$ 2.0 dB, to 2.2 GHz
Configuration	1 for 2, no termination

### RF Switch Characteristics

Impedance	50 $\Omega$
Return Loss	> 12 dB
Type	RF Transfer
Isolation	> 60 dB, to 15 GHz
Switch time	$\leq$ 100 milliseconds
Insertion Loss	$\leq$ 1.5 dB, to 8 GHz; $\leq$ 2.0 dB, to 15 GHz
Configuration	1 for 2, no termination

### Controls, Indicators

Manual Selection	Push-button switches
Remote Selection	RS 232C (RS 422/485, <b>option Q</b> ), 9600 baud
Power	Green LEDs
Alarms	Red LEDs
Online/Offline	Green LEDs

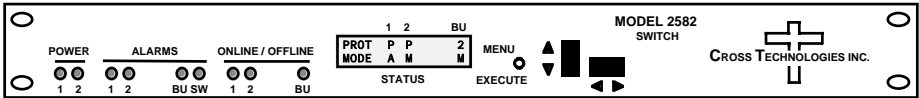
### Other

RF Connectors	SMA (female)
L-Band Connectors	BNC (female)
Alarm/Remote Connectors	DB9 (female)
Size	19 inch, 1RU standard chassis 1.75" high X 16.0" deep
Power	Redundant power supplies; 100-240 $\pm$ 10% VAC, 47 -63 Hz, 25 watts

\* +10°C to +40°C; Specifications subject to change without notice

## 2582-126 Switch, 1 for 2

The 2582-126 1 for 2 Switch provides Auto, Remote, or Manual backup protection for up to 2 block converters by using RF transfer switches (to 15 GHz) for signals from a backup unit to any of the 2 online units. The 2582-126 provides transfer switches for both the IF & RF paths and works with standard Cross block up and downconverters by polling their monitor and control ports on a periodic basis. A defective unit's inputs and outputs are switched from the failed unit to the backup unit either automatically (when an alarm is detected from the failed unit), remotely or manually. Manual switching overrides Remote and Auto switching, while Remote switching overrides Auto switching. Manual selection is made by the front panel multi-function, push-button switches. Remote selection is made via a rear panel female DB9 connector. The 2582-126 is powered by redundant 100-240  $\pm$  10% VAC power supplies and is housed in a 1 3/4" X 19" X 16" 1RU rack mount chassis.



Front Panel

### Technical Specifications\*

#### IF / RF Switch Characteristics

Impedance	50 $\Omega$
Return Loss	$\geq$ 12 dB
Type	RF Transfer
Isolation	$>$ 60 dB, to 15 GHz
Switch time	$\leq$ 100 milliseconds
Insertion Loss	$\leq$ 1.5 dB, to 8 GHz; $\leq$ 2.0 dB, to 15 GHz
Configuration	1 for 2, no termination

#### Controls, Indicators

Manual Selection	Push-button switches
Remote Selection	RS 232C (RS 422/485, <b>option Q</b> ), 9600 baud
Power	Green LEDs
Alarms	Red LEDs
Online/Offline	Green LEDs

#### Other

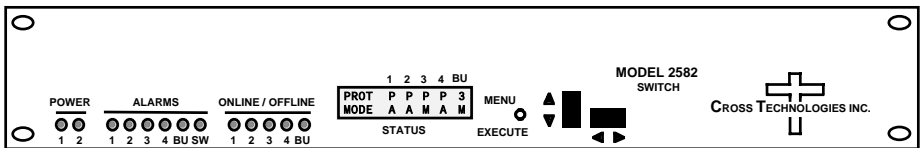
RF Connectors	SMA (female)
Alarm/Remote Conn's	DB9 (female)
Size	19 inch, 1RU standard chassis 1.75" high X 16.0" deep
Power	100-240 VAC $\pm$ 10%, 45 watts max, Redundant power supplies 25 watts max; Redundant power supplies

\* +10°C to +40°C; Specifications subject to change without notice

## 2582-344 Switch, 1 for 4

The 2582-344 1 for 4 Switch with Backup Controller provides Auto or Manual backup protection for up to 4 converters by relay switching two IF and one RF signal from a backup unit to any of 4 on-line units. The controller in the 2582-344 monitors alarms and settings of the on-line units and sets the backup unit to the parameters of the unit being backed up prior to backing it up. The setting of on-line and backup units can be displayed on the 2582-344 display. The 2582-344 works with standard Cross up and downconverters by polling their monitor and control ports on a periodic basis. Manual polling of units can be done at any time. A defective unit's inputs and outputs are switched from the failed unit to the backup when a failure occurs either automatically or manually. Individual priority levels and "on-line", "off-line" and "not used" modes can be programmed for each on-line converter. Alarms are contact closures to ground. Status of the 2582-344 is via a serial data stream and a contact closure to ground on alarm.

All settings are stored in nonvolatile ROM and on power up the 2582-344 polls all units. Manual Select is controlled by the multi-function switches on the front panel. LEDs indicate alarm and switch conditions. The unit is powered by two 100-240  $\pm$ 10% VAC redundant power supplies, and housed in a 2RU chassis.



**Front Panel**

### **Technical Specifications\***

#### **L-Band Switch Characteristics**

Impedance	50 $\Omega$
Return Loss	> 12 dB
Type	Relay
Isolation	> 55 dB, DC to 1.5 GHz; > 50 dB, to 2.2 GHz
Switch time	$\leq$ 100 milliseconds
Insertion Loss	$\leq$ 1.5 dB, to 1.5 GHz; $\leq$ 2.0 dB, to 2.2 GHz
Configuration	1 for 4, no termination

#### **RF Switch Characteristics**

Impedance	50 $\Omega$
Return Loss	> 12 dB
Type	RF Transfer
Isolation	> 60 dB, to 15 GHz
Switch time	$\leq$ 100 milliseconds
Insertion Loss	$\leq$ 1.5 dB, to 8 GHz; $\leq$ 2.0 dB, to 15 GHz
Configuration	1 for 4, no termination

#### **Controls, Indicators**

Manual Selection	Push-button switches
Remote Selection	RS 232C (RS 422/485, <b>option Q</b> ), 9600 baud
Power	Green LEDs
Alarms	Red LEDs
Online/Offline	Green LEDs

#### **Other**

RF Connectors	SMA (female)
L-Band Connectors	BNC (female)
Alarm/Remote Connectors	DB9 (female)
Size	19 inch, 1RU standard chassis 1.75" high X 16.0" deep
Power	100-240 $\pm$ 10% VAC, 25 watts max, Redundant power supplies

\* +10°C to +40°C; Specifications subject to change without notice





## **DATA, OTHER SWITCHES**

<b>MODEL NUMBER</b>	<b>PAGE# OR WEB</b>	<b>LAT-CHED?</b>	<b>DATA RATE</b>	<b>CON-NECTOR</b>	<b>PINS SWITCHED</b>	<b>PINS CON-NECTED</b>
<b>DATA SWITCHES</b>						
1582-03	67	No	128 kbps	DB9	2	5*
1582-04	67	No	128 kbps	DB9	2	5*
1582-11	68	No	512 kbps	DB9	3, 8	1,2,4,5*,6,7, 9
1582-12	68	No	512 kbps	DB9	3, 8	1,2,4,5*,6,7, 9
1582-13	68	No	512 kbps	DB9	1,2,4,6,7, 9	3, 5*, 8
1582-14	68	No	512 kbps	DB9	1,2,4,6,7, 9	3, 5*, 8
1582-42L	69	Yes	15 Mbps	DB9	1,2,4,6,7, 9	5*
1582-45L	70	Yes	1 Mbps	DB25	All 25	NONE
<b>OTHER SWITCHES</b>						
162	71	No	DC	Bar. Strip	16 ChX8 lines	N/A
2082-141	72	Yes	DC	MS	N/A	N/A
2082-142	72	Yes	DC	MS	N/A	N/A

**CONTACT US IF YOU DON'T SEE WHAT YOU NEED HERE!**  
**CUSTOM PRODUCTS ARE OUR SPECIALTY!**

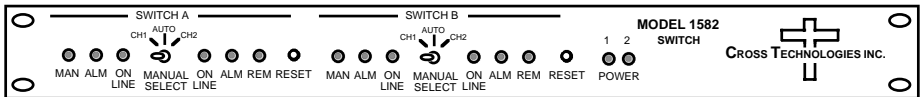
Current pricing for most products can be found on our website at  
[www.crosstechnologies.com](http://www.crosstechnologies.com)

## 1582-03, -04 Data Switch

The **1582-03** detects presence of data (on pin 2) on a main and secondary input and transfers the secondary data to the SELECTED output if data is lost for a preset 1 to 9 minutes on the primary channel or with external alarm contact closures. The **1582-04** has two switches in one chassis. Switching logic can be jumper selected as follows:

1. **CH1 Prime Mode** - Switches from CH1 to the CH2 only if CH1 alarms and CH2 is good. Switches back when CH1 no longer in alarm or both CH1 and CH2 are bad.
2. **Latch to CH2 Mode** - Latches to CH2 if CH1 alarms and CH2 is good. Return to CH1 only when Manual Reset switch is pushed or Remote Reset pin is grounded and if no alarm on CH1.
3. **Minimum AUTO switching, Initial Channel Select (ICS) Mode** - Switch stays on channel last selected by Manual or Remote selection after return to AUTO. AUTO switching occurs only if current channel alarms and other channel is clear.

If power is lost or first applied (as alarms at power up dictate), channel 1 is selected. The Manual Select switch and (when in AUTO) contact closures to Remote Select pins, select CH1 or CH2 independent of alarms. LEDs and closures indicate alarms and switch selection of CH1 or CH2 and REMOTE or MANUAL operation. Redundant power supplies.



**Front Panel**

### Technical Specifications\*

#### Data Characteristics

Input/Output	RS232C
Data rate	128 kbps max
Connector	DB9, female

#### Switch Characteristics

Type	Relay, non-blocking
Isolation	>40 dB
Switch time	≤10 milliseconds
Contact resist.	≤10Ω, < 1Ω typ
Configuration	SPDT, data pin 2
Pins switched	2
Pins connected	5 (GND)
Switch after alm	Settable for 0 to 9 min. in 1 min. increments

#### Controls and Indicators

Manual Select Switch	Switches between manual or automatic operation
LEDS	ON-LINE, ALARM (CH1 & CH2); MANUAL; REMOTE; POWER
Closures In	Alarm 1,2; Remote 1,2; Remote Reset
Closures Out	Data Alarm 1,2,1 OR 2; Remote; Manual; CH1, CH2 Selected

#### Other

Mechanical	19 inch standard chassis 1.75" high X 11.5" deep
Power	100-240 ±10% VAC, 47-63 Hz, 25 W max

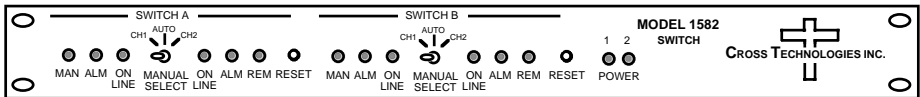
\* +10°C to +40°C; 2000 meters max elevation; 80% max humidity; Specifications may change without notice

## 1582-11, -12, -13, -14 Switch, Data, RS422

The **1582-11** and **1582-13** detect presence of clock on a main and secondary input and transfers the secondary clock to the SELECTED output if clock is lost for a preset 0.1 to 0.9 seconds on the primary channel or with contact closures. The **1582-12** and **1582-14** have two switches in one chassis. Switching logic can be selected as follows:

1. CH1 Prime Mode - Switches from CH1 to the CH2 only if CH1 alarms and CH2 is good. Switches back when CH1 no longer in alarm or both CH1 and CH2 are bad.
2. Latch to CH2 Mode - Latches to CH2 if CH1 alarms and CH2 is good. Return to CH1 only when Manual Reset switch is pushed or Remote Reset pin is grounded and if no alarm on CH1.
3. Minimum AUTO switching. Initial Channel Select (ICS) Mode - Switch stays on channel last selected by Manual or Remote selection after return to AUTO. AUTO switching occurs only if current channel alarms and other channel is clear.

If power is lost or first applied (as alarms at power up dictate), channel 1 is selected. The Manual Select switch and (when in AUTO) contact closures to Remote Select pins, select CH1 or CH2 independent of alarms. LEDs for alarm and switch conditions for CH1 and CH2 and REMOTE or MANUAL operation. Redundant power.



**Front Panel**

### **Technical Specifications\***

#### **Data Characteristics**

Input/Output	RS422 or RS232C
Data rate	512 kbps max
Connector	DB9, female

#### **Switch Characteristics**

Type, Isolation	Relay, >40 dB
Switch time	≤10 milliseconds
Contact resist.	≤10Ω, < 1Ω typ
Configuration	DPDT, clock pins
Pins switched	3, 8
Pins connected (-11, -12)	1,2,4,5(GND),6,7,9
Pins connected (-13, -14)	5(GND)
Switch after alarm	Settable for 0 to 0.9 sec. in 0.1 sec. incr.

#### **Controls and Indicators**

Manual Select	Switches between manual or automatic operation
LEDs	ON-LINE, ALARM (CH1 & CH2); MANUAL; REMOTE; POWER

#### **Other**

Mechanical	19 inch standard chassis 1.75" high X 11.5" deep
Power	100-240 ±10% VAC, 47-63 Hz, 25 W max

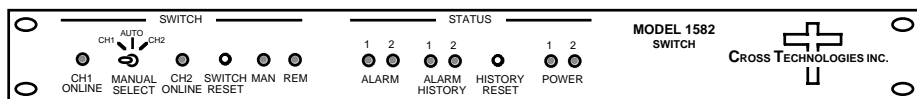
\* +10°C to +40°C; 2000 meters max elevation; 80% max humidity; Specifications may change without notice

## 1582-42L Switch, Data, RS422, 15 MB/s, Latched

Provides AUTO or Manual latched relay switching between CH1 and CH2 data signals. Alarm conditions on CH1 and CH2 are either a contact closure to ground or an open (selectable). Switching logic can be selected as follows:

1. CH1 Prime Mode - Switches from CH1 to the CH2 only if CH1 alarms and CH2 is good. Switches back when CH1 no longer in alarm or both CH1 and CH2 are bad.
2. Latch to CH2 Mode - Latches to CH2 if CH1 alarms and CH2 is good. Return to CH1 only when Manual Reset switch is pushed or Remote Reset pin is grounded and if no alarm on CH1.
3. Minimum AUTO switching. Initial Channel Select (ICS) Mode - Switch stays on channel last selected by Manual or Remote selection after return to AUTO. AUTO switching occurs only if current channel alarms and other channel is clear.

When power is lost, the selected channel remains on. The Manual Select switch and (when in AUTO) contact closures to Remote Select pins, select CH1 or CH2 independent of alarms. LEDs indicate alarm and switch conditions for CH1 and CH2 and REMOTE or MANUAL operation. Redundant power supplies provided.



**Front Panel**

### Technical Specifications\*

#### Data Characteristics

Input/Output	RS422
Data rate	15 Mbps max
Pins Switched	1,2,4,6,7,9

#### Switch Characteristics

Type	Latching Relay
Isolation	>40 dB
Switch time	≤10 milliseconds
Contact resist.	≤10Ω, < 1Ω typ
Configuration	DPDT

#### Controls and Indicators

Manual Select	Manually select CH1, CH2
SWITCH RESET	Resets to CH1 in latch mode, Also Resets REMOTE
HISTORY RESET	Resets alarm history (prior occurrence of alarms now cleared) LEDs only
LEDs	CH1, CH2 ON-LINE, ALM, ALM HISTORY, PWR; MAN; REMOTE

#### Other

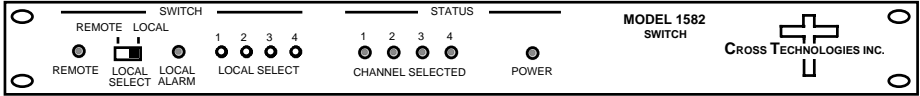
Connectors	Terminal Strip (alarms and controls), DB9, female
Mechanical	19 inch standard chassis 1.75" high X 12" deep
Power	Redundant power supplies; 100-240 ±10% VAC, 47-63 Hz, 25 W max

\* +10°C to +40°C; Specifications subject to change without notice

## 1582-45L Switch, Data, 4 to 1, Latched

The 1582-45L provides Remote or Local latched relay switching between CH1, CH2, CH3 and CH4 data signals. The maximum data rate is 1 Mbps on the clock and data lines (8 lines) and up to 56 kbps on all other lines. Remote selection of CH1 to CH4 is by a contact closure to ground of the corresponding selection pin. Local Selection overrides Remote selection commands.

On power loss the selected channel remains on. LEDs and contact closures to ground indicate the channels selected and REMOTE or LOCAL operation.



**Front Panel**

### Technical Specifications\*

#### Data Characteristics

Input/Output	RS422 or RS232
Data rate, Max.	1 Mbps on clock & data lines; up to 56 kbps on other lines
Pins Switched	All 25 pins

#### Switch Characteristics

Type	Latching Relay
Data Direction	Both ways, non-blocking
Isolation	40 dB, minimum
Switch time	10 milliseconds, max.
Contact resistance	10Ω, max., < 1Ω typ.
Configuration	25P4T

#### Controls and Indicators

LOCAL/REMOTE Switch	Slide switch selects between Local and Remote operation
LOCAL CH Select	Push button switches Locally select CH1, CH2, CH3, OR CH4
LEDs	ON-LINE (CH1, CH2, CH3, CH4); POWER; LOCAL; REMOTE

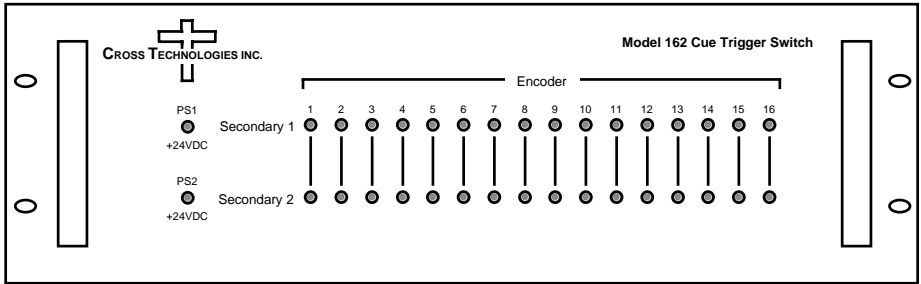
#### Other

Connectors, alarm, Data	Barrier Strip, DB25, female
Mechanical	19 inch standard chassis 1.75" high X 12" deep
Power	Single AC power supply; 100-240 ±10% VAC, 47 - 60Hz, 25 watts

\* +10°C to +40°C; Specifications subject to change without notice

# 162 Cue Trigger Switch

The 162 Cue Trigger Switch switches 8 contact closures from each of 16 on-line encoders to two separate 8 line outputs to two different secondary encoders by a closure to ground to the corresponding channel relay control input pin. High sensitivity relays are used for the switch. Connectors are terminal strip (with removable screw terminal mating connector) for inputs from on-line encoders, DB9, female, for the signal to online encoders, DB9, female, for signals to secondary encoders, and DB37, female, for switch control closures. Green LEDs indicate signals switched to secondary encoders and presence of DC power from each of the two power supplies.



**Front Panel**

## Technical Specifications\*

### Inputs

From Online Encoders	16
Closures per encoder	8
Polarity	The non-switched voltage must be > pass through out

### Outputs

To Online Encoders	16
To Secondary Encoders	2
Polarity	Positive voltage switched

### Relay Specifications (Encoder closure switch)

Contact current	500 ma, max
Contact Voltage	50 volts DC, max

### Control signal (closure to GND to switch relays)

Control current	30 ma, max
Voltage when open	25 volts DC, max

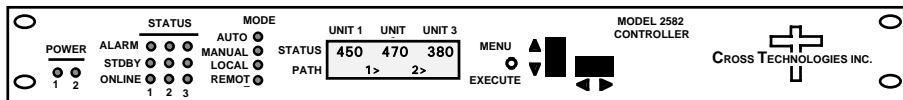
### Indicators, Other

Power	Green LED
Selection	Green LED, Channels select for 1,2
AC Power, Input	100-240 ±10% VAC, 47-63 Hz, 25 watts, max
AC Fuse	2A slow blow Type T, 5mm X 20mm
Size	19"W X 5 1/4"H X 21"D

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

## 2082-141, 142 Redundant Unit Controller

The Model 2082-141, 142 Redundant Unit Controller is used to monitor and control amplifiers (LNA, SSPA, etc.) configured in 1:1 (-141) or 1:2 (-142) redundancy. Front panel LEDs indicate power, status (online, standby, alarm), and mode (auto, manual, local, remote). Up to 600 ma is available to power each amplifier and +26 VDC is provided for 1:1 (2.5A) or 1:2 (5A) waveguide switch drive. Multi-function push button switches select Auto, Local, or Remote operation, priorities for 1:2, and the signal path in the Manual mode. Remote operation via the RS232/RS485 M&C interface allows selection of priorities (1:2) and the signal path. Contact closure to ground inputs allow selection of the signal path, Local/Remote, and Auto/Manual Modes. An LCD display shows each amplifier's current, and signal path. Form C relay contact closures indicate amplifier and power supply status, waveguide switch position, Auto, Remote, and Manual operation. Connectors are DB37 for contact closure I/Os, MS3112E16-23S for the amplifier plate signals, and DB9s for monitor and control and auxiliary external contact closure alarm inputs. The 2082-14X is housed in a 1RU chassis and is powered by redundant power supplies fed by separate, fused 100-240  $\pm$  10% VAC AC input connectors.



### Front Panels (-141, -142)

#### Technical Specifications\*

##### Switch Drive Characteristics

Fault detection time	50 ms max
Total Switchover time	100 ms max, based on switch specifications
Polarity	26 Volts, 2.5A (for-141), 5A (for 142)

##### Alarm and Control, M&C

Alarm input signal	Closure to ground indicates alarm
Alarm input voltage	+15 VDC max., can sink 20 ma max
Alarm output signal	Form C relay: 100VDC, 0.5A, 3W max
M & C Interface	RS232C or RS485, selectable
M & C Signal	9600 baud rate, no parity, 8 data bits, 1 start bit

##### Controls, Indicators

Mode Select	Local/Remote, Auto/Manual - push-button switches, contact closures, or remote selection
Power On Status	Green LEDs, (PS1, PS2), External Form C contact closure, M&C serial
Remote Select Status	Yellow LED, External Form C contact closure, M&C serial
Manual Select Status	Yellow LED, External Form C contact closure, M&C serial
Alarm Status	Red LEDs, External Form C contact closure, M&C serial (for amplifiers, Ext. and Summary alarm)

##### Connectors, Other

Parallel I/O Connector	DB37, female
Ext. Alarm	DB9 (female)
M&C Connector	DB9 (female)
Amp Plate Connector	MS3112E16-23S
Size	1 RU, 19 inch standard chassis 1.75" high X 16.0" deep
Power	Redundant 100-240 $\pm$ 10% VAC, 410-63 Hz, 100 W max. power supplies

##### Models

2082-141	1:1 Redundant Unit Controller
2082-142	1:2 Redundant Unit Controller

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



# Splitters/Combiners

<u>MODEL</u>	<u>DESCRIPTION</u>	<u>PAGE</u>
1584-XX	L-Band Splitters, LNB Voltage, Redundant Power	75
1584-XXS	L-Band Splitters, No LNB Voltage, Single Pwr Supply	76
1584-XX	L-Band Combiners	77
284-0X	L-Band Splitters, No LNB Voltage	78
284-1X	L-Band Splitters, LNB Voltage	79

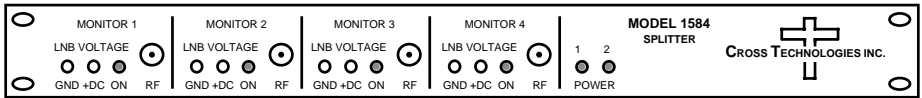
**CONTACT US IF YOU DON'T SEE WHAT YOU NEED HERE!**

**CUSTOM PRODUCTS ARE OUR SPECIALTY!**

Current pricing for most products can be found on our website at  
**[www.crosstechnologies.com](http://www.crosstechnologies.com)**

## 1584-XX Series L-Band Splitters

The Series 1584 Splitters provide numerous configurations of 950 - 2150 MHz, 0 dB gain splitters in a 1 Rack Unit chassis with redundant 100-240  $\pm 10\%$  VAC power supplies. Each splitter provides fused LNB DC power insertion, surge protection, and excellent RF characteristics. Each splitter has a monitor connector on the front panel and a number of outputs on the back panel (dependent upon the specific model). Diode OR'd + 22 VDC voltage provides separately fused power to the LNBs through DC power inserters with a surge suppressor on each LNB input. Green LEDs indicate presence of LNB power and DC voltage, and test points allow monitoring of the LNB voltage. The unit is powered by redundant power supplies.



**1584-45 Front Panel**

### **Technical Specifications\***

#### **Input Characteristics**

Input Impedance	75 $\Omega$
Return Loss	12dB min; 14dB typ
Input Level	-20 dBm total maximum

#### **Output Characteristics**

Output Impedance	75 $\Omega$
Return Loss	12dB min; 14dB typ

#### **In-Band Characteristics**

Gain	+0 dB $\pm$ 1.0 dB
Frequency Response	$\pm$ 1.0dB, 950-2150 MHz; $\pm$ 0.5dB, any 20 MHz incr.
Port to Port Isolation	> 18dB, min., 20dB typ.
Coupler to Coupler Isolation	> 35dB, min., 40dB typ

#### **Indicators**

Power	Green LEDs indicate presence of DC voltage from power supplies
LNB Voltage	Green LED indicates presence of LNB voltage on RF input center pin

#### **Other**

LNB DC voltage	22 $\pm$ 2 VDC
Output LNB current	300 ma, max., each
Surge Suppressor	SiDACTOR
RF connectors	Type F (female) - contact Cross for other options
Power	Redundant switching pwr supplies, 100-240 $\pm 10\%$ VAC, 47-63 Hz, 25 W max
Mechanical	19 inch standard chassis 1.75" high X 12" deep

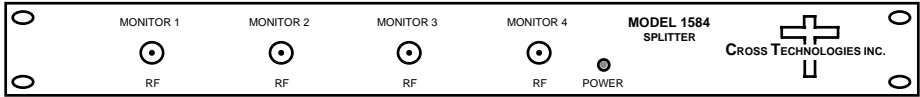
#### **Models**

1584-25	Two 4-way splitters with monitor ports
1584-29	Two 8-way splitters with monitor ports
1584-45	Four 4-way splitters with monitor ports
1584-116	One 16-way splitter with NO monitor port

\* +10°C to +40°C; 2000 meters max elevation; 80% max humidity; Specifications may change without notice

# 1584-XXS Series L-Band Splitters

The Series 1584S Splitters provide numerous configurations of 950 - 2150 MHz, 0 dB gain splitters in a 1 Rack Unit chassis. Each splitter provides surge protection and excellent RF characteristics. Each splitter has a monitor connector on the front panel and a number of outputs on the back panel (dependent upon the specific model). A green LED indicates the presence of DC voltage. The unit is powered by a single 100-240  $\pm$ 10% VAC power supply.



## 1584-45S Front Panel

### Technical Specifications\*

#### Input Characteristics

Input Impedance	75 $\Omega$
Return Loss	12dB min; 14dB typ
Input Level	-20 dBm total maximum

#### Output Characteristics

Output Impedance	75 $\Omega$
Return Loss	12dB min; 14dB typ

#### In-Band Characteristics

Gain	+0dB $\pm$ 1.0 dB
Frequency Response	$\pm$ 1.0dB, 950-2150 MHz; $\pm$ 0.5 dB, any 20 MHz incr.
Port to Port Isolation	> 18dB, min., 20dB typ.
Coupler to Coupler Isolation	> 35dB, min., 40dB typ

#### Indicators

Power	Green LED indicates presence of DC voltage from power supply
-------	--

#### Other

Surge Suppressor	SiDACTOR
RF connectors	Type F (female) - contact Cross for other options
Power	100-240 $\pm$ 10% VAC, 47-63 Hz, 25 W max
Mechanical	19 inch standard chassis 1.75"high X 12" deep

#### Models

1584-25S	Two 4-way splitters with monitor ports
1584-29S	Two 8-way splitters with monitor ports
1584-45S	Four 4-way splitters with monitor ports
1584-116S	One 16-way splitter with NO monitor port

\* +10°C to +40°C; 2000 meters max elevation; 80% max humidity; Specifications may change without notice

## 1584-XX Series L-Band Combiners

The Series 1584 Combiners provide numerous configurations of 950 - 2150 MHz, 0 dB gain combiners in a 1 Rack Unit chassis. Each combiner provides excellent RF characteristics. Each combiner has all inputs and outputs on the back panel (number is dependent upon the specific model). A green LED indicates the presence of DC voltage. The unit is powered by redundant 100-240  $\pm$ 10% VAC power supplies.



**Front Panel**

### Technical Specifications\*

#### Input Characteristics

Input Impedance	75 $\Omega$
Return Loss	10dB min; 14dB typ
Input Level	-20dBm total maximum

#### Output Characteristics

Output Impedance	75 $\Omega$
Return Loss	10dB min; 14dB typ

#### In-Band Characteristics

Gain	+0 dB $\pm$ 1.0 dB
Frequency Response	$\pm$ 1.0dB, 950-2150 MHz; $\pm$ 0.5 dB, any 20 MHz incr.
Port to Port Isolation	> 18dB, min., 20dB typ.
Coupler to Coupler Isolation	> 30dB, min., 35dB typ

#### Indicators

Power	Green LED indicates presence of DC voltage from power supply
-------	--

#### Other

Surge Suppressor	SiDACTOR
RF connectors	Type F (female) - contact Cross for other options
Power	Redundant switching pwr supplies, 100-240 $\pm$ 10% VAC, 47-63 Hz, 25 W max
Mechanical	19 inch standard chassis 1.75"high X 12" deep

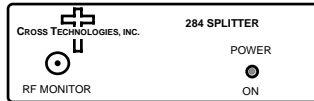
#### Models

1584-82	Two 8-way combiners
1584-161	One 16-way combiner

\* +10°C to +40°C; 2000 meters max elevation; 80% max humidity; Specifications may change without notice

## 284-0X Series L-Band Splitters

The Model 284-0X RF Splitters are four- or eight-way, 950 - 2150 MHz, 0 dB gain splitters providing excellent RF characteristics. Each splitter has a monitor connector on the front panel and four or eight outputs on the back panel. A SiDactor surge suppressor on the RF input protects against high voltage transients. On the front panel, a green LED indicates the presence of DC voltage. Up to three 284s can be mounted on an 1 3/4" X 19" rack mount panel (**option -R1, -R2, or -R3**).



**Front Panel**

### Technical Specifications\*

---

#### Input Characteristics

Input Impedance	75 $\Omega$
Return Loss	12dB min; 14dB typ
Input Level	-20 dBm max

#### Output Characteristics

Output Impedance	75 $\Omega$
Return Loss	12dB min; 14dB typ

#### In-Band Characteristics

Gain	0 dB $\pm$ 1.0 dB
Frequency Response	$\pm$ 1.0dB, 950-2150 MHz; $\pm$ 0.5dB, any 20 MHz increments
Port to Port Isolation	> 18dB min., > 20dB typ.

#### Indicators

Power	Green LED indicates DC voltage
-------	--------------------------------

#### Other

Surge Suppressor	SiDACTOR
RF connectors	Type F (female)
AC Power	100-240 $\pm$ 10% VAC, 60 Hz, 10 watts max, Wall power supply
Size, Bench Top	4.7" wide X 1.75" high X 6.5" deep
Size, Rack Mount	19 inch standard chassis 1.75"high X 7.0" deep ( <b>option -R only</b> )

#### Models

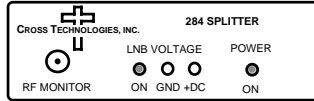
284-05	One 4-way splitter with monitor port
284-09	One 8-way splitter with monitor port

---

\* +10°C to +40°C; 2000 meters max elevation; 80% max humidity; Specifications may change without notice

## 284-1X Series L-Band Splitters

The Model 284-1X RF Splitters are single four- or eight-way, 950 - 2150 MHz, 0 dB gain splitters providing excellent RF characteristics and fused LNB DC power insertion. Each splitter has a monitor connector on the front panel and four or eight outputs on the back panel. A SiDactor surge suppressor on the LNB input protects against high voltage transients. The 284-1X splitters provide +18 VDC voltage to power the LNBs through DC power inserters. On the front panel, green LEDs indicate the presence of +18 VDC at the LNB power supply output and DC voltage test points allow monitoring the LNB voltage with a voltmeter. Up to three 284s can be mounted on an 1 3/4" X 19" rack mount panel (**option -R1, -R2, or -R3**).



**284-1X Front Panel**

### Technical Specifications\*

#### Input Characteristics

Input Impedance	75 $\Omega$
Return Loss	12dB min; 14dB typ
Input Level	-20 dBm max

#### Output Characteristics

Output Impedance	75 $\Omega$
Return Loss	12dB min; 14dB typ

#### In-Band Characteristics

Gain	0 dB $\pm$ 1.0 dB
Frequency Response	$\pm$ 1.0 dB, 950-2150 MHz; $\pm$ 0.5 dB, any 20 MHz incr.
Port to Port Isolation	> 18 dB min., > 20 dB typ.

#### Indicators

Power	Green LED indicates DC voltage
LNB Voltage	Green LED indicates power to LNB

#### Other

LNB DC voltage	18 $\pm$ 2 VDC
Output LNB current	300 ma, max.
Surge Suppressor	SiDACTOR
RF connectors	Type F (female)
AC Power	100-240 $\pm$ 10% VAC, 60 Hz, 10 watts max, Wall power supply
Size, Bench Top	4.7" wide X 1.75" high X 6.5" deep
Size, Rack Mount	19 inch standard chassis 1.75" high X 7.0" deep ( <b>option -R only</b> )

#### Models

284-15	One 4-way splitter with monitor port
284-19	One 8-way splitter with monitor port

\* +10°C to +40°C; 2000 meters max elevation; 80% max humidity; Specifications may change without notice





## TEST CONVERTERS

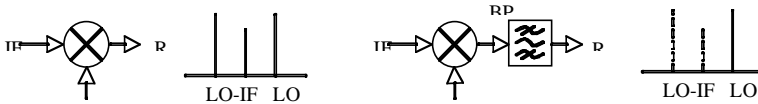
MODEL NUMBER	PAGE# OR WEB	BAND	FREQ. RANGE (GHz)	IF FREQ (MHz)	FREQ INCR (MHz)	FREQ ACCU-RACY	GAIN (dB)
<b>TEST UPCONVERTERS</b>							
<u>2003</u>	<u>WEB</u>	<u>L</u>	<u>0.95-1.45</u>	<u>70/140</u>	<u>1</u>	<u>± 25 kHz</u>	<u>-25,-45,-65</u>
<u>2004</u>	<u>85</u>	<u>L</u>	<u>0.95-2.050</u>	<u>70/140</u>	<u>1</u>	<u>± 25 kHz</u>	<u>-25,-45,-65</u>
<u>2005-02</u>	<u>86</u>	<u>L</u>	<u>0.95-2.050</u>	<u>70/140</u>	<u>1</u>	<u>± 25 kHz</u>	<u>-10, -30</u>
<u>2005-03</u>	<u>86</u>	<u>L</u>	<u>0.95-1.45</u>	<u>70/140</u>	<u>1</u>	<u>± 25 kHz</u>	<u>-10, -30</u>
<u>2005-04</u>	<u>WEB</u>	<u>L</u>	<u>0.95-2.050</u>	<u>70/140</u>	<u>1</u>	<u>± 25 kHz</u>	<u>-5</u>
<u>2005-05</u>	<u>WEB</u>	<u>L</u>	<u>0.95-1.45</u>	<u>70/140</u>	<u>1</u>	<u>± 25 kHz</u>	<u>-5</u>
<u>2006-01</u>	<u>WEB</u>	<u>L</u>	<u>1.13 LO</u>	<u>70/140</u>	<u>FIXED</u>	<u>± 100 kHz</u>	<u>-25</u>
<u>2006-02</u>	<u>WEB</u>	<u>L</u>	<u>1-1.5 LO</u>	<u>70/140</u>	<u>FIXED</u>	<u>± 100 kHz</u>	<u>-25</u>
<u>2006-03</u>	<u>WEB</u>	<u>L</u>	<u>1.13 LO</u>	<u>70/140</u>	<u>FIXED</u>	<u>± 100 kHz</u>	<u>-5</u>
<u>2006-04</u>	<u>WEB</u>	<u>L</u>	<u>1-1.5 LO</u>	<u>70/140</u>	<u>FIXED</u>	<u>± 100 kHz</u>	<u>-5</u>
<u>2006-11</u>	<u>87</u>	<u>L</u>	<u>1.13 LO</u>	<u>70/140</u>	<u>FIXED</u>	<u>± 25 kHz</u>	<u>-5, -25</u>
<u>2006-12</u>	<u>87</u>	<u>L</u>	<u>1-1.5 LO</u>	<u>70/140</u>	<u>FIXED</u>	<u>± 25 kHz</u>	<u>-5, -25</u>
<u>2004-10</u>	<u>88</u>	<u>S</u>	<u>2.0-2.4</u>	<u>70/140</u>	<u>1</u>	<u>± 10 kHz</u>	<u>-25,-45,-65</u>
<u>2005-10</u>	<u>89</u>	<u>S</u>	<u>2.0-2.4</u>	<u>70/140</u>	<u>1</u>	<u>± 10 kHz</u>	<u>-10, -30</u>
<b>TEST DOWNCONVERTERS</b>							
<u>2005-22P</u>	<u>90</u>	<u>L</u>	<u>0.95-2.05</u>	<u>70/140</u>	<u>1</u>	<u>± 25 kHz</u>	<u>-20, 0</u>
<u>2006-103</u>	<u>WEB</u>	<u>L</u>	<u>1.13 LO</u>	<u>70/140</u>	<u>FIXED</u>	<u>± 25 kHz</u>	<u>-5</u>
<u>2005-20P</u>	<u>91</u>	<u>S</u>	<u>0.95-2.150</u>	<u>140</u>	<u>1</u>	<u>± 25 kHz</u>	<u>-15, +5</u>
<u>2009-38</u>	<u>WEB</u>	<u>C</u>	<u>3.80-5.05</u>	<u>0.90-2.15</u>	<u>FIXED</u>	<u>± 4 PPM</u>	<u>-40</u>
<u>2009-59</u>	<u>92</u>	<u>C</u>	<u>5.925-6.425</u>	<u>0.95-1.45</u>	<u>FIXED</u>	<u>± 4 PPM</u>	<u>-40</u>
<u>2009-59H</u>	<u>CALL</u>	<u>C</u>	<u>5.925-6.425</u>	<u>0.95-1.45</u>	<u>FIXED</u>	<u>± 4 PPM</u>	<u>-40</u>
<u>2009-72P</u>	<u>WEB</u>	<u>X</u>	<u>7.25-7.75</u>	<u>0.95-1.45</u>	<u>FIXED</u>	<u>± 4 PPM</u>	<u>-10</u>
<u>2009-79P</u>	<u>WEB</u>	<u>X</u>	<u>7.95-8.45</u>	<u>0.95-1.45</u>	<u>FIXED</u>	<u>± 4 PPM</u>	<u>-10</u>
<u>2009-117</u>	<u>WEB</u>	<u>Ku</u>	<u>11.7-12.2</u>	<u>0.95-1.45</u>	<u>FIXED</u>	<u>± 5 PPM</u>	<u>-30</u>
<u>2009-140</u>	<u>93</u>	<u>Ku</u>	<u>14.0-14.5</u>	<u>0.95-1.45</u>	<u>FIXED</u>	<u>± 10 PPM</u>	<u>-20</u>
<b>TEST UP/DOWNCONVERTER COMBOS</b>							
<u>2017-TD02</u>	<u>WEB</u>	<u>L,L</u>	<u>0.95-2.150</u>	<u>70/140</u>	<u>1</u>	<u>± 1 PPM</u>	<u>-10 to +10</u>
<u>2017-T03</u>	<u>WEB</u>	<u>L,L</u>	<u>0.95-1.525</u>	<u>70/140</u>	<u>1</u>	<u>± 1 PPM</u>	<u>-10 to +10</u>

**CONTACT US IF YOU DON'T SEE WHAT YOU NEED HERE!  
CUSTOM PRODUCTS ARE OUR SPECIALTY!**

Current pricing for most products can be found on our website at  
[www.crosstechnologies.com](http://www.crosstechnologies.com)

## AN2006 - Using Test Up and Down Converters Some Practical Applications

**SUMMARY** - Frequency converters can be very expensive and there are situations where a much simpler and less expensive device called a test up or down converter can be used. Cross Technologies uses the term “test converter” to indicate a converter that can only be used in a loop test situation because, in that case, the purity and filtering of a regular up and down converter is often not required.



**TEST UP CONVERTER**

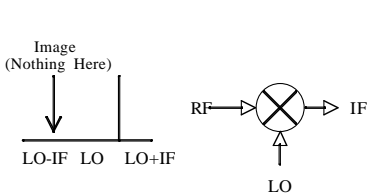
**“REGULAR” UP CONVERTER**

**Test Up Converters, Explanation and Use** - In frequency translation, the primary products of a mixer are the lower side band, the local oscillator and the upper side band (see figure 1). In a conventional up converter or down converter, the desired side band is filtered.

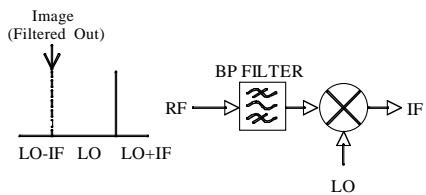
However, when converting an IF signal (at 70 or 140 MHz) to a frequency going directly into a receiver, it is not necessary to filter out all the other products because the receiver contains internal filtering that will select the desired carrier. Atypical application of this is where modulators operate at 70 MHz, but the receivers are L-band. This allows the frequency translator to be primarily a mixer and a good local oscillator frequency source, what Cross calls a test upconverter.

Cross Technologies manufactures a broad line of test up converters. For the fixed frequency 2006 series, the frequency cannot be changed which works in many applications where the receiver can be tuned to that specific frequency to test the functionality of the modulator. Cross offers two versions of agile test converters. The 2005 series uses BCD switches to adjust the frequency of the internal local oscillator. This is a good solution in cases where the frequency needs to be changed. The 2003, 2004 test converters have frequency changed by push-button tuning or remote control. This option is very useful if frequent change of the LO frequency is required such as in a production receiver test facility.

**Test Down Converter, Explanation and Use** - In a down conversion process, the mixer translates RF frequencies that are plus and minus the IF from the LO to the IF frequency. The unwanted portion of this translation is called the image frequency. In a situation where there is no image frequency, as when converting a signal from an up converter down to L-band for instance, the RF signal coming into the mixer from the up converter output is a clean signal with no energy at the image frequency. Therefore, the signal can be translated to another frequency without filtering of the signal, but just by a simple mixing process



**TEST DOWNCONVERTER**

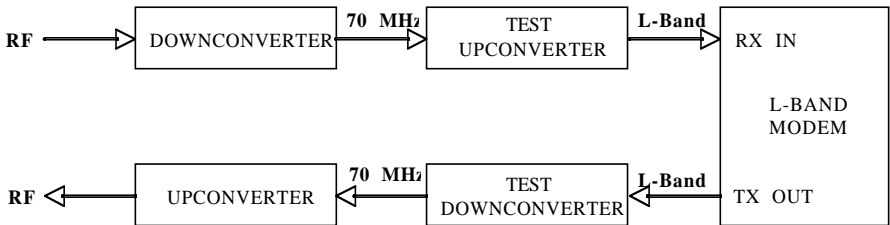


**“REGULAR” DOWNCONVERTER**

Cross Technologies' test down converters go from L-band to 70 or 140 MHz either in a fixed equivalent to the 2006 series or a BCD switch tuning version such as the 2005 series. Cross Technologies also has the series 2009 test down converter which can take the output of an up converter or power amplifier and convert it to L-band for loop testing into an L-band receiver.

**Using Test Up and Down Converters - Some Practical Applications**

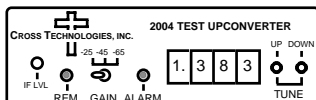
**Interfacing 70 MHz IF's to L-Band Modems** - There are some facilities that have a 70 MHz interface into the up converter and out of the down converter but need to translate these signals into L-band modems. This is an ideal application for the use of test up and down converters, either fixed or agile. The 70 MHz output out of a down converter goes into a test up converter to convert the signal to L-band for the receive side of the L-band modem. Similarly, the clean L-band output out of the L-band modem can be down converted with a test down converter to 70 MHz to go into the up converter. Since the modems can be tuned, the most economical way of doing this is using the series 2006 test up converters and down converters with fixed local oscillators. If tuning is desired, this can be accomplished with the 2005 test up converters and down converters which can also be mounted in a single RU rack panel. Due to limited gain adjustment range of the test converters, external attenuators or amplifiers may be required to provide the proper levels for the L-band modem.



**CROSS TECHNOLOGIES, INC.**  
 6170 Shiloh Road, Alpharetta, Georgia 30005  
 770-886-8005, FAX 770-886-7964  
 www.crosstechnologies.com

## 2004 Test Upconverter, 950 - 2050 MHz

The 2004 takes a 70 MHz IF signal and converts it to 950 to 2050 MHz in 1MHz steps with a high side 1020 to 2120 MHz LO. Over a limited frequency range, the 2004 also operates with a 140 MHz input (950 - 1980 MHz out with high side LO; 1160 - 2050 MHz out with low side LO) and 70 MHz in with low side LO (1090 - 2050 MHz out). The IF input is mixed with a synthesized 1020 - 2120 MHz local oscillator signal. The output frequency is selected with up and down push button switches which control the synthesized oscillator. An alarm LED lights and an open drain FET closes to ground when the PLL is unlocked. A yellow LED indicates remote operation. The mixer output goes to a switched attenuator providing IF to RF gains of -25, -45, or -65dB. Power is provided by a wall-mount power supply and connectors are BNC female. The 2004 is housed in a bench-top chassis. An optional 1RU rack mount package (**option -R**) is available.



### 2004 Test Upconverter Front Panel

#### **Technical Specifications\***

##### **Input Characteristics**

Input Impedance/RL	75 $\Omega$ /15 dB
Frequency	70 or 140 MHz center
Input Level	-20 to -10 dBm
Input 1 dB	0 dBm

##### **Output Characteristics**

Impedance/RL	75 $\Omega$ /10 dB
Frequency Band	950 -2050 MHz (70 MHz high side LO)
Level	Selectable -35 dBm, -55 dBm, or -75 dBm with -10 dBm in

##### **Channel Characteristics**

Gain	Selectable -25, -45 dB; -65 dB $\pm$ 3 dB
Spurious Response	< -40 dBC max; -45 dBC typ., Fc $\pm$ 20 MHz
Frequency Sense	Inverted (C) or Non-inverted (Ku)
Frequency Response	$\pm$ 3 dB, 950 -2050 MHz, @ -25, -45 gain; $\pm$ 0.5 dB, any 10 MHz incr.

##### **Synthesizer Characteristics**

Frequency Accuracy	$\pm$ 25 kHz max
Frequency Step	1.0 MHz minimum
Phase Noise	@ Freq   10 kHz   100 kHz   1 MHz
	dBc/Hz   - 80   -90   -100

##### **Controls**

Frequency Selection	Push button switches w/ direct frequency readout
Output Level	Potentiometer and Toggle switch

##### **Indicators**

PLL Alarm	Red LED (with FET open drain )
Remote	Yellow LED

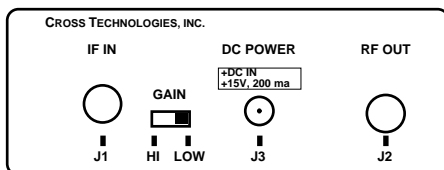
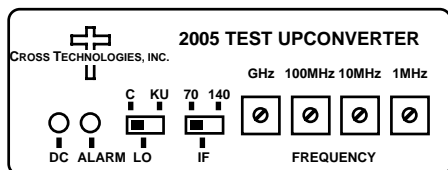
##### **Other**

RF, IF Connectors	BNC (female)
Size, Bench Top	4.7" wide X 1.75" high X 12.5" deep
Size, Rack Mount	19 inch panel 1.75" high X 13.0" deep ( <b>option -R only</b> )
Power	100-240 $\pm$ 10% VAC, 60 Hz, 20 watts max, wall power supply

\* +10°C to +40°C; Specifications subject to change without notice

## 2005-02, -03 Test Upconverter

Converts a 70 or 140 MHz IF signal to 950 to 2050 MHz (-02) or 950 to 1450 (-03) in 1 MHz steps using a synthesized 1020 to 2120 MHz (-02) or 800 to 1600 MHz (-03) local oscillator (LO) signal. Four BCD switches control the synthesized LO and the output frequency. A green LED lights when DC power is applied, and a red LED lights when a PLL alarm occurs. The mixer output is applied to the output attenuator providing a -25 dB or -5 dB gain. Power is provided by the LNB voltage from the receiver under test, and the unit is housed in a bench-top chassis. Connectors are BNC (female) for the IF input and Type F (female) for the RF output. An external power supply (**option -P**) and rack mounting (**option -R**) is available.



### 2005 Test Upconverter Front and Rear Panels

#### Technical Specifications\*

##### Input Characteristics

Input Impedance/RL	75 $\Omega$ /15 dB
Frequency	70 or 140 MHz $\pm$ 20 MHz
Input Level	-10 to -40 dBm (low gain), -25 to -40 dBm (high gain)
Input 1 dB	0/+10 dBm (low gain), -20/-10 dBm (high gain)

##### Output Characteristics

Impedance/RL	75 $\Omega$ /12 dB
Output Level	-35 to -50 dBm (low gain), -30 to -45 dBm (high gain)
Frequency Band	950 -2050 MHz (-02); 950 -1450 MHz (-03)

##### Channel Characteristics

Gain	-25, $\pm$ 3 dB (low gain); -5, $\pm$ 3 dB (high gain);
Spurious Response	< -40 dBC max; -45 dBC typ., Fc $\pm$ 20 MHz
Frequency Sense	Inverted (C) or Non-inverted (Ku)
Frequency Response -02	$\pm$ 4 dB, 950 -2050 MHz; $\pm$ 0.5 dB, any 10 MHz increment
Frequency Response -03	$\pm$ 3 dB, 950 -1450 MHz; $\pm$ 0.5 dB, any 10 MHz increment

##### Synthesizer Characteristics

Frequency Accuracy	$\pm$ 25 kHz max
Frequency Step	1.0 MHz minimum
Phase Noise	@ Freq   10 kHz   100 kHz   1 MHz
	dBc/Hz   - 80   -90   -100

##### Controls

Frequency Selection	BCD switches w/ direct frequency readout
Local Oscillator Selection	SPDT slide switch
IF Selection	SPDT slide switch

##### Indicators

DC Power	Green LED
PLL Alarm	Red LED

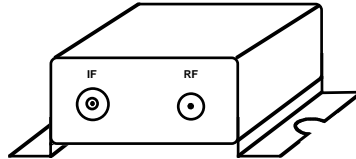
##### Other

RF Connector	Type F (female)
IF Connectors	BNC (female)
Size, Bench Top	4.7" wide X 1.75" high X 6.5" deep
Size, Rack Mount	19 inch panel 1.75" high X 7.0" deep ( <b>option -R only</b> )
Power	+14 to +20 VDC, 180 ma on RF In;
Power ( <b>option -P</b> )	+15 VDC, 180 ma, 115 VAC, wall power supply

\* +10°C to +40°C; Specifications subject to change without notice

## 2006-11, -12 Test Upconverter, Fixed Frequency

The Model 2006-11 Test Upconverter converts a 70 or 140 MHz signal to L-Band with a 1130 MHz LO frequency (-11) or to L-Band at a frequency specified at order (-12). The 70 or 140 MHz IF input signal first goes to the gain selection switch providing a gain of -5dB (high gain) or -25 dB (low gain). A green LED indicates the presence of DC power. Power is provided by the LNB voltage from the receiver under test and connectors are BNC female for the IF input and F, female for the RF output.



**2006 Test Upconverter Chassis**

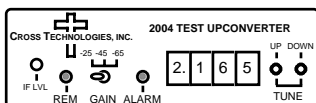
### **Technical Specifications\***

<b>Input Characteristics</b>	<b>2006-11</b>	<b>2006-12</b>
Input Impedance/RL	75 Ω /15 dB	75 Ω /15 dB
Frequency	70 or 140 MHz ± 20 MHz	70 or 140 MHz ± 20 MHz
Input Level Range	-30 to -10 dBm (low gain)	-50 to -30dBm (high gain)
Input 1 dB compression	+0 dBm	-20 dBm
<b>Output Characteristics</b>		
Impedance/RL	75 Ω/12 d	75 Ω/12 dB
Frequency, LO	1130 MHz	1020 to 1520 MHz, fixed
Frequency, Ku, 70 MHz	1200 MHz	LO + 70, +140 MHz
Frequency, C, 70 MHz	1060 MHz	LO - 70, -140 MHz
Level, with -10 dBm in	-35 dBm (low gain)	-35 dBm (low gain)
<b>Channel Characteristics</b>		
Gain	-25, ±3 dB	-25 dB ±5 dB
Spurious Response	NA; output not filtered	NA; output not filtered
Frequency Response	±0.5 dB, over 10 MHz	±0.5 dB, over 10 MHz
<b>Synthesizer Characteristics</b>		
Frequency Accuracy	± 25 kHz max	± 25 kHz max
Frequency Selection	NONE: Fixed tuned	Field changeable
Phase Noise	@ Freq   10 kHz   100 kHz	1 MHz
	dBc/Hz   - 75   -90	-105 (both models)
<b>Indicators</b>		
DC Power	Green LED	Green LED
<b>Other (Applies to both 2006-11 and 2006-12)</b>		
RF Connector	Type F (female)	
IF Connector	BNC (female)	
Size	3.4" wide X 1.2" high X 4.0" deep	
Power	+14 to +20 VDC, 150 ma on RF In;	
Power (option -P)	+15 VDC, 150 ma, 115 VAC, wall power supply	
Power (option -P4)	100-240 ±10% VAC, 47-63 Hz wall PS; Specify US, EUR, AUS, or UK	
plug		
Approvals	UL, FCC, CE (2006-11)	

\* +10°C to +40°C; 2000 meters max elevation, 80% max humidity; Pollution Degree 2; Specifications subject to change without notice.

## 2004-10 Test Upconverter, 2.0 - 2.4 GHz

The 2004-10 takes a 70 or 140 MHz IF signal and converts it to 2.0-2.4 MHz in 1MHz steps with a high or low side LO. The IF input is mixed with a synthesized 1.8 - 2.5 GHz local oscillator signal. The output frequency is selected with up and down push button switches which control the synthesized oscillator. An alarm LED lights and an open drain FET closes to ground when the PLL is unlocked. A yellow LED indicates remote operation. The mixer output goes to a switched attenuator providing IF to RF gains of -25, -45, or -65dB. Power is provided by a wall-mount power supply and connectors are BNC female. The 2004-10 is housed in a bench-top chassis. An optional 1RU rack mount package (option -R) is available.



**2004-10 Test Upconverter Front Panel**

### **Technical Specifications\***

#### **Input Characteristics**

Input Impedance/RL	75 Ω / 15 dB
Frequency	70 or 140 MHz ± 20 MHz
Input Level	-10 to -20 dBm
Input 1 dB	0 dBm

#### **Output Characteristics**

Impedance/RL	75 Ω / 10 dB
Frequency Band	2000 -2400 MHz, 70 or 140 MHz high or low side LO
Level	Selectable -35 dBm, -55 dBm, or -75 dBm with -10 dBm in

#### **Channel Characteristics**

Gain	Selectable -25, -45 ±4 dB; -65 dB ±6 dB
Spurious Response	< -40 dBC max; -45 dBC typ., Fc ± 20 MHz
Frequency Sense	Inverted (C) or Non-inverted (Ku)
Frequency Response	±4 dB, 2000 -2400 MHz, @ -25, -45 gain; ±0.7 dB, any 10 MHz

#### **Synthesizer Characteristics**

Frequency Accuracy	± 25 kHz max
Frequency Step	1.0 MHz minimum
Phase Noise	@ Freq   10 kHz    100 kHz    1 MHz
	dBc/Hz      -75        -90        -100

#### **Controls**

Frequency Selection	Push button switches w/direct frequency readout
Output Level	Potentiometer and Toggle switch

#### **Indicators**

PLL Alarm	Red LED (with FET open drain )
Remote	Yellow LED

#### **Other**

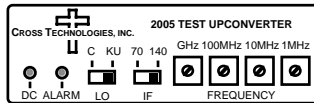
RF, IF Connectors	BNC, female
Size, Bench Top	4.7" wide X 1.75" high X 12.5" deep
Size, Rack Mount	19 inch panel 1.75" high X 13.0" deep ( <b>option -R only</b> )
Power	100-240 ±10% VAC, 60 Hz, 20 watts max, wall power supply

\* +10°C to +40°C; Specifications subject to change without notice

## 2005-10P Test Upconverter, 2.0 - 2.5 GHz

The 2005-10P Test Upconverter converts a 70 MHz or 140 MHz IF signal to 2000 to 2500 MHz in 1 MHz steps with selection of high side LO (C = inverted) or low side LO (Ku = non-inverted) and 70 or 140 MHz input over the 2.0 - 2.5 GHz range.

Featuring low phase noise, these units are used to loop 70 or 140 MHz modulators to 2.0 - 2.5 GHz receivers for test purposes. The 70 or 140 MHz carrier input is mixed with a synthesized local oscillator (LO) signal. The output frequency is selected with four BCD switches which control the synthesized LO. Front panel LEDs light when DC power is applied (green) and when a PLL alarm occurs (red). The mixer output is applied to the output attenuator providing a nominal gain of -10 dB (high gain) or -30 dB (low gain). Connectors are 50Ω BNC (female) for the IF input and for the RF output (other connector options are available). Powered by a 120VAC wall power supply (100-240 ± 10% VAC, **option -P4**). The 2005 can be mounted on a 1 3/4" X 19" rack mount panel (**option -R**).



**2005 Test Upconverter Front Panel**

### **Technical Specifications\***

#### **Input Characteristics**

Input Impedance/RL	50 Ω / 15 dB
Frequency	70 or 140 MHz ± 20 MHz
Input Level	-10 to -25 dBm (low gain), -25 to -40 dBm (high gain)
Input 1 dB compression	+0 dBm (low gain), -20 dBm (high gain)

#### **Output Characteristics**

Impedance/RL	50 Ω / 12 dB
Output Level	-40 to -55 dBm (low gain), -35 to -50 dBm (high gain)
Frequency Band	2000 to 2500 MHz

#### **Channel Characteristics**

Gain	-20, ±3 dB (low gain); 0, ±3 dB (high gain);
Spurious Response	< -40 dBC max; -45 dBC typ., Fc ± 20 MHz
Frequency Sense	Inverted (C) or Non-inverted (Ku)
Frequency Response	±4 dB, 2000-2400 MHz; ±0.5 dB, any 10 MHz increment

#### **Synthesizer Characteristics**

Frequency Accuracy	± 25 kHz max
Frequency Step	1.0 MHz minimum
Phase Noise	@ Freq   10 kHz   100 kHz   1 MHz
	dBc/Hz   - 75   -90   -105

#### **Controls**

Frequency Selection	BCD switches w/ direct frequency readout
Local Oscillator Selection	SPDT slide switch
IF Selection	SPDT slide switch

#### **Indicators**

DC Power	Green LED
Alarm	Red LED

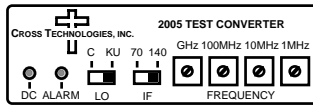
#### **Other**

RF Connector	BNC (female)
IF Connectors	BNC (female)
Size, Bench Top	4.7" wide X 1.75" high X 6.5" deep
Size, Rack Mount	19 inch panel 1.75" high X 7.0" deep ( <b>option -R only</b> )
Power	+15 VDC, 180 ma, 115 VAC, wall power supply

\* +10°C to +40°C; Specifications subject to change without notice

# 2005-22P Agile Test Downconverter, 950 - 2050 MHz

The 2005-22P converts a 950 to 2050 MHz signal to 70 MHz in 1 MHz steps with a high side 1020 to 2120 MHz LO (C, inverted spectrum) and 1070 to 2050 MHz to 70 MHz with low side 1020 to 1980 MHz LO (Ku, non-inverted spectrum). Over a limited frequency range, the 2005-22P also operates with a 140 MHz output. Featuring low phase noise, these units are used to downconvert “clean” (having only this frequency) 950 to 2050 MHz signals to 70 or 140 MHz for test purposes. The input frequency is selected with four BCD switches which control the synthesized LO. The 950 to 2050 MHz input is mixed with a synthesized local oscillator (LO) signal to the 70 or 140 MHz IF. Front panel LEDs light when DC power is applied (green) and when a PLL alarm occurs (red). The mixer output is applied to the output amplifier providing a nominal gain of +5 dB (high gain) or -15 dB (low gain). Connectors are 75 ohm BNC female for the IF output and type F, female for the RF input. DC power for the 2005-22P is provided by an external wall mount power supply. The 2005-22P can be mounted on an 1 3/4” X 19” rack mount panel (**option -R**).



**2005-22P Test Downconverter Front Panel**

## Technical Specifications\*

### Input Characteristics

Input Impedance/RL	75 Ω /12 dB
Frequency,	950 to 2050 MHz
Input Level	-10 to -30 dBm, low or high gain
Input 1 dB compression	-5 dBm

### Output Characteristics

Impedance/RL	75 Ω /15 dB
Output Level	-25 to -45 dBm (low gain), 0 to -25 dBm (high gain)
Frequency Band	70 or 140 MHz ± 20 MHz

### Channel Characteristics

Gain	-20 dB ±3 dB (low gain); 0 dB ±3 dB (high gain)
Spurious Response	< -40 dBC max; -45 dBC typ., 70 or 140 MHz ± 20 MHz
Frequency Sense	Inverted (C) or Non-inverted (Ku)
Frequency Response	±3 dB, 950 - 2050 MHz; ±0.5 dB, any 10 MHz incr.

### Synthesizer Characteristics

Frequency Accuracy	± 25 kHz max
Frequency Step	1.0 MHz minimum
Phase Noise	@ Freq   10 kHz   100 kHz   1 MHz
	dBc/Hz   -75   -90   -105

### Controls

Frequency Selection	BCD switches w/ direct frequency readout
LO, IF Selection	SPDT slide switch

### Indicators

DC Power	Green LED
PLL Alarm	Red LED

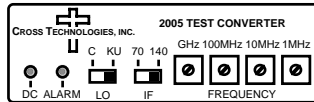
### Other

RF Connector	Type F (female)
IF Connector	BNC (female)
Size, Bench Top	4.7” wide X 1.75” high X 6.5” deep
Size, Rack Mount	19 inch panel 1.75” high X 7.0” deep ( <b>option -R only</b> )
Power	120 ± 10% VAC, 60 Hz, 10W max, wall power supply; + 15VDC 600 max.

\* +10°C to +40°C; Specifications subject to change without notice

## 2005-20P Test Downconverter, 2.0 - 2.5 GHz

The 2005-20P converts a 2000 to 2500 MHz signal to 70 MHz in 1 MHz steps with a high side 2070 to 2570 MHz LO (C, inverted spectrum) and 70 MHz with low side 1930 to 2430 MHz LO (Ku, non-inverted spectrum). Over a limited frequency range, the 2005-20P also operates with a 140 MHz output. Featuring low phase noise, these units are used to downconvert “clean” (having only this frequency) 2.0 to 2.5 GHz signals to 70 or 140 MHz for test purposes. The input frequency is selected with four BCD switches which control the synthesized LO. The 2.0 to 2.5 GHz input is mixed with a synthesized local oscillator (LO) signal to the 70 or 140 MHz IF. Front panel LEDs light when DC power is applied (green) and when a PLL alarm occurs (red). The mixer output is applied to the output amplifier providing a nominal gain of +5 dB (high gain) or -15 dB (low gain). Connectors are 50 ohm BNC female for the IF output and the RF input. DC power for the 2005-20P is provided by an external wall mount power supply. The 2005-20P can be mounted on an optional 1 3/4” X 19” rack mount panel (**option -R**).



**2005-20P Test Downconverter Front Panel**

### Technical Specifications\*

#### Input Characteristics

Input Impedance/RL	50 Ω /12 dB
Frequency, center	950 to 2050 MHz
Input Level	-10 to -30 dBm, low or high gain
Input 1 dB compression	-5 dBm

#### Output Characteristics

Impedance/RL	50 Ω /15 dB
Output Level	-25 to -45 dBm (low gain), -5 to -25 dBm (high gain)
Frequency Band	70 or 140 MHz, ± 20 MHz

#### Channel Characteristics

Gain	-15 dB ±3 dB (low gain); +5 dB ±3 dB (high gain)
Spurious Response	< -40 dBC max; -45 dBC typ., 70 or 140 MHz ± 20 MHz
Frequency Sense	Inverted (C) or Non-inverted (Ku)
Frequency Response	±2 dB, 2.0-2.5 GHz; ±0.5 dB, any 10 MHz incr.

#### Synthesizer Characteristics

Frequency Accuracy	± 25 kHz max
Frequency Step	1.0 MHz minimum
Phase Noise	@ Freq    10 kHz    100 kHz    1 MHz
	dBc/Hz    - 75        -90        -105

#### Controls

Frequency Selection	BCD switches w/ direct frequency readout
LO, IF Selection	SPDT slide switch

#### Indicators

DC Power	Green LED
PLL Alarm	Red LED

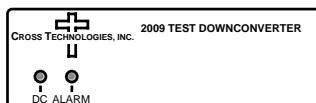
#### Other

RF, IF Connectors	BNC (female)
Size, Bench Top	4.7” wide X 1.75” high X 6.5” deep
Size, Rack Mount	19 inch panel 1.75” high X 7.0” deep ( <b>option -R only</b> )
Power	120 ± 10% VAC, 60 Hz, 10W max, wall pwr supply; +15VDC 600 max.

\* +10°C to +40°C; Specifications subject to change without notice

## 2009-59 Test Downconverter, 5.925 - 6.425 GHz

The 2009-59 Test Downconverter converts a 5.925 - 6.425 GHz signal to 950 - 1450 MHz with a high side local oscillator (LO) (inverted spectrum). With low phase noise, this unit down converts “clean” (having only this frequency) 5.925 - 6.425 GHz signals to 950 - 1450 MHz for test purposes. The 5.925 - 6.425 GHz input is mixed with a synthesized local oscillator (LO) signal to 950 - 1450 MHz. The mixer output goes to the output attenuator providing a nominal gain of -40 dB. Connectors are 75 ohm F female for the 950 - 1450 MHz output and 50 ohm N, female for the RF input. Front panel LEDs show DC power is applied (green) and if a PLL alarm occurs (red). DC power is provided by the LNB voltage from the receiver under test or by an external wall mount power supply (**options -P and -P4**). **Option -C** has no power supply and is powered by an external power supply like the 2000-01. The 2009 can be mounted on an 1 3/4” X 19” rack mount panel (option -R). Models with **option -H** operate over an extended -20°C +60°C temperature range.



**2009-59 Test Downconverter Front Panel**

### **Technical Specifications\***

---

#### **Input Characteristics**

Input Impedance/RL	50 $\Omega$ /12 dB
Frequency	5.925 to 6.425 GHz
Input Level	-10 to +15 dBm
Input 1 dB compression	+20 dBm

#### **Output Characteristics**

Impedance/RL	75 $\Omega$ /12 dB
Frequency Band	950 to 1450 MHz

#### **Channel Characteristics**

Gain at band center	-40 dB $\pm$ 2 dB - Contact Cross for other gain requirements
Spectrum Sense	Inverting
Spurious Response	<-40 dBc, 950-1450 MHz out
Frequency Response	$\pm$ 2 dB, 950 -1450 MHz; $\pm$ 0.5 dB, any 10 MHz increment

#### **Synthesizer Characteristics**

Frequency Accuracy	$\pm$ 4ppm max
LO Frequency	7.375 GHz
Phase Noise	@ Freq    1 kHz    10 kHz    100 kHz    1 MHz dBc/Hz    - 80       -90       -95       -110

#### **Indicators**

DC Power	Green LED
Alarm	Red LED

#### **Other**

RF In, RF Out Connectors	Type N, female, Type F, female
Size, Bench Top	4.7” wide X 1.75” high X 6.5” deep
Size, Rack Mount	19 inch standard chassis 1.75”high X 7.0” deep ( <b>option -R only</b> )
Power	+16 to +20 VDC, 250 ma on RF (from RX LNB)
Power ( <b>option -P</b> )	120 $\pm$ 10% VAC, 60 Hz, 15 watts max, wall mt PS

#### **Options**

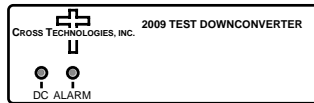
-P	120 VAC Wall Power Supply
-P4	100-240 $\pm$ 10% VAC Wall Power Supply
-H	Operates over an extended -20°C to +60°C temp range

---

\* +10°C to +40°C; 2000 meters max elevation, 80% max humidity;  
Specifications subject to change without notice.

# 2009-140 Test Downconverter, 14.0 - 14.5 GHz

The 2009-140 converts a 14.0 - 14.5 GHz signal to 950 - 1450 MHz with a low-side local oscillator (LO - non-inverted spectrum). Featuring low phase noise, this unit is used to downconvert “clean” (having only this frequency) 14.0 - 14.5 GHz signals to 950 to 1450 MHz for test purposes. The 14.0 - 14.5 GHz input is mixed with a synthesized local oscillator (LO) signal to 950 to 1450 MHz. The mixer output is applied to the output amplifier providing a nominal gain of -20 dB. Connectors are 75 ohm Type F (female) for the 950 - 1450 MHz output and 50 ohm Type N (female) for the RF input. Front panel LEDs light when DC power is applied (green) and when a PLL alarm occurs (red). DC power is provided by the LNB voltage from the receiver under test or by an optional external 115 VAC, 60 Hz wall mount power supply (**option -P**). A rack mount option is also available (**option -R**).



**2009-140 Test Downconverter Front Panel**

## Technical Specifications\*

### Input Characteristics

Input Impedance/RL	50 $\Omega$ /12 dB
Frequency	14.0 to 14.5 GHz
Input Level	0 to -15 dBm
Input 1 dB compression	+5 dBm

### Output Characteristics

Impedance/RL	75 $\Omega$ /12 dB
Frequency Band	950 to 1450 MHz

### Channel Characteristics

Gain at band center	-20 dB $\pm$ 2 dB - Contact Cross for other gain requirements
Spectrum Sense	Non-inverting
Spurious Response	<-40 dBc, 950-1450 MHz out
Frequency Response	$\pm$ 2 dB, 950 -1450 MHz; $\pm$ 0.5 dB, any 10 MHz increment

### Synthesizer Characteristics

Frequency Accuracy	$\pm$ 10ppm max
LO Frequency	13.05 GHz
Phase Noise	@ Freq    10 kHz    100 kHz    1 MHz dBc/Hz    - 70        -85        -95

### Indicators

DC Power	Green LED
Alarm	Red LED

### Other

RF In,	Type N (female), 50 $\Omega$
RF Out Connectors	Type F (female)
Size, Bench Top	4.7" wide X 1.75" high X 6.5" deep
Size, Rack Mount	19 inch standard chassis 1.75" high X 7.0" deep ( <b>option -R only</b> )
Power	+16 to +20 VDC, 250 ma on RF Out (from RX LNB)
Power ( <b>option -P</b> )	100-240 $\pm$ 10% VAC, 60 Hz, 15 watts max, wall mt PS
Power ( <b>option -P4</b> )	100-240 $\pm$ 10% VAC, 47-63 Hz, 15 watts max, wall mt PS

### Options

-P	120 VAC Wall Power Supply
-P4	100-240 $\pm$ 10% VAC Wall Power Supply
-H	Operates over an extended -20°C to +60°C temp range

\* +10°C to +40°C; 2000 meters max elevation, 80% max humidity; Specifications subject to change without notice.





## SUBCARRIER PRODUCTS - DATA SHEETS ON WEB

MODEL NUMBER TX	MODEL NUMBER RX	PEAK DEV. (kHz)	CH. SPACING (kHz)	EMPH-ASIS	FREQ. OR DATA TO:	TUNING
455T	455R	75	280 or 600	None	120 KHZ	Synth, Agile
2455T	2455R	75	600	None	120 KHZ	Fixed, Xtal
2779-01	2710-01	150	400	75, J17opt.	15 KHZ	Fixed, Xtal
2779-02	2710-02	75	250	75, J17opt.	15 KHZ	Fixed, Xtal
2779-03	2710-03	50	180	75, J17opt.	15 KHZ	Fixed, Xtal
2720-01T	2720-0XR	FSK	45	FSK	19.2 kB/s	Fixed, Xtal

### SUBCARRIER PRODUCT SUMMARY

\*\*\* AUDIO \*\*\*

**Wideband, 15 kHz** - For Microwave, STL, and Satellite

**2779-01, 2710-01** - Single (Dual available), Crystal, fixed, 5.4 to 8.5 MHz

**Narrowband, 15 kHz** - For Microwave, STL, and Satellite

**2779-02, 2710-02** - Single (Dual available), Crystal, fixed, 5.4 to 8.5 MHz

**2779-03, 2710-03** - Single (Dual available), Crystal, fixed, 5.4 to 8.5 MHz

**Ultra Wideband, 120 kHz** - For Microwave, STL (for MTS/BTSC composite)

**455** - Single channel, synthesized 1 to 9.99 MHz

**2455** - Single channel, Crystal, fixed, 5.4 to 8.5 MHz

\*\*\* FSK DATA - Async or Synch to 19.2 kBps, Narrowband

**2720-XX** - Subcarrier FSK Data System

**(Please see Cross Website for Data Sheets)**

**CONTACT US IF YOU DON'T SEE WHAT YOU NEED HERE!**

**CUSTOM PRODUCTS ARE OUR SPECIALTY!**

Current pricing for most products can be found on our website at  
[www.crosstechnologies.com](http://www.crosstechnologies.com)



# Other Products

<b><u>MODEL</u></b>	<b><u>DESCRIPTION</u></b>	<b><u>PAGE</u></b>
	2000 Series Rack Adapters	99
1200-03	IF Processor	100
1200-07	IF AGC Amplifier, -35 dBm Output	101
1200-08	IF AGC Amplifier, 0 to +10 dBm Output	102
1200-88	IF Amplifier, Dual	103
1583-09	Data Splitter	104
1586-06	Programmable RF Attenuators, 6-12 GHz	105
2000-01	Power Supply, $\pm 15$ VDC	106
2000-02	Power Supply, +18 VDC	107
2000-2XX	LNB Power Supply	108
2000-3XX	SSPB Power Supply	109
2007	Noise Source, 70 MHz	110
2098-007	Frequency Source, 70 MHz	111

**CONTACT US IF YOU DON'T SEE WHAT YOU NEED HERE!**

**CUSTOM PRODUCTS ARE OUR SPECIALTY!**

Current pricing for most products can be found on our website at  
**[www.crosstechnologies.com](http://www.crosstechnologies.com)**

## 2000 Series Rack Adapters

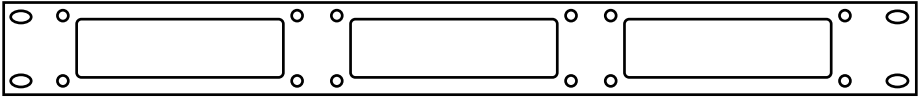
The Series 2000 bench top products can be mounted on 1 3/4" panels for rack mounting. To order this add a "R" to the model number (2004R is the rack mount version of the 2004). Although the standard rack mount configuration is one unit in a 1 3/4" rack space (**Option -R**), two (**Option -R2**) and three (**Option -R3**) of the Series 2000 products can also be mounted on a single panel (see below). Contact Cross to specify this when ordering the rack mount option.



-R



-R2

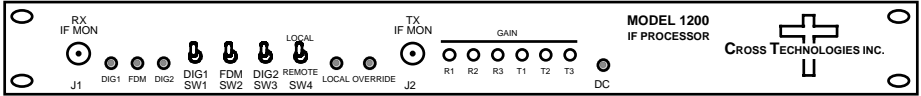


-R3

## 2000 Series Rack Adapters

# 1200-03 IF Processor

The 1200-03 IF Processor consists of a transmit and receive side. The receive side consists of one receive IF signal going through an Automatic Gain Control (AGC) amplifier and then split into three signals, each adjustable over a 30 dB output range via front panel multi-turn potentiometers. The AGC amplifier provides gain for an IF signal to amplify a -80 to 0 dBm input level to a -35 dBm  $\pm$  10 dB output. The transmit side consists of three transmit IF signals combined into one. Each of these three signals pass through individual attenuators controlled via front panel multi-turn potentiometers and a switch that is controlled remotely through a DB9 connector or locally with three 2PDT switches located on the front panel. A 2PDT switch on the front panel selects either REMOTE or LOCAL operation. A local override feature is included such that when the REMOTE/LOCAL 2PDT switch is left in the LOCAL position, the user can remotely override this switch allowing for REMOTE control.



**Front Panel**

## Technical Specifications\*

### RX Input Characteristics-RX

Impedance/RL	50 $\Omega$ /18 dB
Frequency	50 to 90 MHz
Input Level range/1dB	0 to -80 dBm / +5 dBm

### RX Output Characteristics

Output Impedance/RL	FDMRX 50 $\Omega$ /18 dB; DIG1RX, DIG2RX 75 $\Omega$ /18 dB
Output Level, nom/max.	-35 $\pm$ 10 dB/-10 dB
Output Level Adjust	-35 to -65 $\pm$ 10 dB at -35 dB nominal
RX IF Mon Output Level	-35 $\pm$ 10 dB

### RX Channel Characteristics

Gain, AGC	-35 to +35 dB, AGC range
Frequency Response	$\pm$ 1.0 dB

### TX Input Characteristics

Input Impedance/RL	FDMTX 50 $\Omega$ /18 dB; DIG1TX, DIG2TX 75 $\Omega$ /18 dB
Frequency	50 to 90 MHz
Input Level range	-20 to +5 dBm, 0 dBm nominal
Input Level Adjust	0 to -30 with 0 dBm in

### TX Output Characteristics

Impedance/RL	50 $\Omega$ /18 dB
Output range/1 dB	+5 to -20 dBm / +10dBm

### TX Channel Characteristics

Gain adjustment	0 to -30, each channel individually adjustable
Frequency Response	$\pm$ 1.0 dB
Group Delay, max	5 ns

### TX Switch Characteristics

Isolation, Switch off	$\geq$ 60dB
Isolation, Port to Port	$\geq$ 50dB, all "ON"
Switch time	$\leq$ 10 milliseconds

### Controls/Indicators

SW 1, SW2, SW3	DIG1TX, FDMTX, DIG2TX switch - 2PDT
SW 4	REMOTE/LOCAL switch - 2PDT
SW 1, SW2, SW3	Green LED indicates DIG1TX, FDMTX, DIG2TX are On
OVERRIDE	Yellow LED indicates override of LOCAL control
DC	Green LED indicates power is supplied to the unit
J1, J2	RX AGC Monitor, TX IF Out Monitor

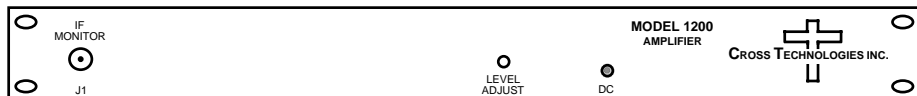
### Other

IF Connectors	BNC (female)
DC/Control Connector	DB9 (female)
Size,	19 inch standard chassis 1.75"high X 12.0" deep
Power	100-240 $\pm$ 10% VAC, 47-63 Hz, 45 W max.

\* +10°C to +40°C; 2000 meters max elevation; 80% max humidity; Specs subject to change without notice

## 1200-07 IF AGC Amplifier

The 1200-07 IF Amplifier provides automatic gain control (AGC) for a 50 to 200 MHz IF signal. It takes a -80 to 0 dBm input signal and automatically adjusts the gain for a -35 dBm  $\pm$  10 dB output. The 1200-07 has a band limiting lowpass filter. It also has capabilities to switch between automatic gain control (AGC) or manual gain control (MGC). A potentiometer on the rear panel allows for manual gain adjustment when in MGC mode. The 1200-07 is powered by a 100-240  $\pm$ 10% VAC switching power supply and is housed in a 1RU x 12" deep chassis.



**Front Panel**

### **Technical Specifications\***

---

#### **Input Characteristics**

Impedance	50 $\Omega$
Return Loss	18 dB
Frequency	50 to 200 MHz
Input Level range	-80 to 0 dBm
Input 1dB Compression	+5 dBm

#### **Output Characteristics**

Impedance	50 $\Omega$
Return Loss	12 dB
Output Level	-35 $\pm$ 10 dB

#### **Channel Characteristics**

Gain, AGC	-35 to +35 dB
Frequency Response	$\pm$ 1.0 dB
Group Delay, max.	$\pm$ 5 ns, max.; 50 to 100 MHz

#### **Controls/Indicators**

AGC/MGC Switch	Switches between Manual (MGC) or Automatic (AGC) Gain Control
Level Adjust	Potentiometer that adjusts output level in AGC mode
MGC Adjust	Potentiometer that adjusts manual gain in MGC mode
AGC Voltage	Allows for monitoring of the AGC gain (BNC connector)
Power	Green LED indicates power is supplied to the unit

#### **Other**

IF Connectors	BNC (female)
Size,	19 inch standard chassis 1.75" high X 12.0" deep
Power	100-240 $\pm$ 10% VAC, 47-63 Hz, 45 W max.

---

\* +10°C to +40°C; 2000 meters max elevation; 80% max humidity; Specs subject to change without notice

## 1200-08 IF AGC Amplifier

The 1200-08 IF Amplifier provides automatic gain control (AGC) for a 50 to 200 MHz IF signal. It takes a -35 to 0 dBm input signal and automatically adjusts the gain for a 0 to +10 dBm ( $\pm 1$  dB) output which can be adjusted using the front panel potentiometer. The 1200-08 has a band limiting lowpass filter. It also has capabilities to switch between automatic gain control (AGC) or manual gain control (MGC). A potentiometer on the rear panel allows for manual gain adjustment when in MGC mode. The 1200-08 is powered by a 100-240  $\pm 10\%$  VAC switching power supply and is housed in a 1RU x 14" deep chassis.



**Front Panel**

### Technical Specifications\*

#### Input Characteristics

Impedance	50 $\Omega$ or 75 $\Omega$
Return Loss	14 dB
Frequency	50 to 200 MHz
Input Level range	-35 to 0 dBm
Input 1dB Compression	+5 dBm

#### Output Characteristics

Impedance	50 $\Omega$ or 75 $\Omega$
Return Loss	14 dB
Output Level	0 to +10 dBm
Output 1dB compression	+15 dBm

#### Channel Characteristics

Gain, AGC	0 to +45 dB
Frequency Response	$\pm 1.0$ dB, 50 to 200 MHz; $\pm 0.5$ dB, $\pm 20$ MHz
Group Delay, max.	$\pm 2$ ns, max.; 50 to 200 MHz

#### Controls/Indicators

AGC/MGC Switch	Switches between Manual (MGC) or Automatic (AGC) Gain Control
Level Adjust	Potentiometer that adjusts output level in AGC mode
MGC Adjust	Potentiometer that adjusts manual gain in MGC mode
AGC Voltage	Allows for monitoring of the AGC gain (BNC connector)
Power	Green LED indicates power is supplied to the unit

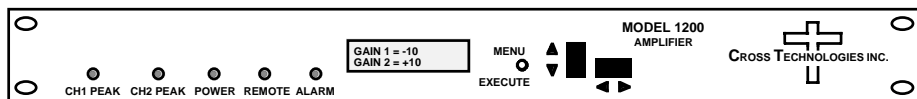
#### Other

IF Connectors	BNC (female)
Size,	19 inch standard chassis 1.75" high X 12.0" deep
Power	100-240 $\pm 10\%$ VAC, 47-63 Hz, 45 W max.

\* +10°C to +40°C; 2000 meters max elevation; 80% max humidity; Specs subject to change without notice

## 1200-88 IF AGC Amplifier

The 1200-88 IF Amplifier is a dual channel amplifier each providing manual gain control (MGC) for a 0.1 to 100 MHz IF signal for a -50 to 0 dBm input signal. The gain can be manually adjusted from -25 to +25 dB for up to a +10 dBm output. The 1200-88 has a band limiting lowpass filter. Multi-function push button switches select the gain of each channel (-25 to +25 dB, selectable in 1 dB steps) and the settings appear on the LCD display. Front panel LEDs light when DC power is applied (green) or the output level exceeds +13 dBm (red). Connectors are BNC female for IF input and output. A DB9 connector provides indication and remote control of gain via a 9600 baud, RS232C interface. The 1200-88 is powered by a 100-240  $\pm$  10% VAC switching power supply and is housed in a 1RU x 16" deep chassis.



**Front Panel**

### Technical Specifications\*

#### Input Characteristics

Impedance	50 $\Omega$
Return Loss	14 dB
Frequency	0.1 to 100 MHz
Input Level range	-50 to 0 dBm
Input 1dB Compression	+5 dBm @ min gain

#### Output Characteristics

Impedance	50 $\Omega$
Return Loss	14 dB
Output Level	+10 dBm, max.
Output 1dB compression	+15 dBm

#### Channel Characteristics

Gain	-25 to +25 dB (Front Panel Adjustment)
Frequency Response	$\pm$ 1.0 dB, 0.1-100 MHz; $\pm$ 0.5 dB, ANY 20 MHz segment
Group Delay, max.	$\pm$ 2 ns, max.; 0.1 to 100 MHz

#### Controls/Indicators

Level Adjust	Pushbutton switches or REMOTE; setting shown on LCD display; Set to -25 to +25 dB (+10 dBm max out)
Level Peak	Red LED lights when output level exceeds +13 dBm
Power, Remote, Alarm	Green LED, Yellow LED, Red LED

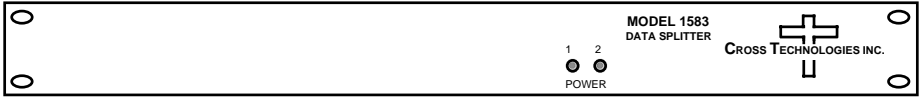
#### Other

IF Connectors	BNC (female)
Connector, Alarm, M&C	DB9 - NO or NC contact closure on Alarm; M&C 9600 Baud, RS232C
Size	19 inch standard 1RU chassis 1.75" high X 14.0" deep
Power	100-240 $\pm$ 10% VAC, 47-63 Hz, 45 W max.

\* +10°C to +40°C; 2000 meters max elevation; 80% max humidity; Specs subject to change without notice

## 1583-09A Data Splitter

The 1583-09 Data Splitter provides 9 RS232C outputs of the data signal (pin 2 of the DB9 connector). One of the outputs is a hard wired pass through of the input which can be used for very important functions or to further split the data. Dual power supplies provide redundant power to the 1583-09 with front panel LEDs indicating proper power supply operation. Housed in a 1 3/4", rack mount chassis. Data connectors are DB9, female.



**Front Panel**

### **Technical Specifications\***

---

#### **Data Characteristics**

Input/Output	RS232C
Data rate	128 kbps max.
Number of outputs	1 - Hard wired loop of the input 8 - Buffered RS232C outputs
Connector	DB9 (female)

#### **Indicators**

POWER CH1 LED	Turns green when power is applied to number 1 AC input
POWER CH2 LED	Turns green when power is applied to number 2 AC input

#### **Other**

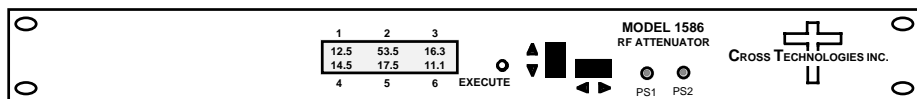
Mechanical	19 inch standard chassis 1.75" high X 7.5" deep
Power	100-240 $\pm$ 10% VAC, 60 Hz, 10 watts

---

\* +10°C to +40°C; Specifications subject to change without notice

# 1586-06 Programmable RF Attenuators, 6 to 12 GHz

The 1586-06 RF Attenuator contains six Programmable Digital PIN Attenuators and Local/Remote control circuitry to independently adjust each attenuator. Multi-function push button switches select the attenuation locally. Local operation starts when the Execute button is pushed. The upper left first digit of the first attenuator value is underlined and the Left/Right pushbutton switch is used to select the digit to be adjusted by using the Up/Down pushbutton switch. On completion of the attenuator value adjustments, the Execute button is pushed again which stores these values and restores the operating mode to Remote. When in Local control a time-out returns the mode to Remote if no activity is noted on any of the switches for 20 seconds. The attenuator values are stored in nonvolatile memory so these values remain when power is cycled off and on. Front panel LEDs provide indication of DC power (red/green). Each Programmable Digital PIN Attenuator provides an attenuation range of 64 dB from 4 to 68 dB. Remote operation also controls each attenuator and allows status monitoring of attenuator settings and power supply and summary alarms. Attenuator settings appear on the LCD display. Connectors are SMA, female for inputs and outputs and DB9 female for the RS422 remote control. Powered by redundant 100-240±10% VAC power supplies, and mounted in a 1 3/4" X 19" X 19" rack mount chassis.



**Front Panel**

## Technical Specifications\*

### Input/Output Characteristics

Impedance/Return Loss	50 Ω /10 dB
Frequency	6 to 12 GHz
Level, maximum	+20 dBm

### Channel Characteristics

Attenuator range	4 to 68 dB
Frequency Response	
4 to 24 dB atten	±1.5 dB
25 to 44 dB atten	±2.0 dB
45 to 68 dB atten	±2.0 dB
Attenuator Accuracy	
4 to 34 dB atten	±0.5 dB
35 to 54 dB atten	±1.0 dB
55 to 68 dB atten	±1.5 dB
Temp Coefficient	±0.025 dB/°C

### Controls, Indicators

Attenuation Selection	direct readout LCD; pushbutton switches or remote selection
Power	Red/Green LED; Alarm/Normal
Remot	RS422, 9600 baud, no parity, 8 data bits, 1 start and stop bit

### Other

RF Connectors	SMA (female)
Remote Connector	DB9 (female) - (NO or NC contact closure on Alarm-may not be needed)
Size	19 inch, 1RU standard chassis 1.75" high X 19.0" deep
Power, Redundant	100-240 ±10% VAC, 47-63 Hz, 45 watts max.

\* -20°C to +55°C; 0 to 100% humidity; Specifications subject to change without notice

## 2000-01 Power Supply

The 2000-01 Power Supply is a switching power supply which provides regulated +15 VDC at 1.2 amps and -15 VDC at 0.5 amps with a 100-240  $\pm$  10% VAC, 47 to 63 Hz input and can be used with Cross Series 2000 products. The input AC connector is IEC 320 C13 and the DC outputs are on a Terminal strip. The 2000-01 can be mounted on an 1 3/4" X 19" rack mount panel (**option -R**).



**Front Panel**

### Technical Specifications\*

---

#### AC Input Characteristics

Voltage	100 - 240 $\pm$ 10% VAC
Frequency	47 - 63 Hz
Power, maximum	50 watts

#### DC Output Characteristics

Voltage / Current	+15 VDC / 1.2 amps, - 15 VDC / 0.5 amps
Load Reg., max.	$\pm$ 5%
Power Supply type	Switcher
Switching Frequency	50 kHz, typical

#### Indicators

DC Power	Green LED
----------	-----------

#### Other

Connector, AC Input	IEC 320 C13
Connector, DC Output	Barrier Strip
Size, Bench Top	4.7" wide X 1.75" high X 8.5" deep
Size, Rack Mount	19 inch chassis 1.75" high X 9.0" deep ( <b>option -R only</b> )

---

\* +10°C to +40°C; Specifications subject to change without notice

## 2000-02 Power Supply

The 2000-02 Power Supply is a switching power supply which provides regulated +18 VDC at 0.8 amps with a 100-240  $\pm$  10% VAC, 47 to 63 Hz input and can be used with Cross products requiring +18 VDC. The input AC connector is IEC 320 C13 and the DC outputs are on a barrier strip. The 2000-02 can be mounted on an 1 3/4" X 19" rack mount panel (**option -R**).



**Front Panel**

### Technical Specifications\*

---

#### AC Input Characteristics

Voltage	100-240 $\pm$ 10% VAC
Frequency	47 - 63 Hz
Power, maximum	20 watts

#### DC Output Characteristics

Voltage / Current	+18 VDC / 0.8 amps
Load Regulation, max.	$\pm$ 5%
Power Supply type	Switcher
Switching Frequency	50 kHz, typical

#### Indicators

DC Power	Green LED
----------	-----------

#### Other

Connector, AC Input	IEC 320 C13
Connector, DC Output	Barrier Strip
Size, Bench Top	4.7" wide X 1.75" high X 8.5" deep
Size, Rack Mount	19 inch chassis 1.75" high X 9.0" deep ( <b>option -R only</b> )

---

\* +10°C to +40°C; Specifications subject to change without notice

# 2000-2XX LNB Power Supply

The 2000-2XX LNB Power Supply is a switching power supply which provides regulated +18 VDC (-218) OR +24 VDC (-224) at 0 amps through RF connectors for insertion on an RF cable. Also provided is a BNC connector for insertion of a 10 MHz reference signal on the RF line. The input AC connector is IEC 320 C13. The 2000-2XX can be mounted on an 1 3/4" X 19" rack mount panel (**option -R**).



**Front Panel**

## Technical Specifications\*

### RF Input/Output Characteristics

Impedance	75 $\Omega$
Return Loss	14 dB
Frequency	950 to 2150 MHz
Insertion Loss	1 $\pm$ 0.5 dB
Frequency Response	$\pm$ 1.0 dB

### AC Input Characteristics

Voltage	100 - 240 $\pm$ 10% VAC
Frequency	47 - 63 Hz
Power, maximum	20 watts

### DC Output Characteristics

Voltage / Current	See <b>Models/Options</b> (below)
Load Regulation, max.	$\pm$ 5%
Power Supply type	Switcher
Switching Frequency	50 kHz, typical

### Indicators

DC Power (Front Panel)	Green LED
LNB Power (Rear Panel)	Yellow LED

### Other

AC Input Connector	IEC 320 C13
10MHz Ref Connector	BNC (female), 75 $\Omega$ (also works with 50 $\Omega$ )
RF Connector	Type F (female)
Size, Bench Top	4.7" wide X 1.75" high X 8.5" deep
Size, Rack Mount	19 inch chassis 1.75" high X 9.0" deep ( <b>option -R only</b> )

### Models/Options

2000-218	+18 VDC / 0.5 amps
2000-224	+24 VDC / 0.5 amps
Option -B	BNC (female), 75 $\Omega$ RF Connector
Option -D	BNC (female), 50 $\Omega$ RF Connector
Option -R, -R2, or -R3	Rack Mount Panel (1, 2, or 3 positions)

\* +10°C to +40°C; Specifications subject to change without notice

## 2000-3XX SSPB Power Supply

The 2000-3XX SSPB Power Supply is a switching power supply which provides regulated +18 VDC (-318) OR +24 VDC (-324) at 2.5 amps through RF connectors for insertion on an RF cable. Also provided is a BNC connector for insertion of a 10 MHz reference signal on the RF line. The input AC connector is IEC 320 C13. The 2000-3XX can be mounted on an 1 3/4" X 19 " rack mount panel (**option -R**).



**Front Panel**

### Technical Specifications\*

#### RF Input/Output Characteristics

Impedance	75 $\Omega$
Return Loss	14 dB
Frequency	950 to 2150 MHz
Insertion Loss	1 $\pm$ 0.5 dB
Frequency Response	$\pm$ 1.0 dB

#### AC Input Characteristics

Voltage	100- 240 $\pm$ 10% VAC
Frequency	47- 63 Hz
Power, maximum	65 watts

#### DC Output Characteristics

Voltage / Current	See <b>Models/Options</b> (below)
Load Regulation, max.	$\pm$ 5%
Power Supply type	Switcher
Switching Frequency	50 kHz, typical

#### Indicators

DC Power (Front Panel)	Green LED
LNB Power (Rear Panel)	Yellow LED

#### Other

AC Input Connector	IEC 320 C13
10MHz Ref Connector	BNC (female), 75 $\Omega$ (also works with 50 $\Omega$ )
RF Connector	Type F (female)
Size, Bench Top	4.7" wide X 1.75" high X 8.5" deep
Size, Rack Mount	19 inch chassis 1.75" high X 9.0" deep ( <b>option -R only</b> )

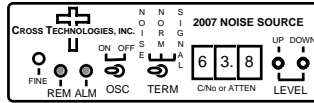
#### Models/Options

2000-318	+18 VDC / 2.5 amps
2000-324	+24 VDC / 2.5 amps
Option -B	BNC (female), 75 $\Omega$ RF Connector
Option -D	BNC (female), 50 $\Omega$ RF Connector
Option -R, -R2, or -R3	Rack Mount Panel (1, 2, or 3 positions)

\* +10°C to +40°C; Specifications subject to change without notice

## 2007 Noise Source, 70 MHz

Provides 70 MHz band limited noise in 0.1 dB increments and summing of an external signal. Broad band noise goes to precision attenuators controlled by front panel “up” and “down” pushbuttons via the microprocessor controller. The front panel display shows C/No or attenuation of the noise from a 50 dB- Hz C/No level calibrated for a -20.0 dBm carrier level. On board jumpers select bandpass filters to band limit the noise at 70 MHz. A red LED lights if the ambient temperature is outside the +15 to +40 C calibrated temperature range. A yellow LED lights if in remote operation.



**Front Panel**

### Technical Specifications\*

#### Input Characteristics- carrier input

Input Impedance/RL	75 $\Omega$ /15 db
Frequency	70 MHz center
Input Level	-20.0 dBm
Gain	0 dB $\pm$ 0.1 dB

#### Output Characteristics

Impedance/RL	75 $\Omega$ /15 dB
Frequency Band	52 - 88 MHz
Level	Provides C/No of 50 to 90 dB-Hz (with 10 MHz filter; 60 to 90 dB-Hz with 40 MHz filter) with a -20 dBm carrier
Monitor level	-10 dB down from main output

#### Channel Characteristics - noise source

Selectable BW(MHz)	10 MHz or 40 MHz @ 70 MHz
Frequency Response	$\pm$ 0.5 dB 8 MHz, 36 MHz
Noise Pwr Accuracy	$\pm$ 0.25 dB, 15 to 40 deg C; $\pm$ 0.5 dB, 10 to 15, 40 to 50 deg C
Noise Pwr stability	$\pm$ 0.5 dB, 15 to 40 deg C, 30 days

#### Controls

Test Carrier	Toggle switch turns reference 70 MHz carrier On and Off
Term Noise or Carrier	Toggle switch terminates noise or external signal
Output Level	Potentiometer for Noise calibration
Attenuation	PB switches w/ readout of attenuator or C/No setting

#### Indicators

Alarm	Red LED for temp range (with FET open drain )
Remote	Yellow LED shows control of noise power level is remote
Level	Displays show C/No or attenuation from max noise level

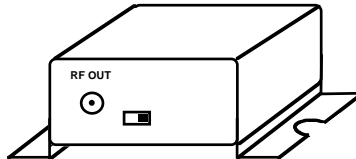
#### Other

RF, IF Connectors	BNC, female
Size, Bench Top	4.7" wide X 1.75" high X 12.5" deep
Size, Rack Mount	19 inch standard chassis 1.75"high X 13.0" deep
Power	100 - 240 $\pm$ 10% VAC, 60 Hz, 20 watts max, wall power supply

\* +10°C to +40°C; Specifications subject to change without notice

## 2098-007 Frequency Source, 70 MHz

The Model 2098-007 Frequency Source, is a 70 MHz, synthesized frequency generator. The 70.000 MHz signal is generated by the VCO controlled by the Phase Lock Loop circuit which is referenced to a 25 MHz Crystal oscillator. The 70 MHz is applied to an amplifier and then to the output switch/attenuator providing a level of 0.0 dBm (high) or -15 dBm (low). A green LED indicates the presence of DC power. Power is provided by a wall transformer for 115 VAC, 60Hz and provides +15 VDC at 150 ma. The Option -P4 wall power supply covers 100-240  $\pm$ 10% VAC, 47-63 Hz. Specify US, EUR, AUS or UK plug for the -P4 option. The connector is BNC female for the 70 MHz output and the impedance is 75 ohms.



2098-007 Frequency Source

### **Technical Specifications\***

---

#### **Output Characteristics**

Impedance/RL	75 $\Omega$
Return Loss	> 15 dB
Frequency	70.000 $\pm$ 0.0005 MHz
Harmonics	< -30 dBC, max; -35 dBC typ for 2nd and 3rd; -50 dBC for all others
Spurious	< -60 dBC, max

#### **Synthesizer Characteristics**

Frequency Accuracy	$\pm$ 0.5 kHz max. over time and temp.; $\pm$ 0.25 kHz typical
Phase Noise (dBC/Hz)	$\leq$ -100 @ 10kHz; $\leq$ -120 @ 100kHz; $\leq$ -130 @ 1 MHz
Frequency Selection	NONE; fixed tuned

#### **Controls, Indicators**

Level Select	Slide switch selects High (0 dBm) or Low (-15 dBm) level
DC Power	Green LED

#### **Other**

RF Output Connector	BNC (female)
Size	3.3" wide X 1.2" high X 4.0" deep
Power	115 VAC, 60 Hz provides +15 VDC, 150mA
Power ( <b>option -P4</b> )	100-240 $\pm$ 10% VAC, 47-63 Hz - Specify US, EUR, AUS, or UK plug

---

\* +10°C to +40°C; Specifications subject to change without notice

