Products/Prices
2011

CROSS TECHNOLOGIES, INC.

Frequency Converters ...and more!

Since...1994

Weatherized/Multi-Band
Frequency Converters

Rack 'N Stack Solutions

Frequency Converters - IF to Ka

Power Supplies, Sources, Inserters

Frequency Sources

Frequency Converters • Switches • Precision Sources • Splitters/Combiners • Power Supplies

2011 Product Catalog

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I. AGILE UPCONVERTERS

MODEL NUMBER	PAGE# OR WEB	BAND	RF RANGE (GHz)	IF FREQ (MHz)	IF BW (MHz)	FREQ STEPS (Hz)	GAIN RANGE (dB)	10 kHz ø NOISE dBC/Hz
2015-75	5	UHF	0.25-0.75	70	36	1M	-10to+30	-85
2015-95	WEB	UHF	0.25-0.95	70	36	1M	-10to+30	-85
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	-85
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	-85
2015-22	7	L	0.95-2.150	70	36	1K	-10to+30	-88
2015-24	WEB	L	0.95-2.150	140	72	1K	-10to+30	-88
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	-88
2015-58	10	C	5.85-6.425	70	36	125K	0to+20	-80
2015-59	WEB	C	5.85-6.745	70	36	1K	0to+20	-88
2015-61-01	11	C	5.845-6.745	70	36	1K	+10to+30	-85
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 48 FOR OPTIONS

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

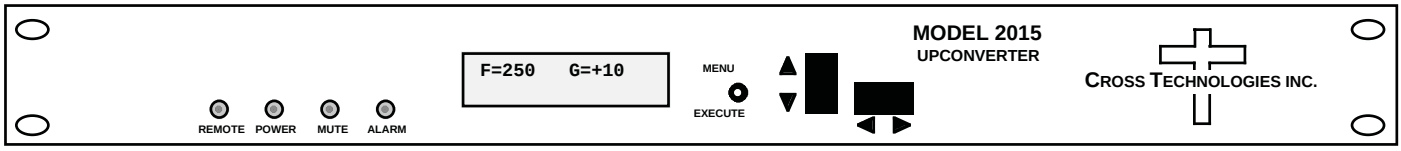
CUSTOM PRODUCTS ARE OUR SPECIALTY!

Current pricing for most products can be found on our website at:

www.crosstechnologies.com

2015-75 Upconverter, 250 - 750 MHz

The 2015-75 Upconverter converts 70 ± 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 optional external 10MHz reference input and output, and Type F (female) for the RF output. 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

EQUIPMENT SPECIFICATIONS*

Input Characteristics

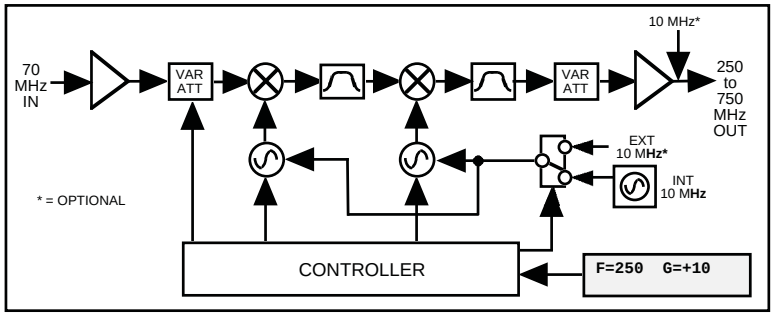
Impedance	75 Ω
Return Loss	18 dB
Frequency	70 ± 18 MHZ
Input Level	-40 to -10 dBm

Output Characteristics

Impedance	75 Ω
Return Loss	10 dB
Frequency	250 to 750 MHz
Output level	0 to -20 dBm
Output 1 dB compression	+5 dBm

Channel Characteristics

Gain range (adjustable)	-10.0 to 30.0 dB
Spurious Response	< -50 dBC
2nd Harmonic	< 40 dB
Frequency Response	±1.5 dB, 250-750 MHz; ± 0.5 dB, 36 MHz BW
Group Delay, max	0.01 ns/MHz^2 parabolic; 0.03ns/MHz linear; 1 ns ripple
Frequency Sense	Non-inverting



Block Diagram

Synthesizer Characteristics

Frequency Accuracy	± 1.0 ppm max over temp (± 0.01 ppm, **opt-H**) internal ref.
Frequency Step	1.0 MHz minimum
External 10 MHz level	+3 dBm ± 3 dB, 50/75 Ω (**opt-E**)

Phase Noise @ Freq	100 Hz	1kHz	10kHz	100kHz	1 MHz
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
Pwr; Alm; Remote; Mute	Green LED; Red LED; Yellow LED; Yellow LED
Remote	RS232C, 9600 baud (RS422/485/**opt.-Q,** Ethernet/**opt-W8; W18**)

Other

RF Connector	Type F (female)
IF, 10 MHz Connectors	BNC (female)
Alarm/Remote Connector	DB9 (female) - NO or NC contact closure on Alarm
Size	19 inch, 1RU standard chassis 1.75"high X 16.0" deep
Power	100-240 ±10% VAC, 47-63 Hz, 45 watts max

Available Options

E - External 10 MHz ref input & output w/ RF insertion
H - High Stability (± 0.01 ppm) Int. Ref
Q - RS485 Remote Interface
Z - Attenuator 0.1 dB on Upconverter
W8 - Ethernet; w/Web Browser (WB)
W18 - Ethernet; w/WB & SNMP
W17 - IF Test/Monitor Ports

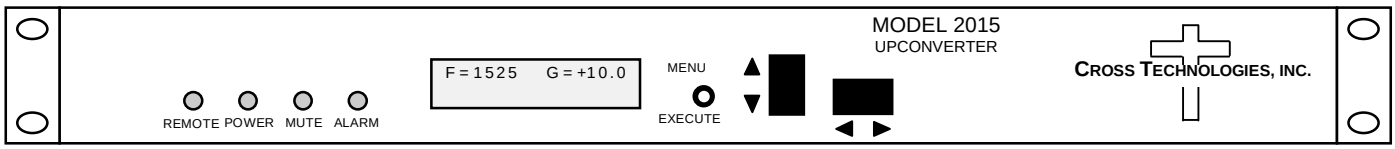
Connectors/Impedance

B - 75Ω BNC (RF), 75Ω BNC (IF)
C - 50Ω BNC (RF), 75Ω BNC (IF)
D - 50Ω BNC (RF), 50Ω BNC (IF)
N - 50Ω N-type (RF), 75Ω BNC (IF)
M - 50Ω N-type (RF), 50Ω BNC (IF)
S - 50Ω SMA (RF), 50Ω BNC (IF)

*10˚C to 40˚C; Specifications subject to change without notice

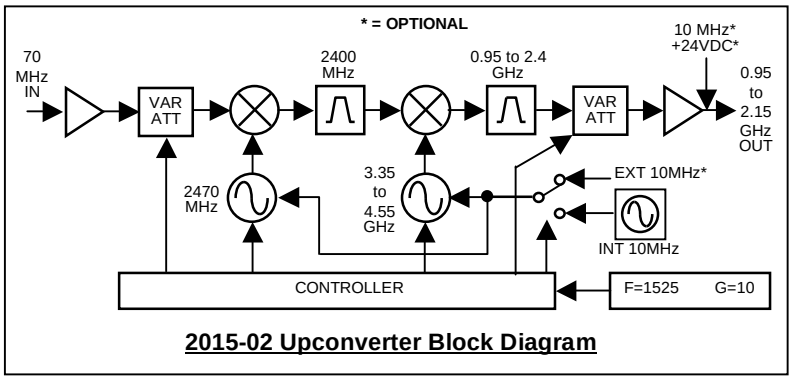
2015-02 L-Band Upconverter

The 2015-02 L-band Upconverter converts 70 ± 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 includes a 10 MHz output connector which contains either the internal or external 10 MHz reference signal. A high stability (±0.01ppm) option is also available. 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.



2015-02 Upconverter Front Panel

EQUIPMENT SPECIFICATIONS*



2015-02 Upconverter Block Diagram

Input Characteristics (IF)

Impedance/Return Loss	75 Ω /18 dB
Frequency	70 ± 18 MHZ
Input Level	-40 to -10 dBm

Output Characteristics (RF)

Impedance/Return Loss	75 Ω/12 dB
Frequency	950 to 2150 MHz
Output level	0 to -20 dBm
Output 1 dB comp.	+5 dBm

Channel Characteristics

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

Synthesizer Characteristics

Frequency Accuracy	± 1.0 ppm max over temp (±0.01 ppm, option-H)
Frequency Step	1.0 MHz (as low as 1 kHz steps available)

Phase Noise @ Freq	100 Hz	1kHz	10kHz	100kHz	1 MHz
dBC/Hz	-70	-70	-80	-90	-100

10 MHz Level (In or Out) 3 dBm, ± 3 dB, 75 ohms (option-E)

Controls, Indicators

Frequency Selection	direct readout LCD; manual or remote selection
Gain Selection	direct readout LCD; manual or remote selection
Pwr; Alarm; Rem; Mute	Green LED; Red LED; Yellow LED; Yellow LED
Remote	RS232C, 9600 baud (RS485, option-Q) (Ethernet Interface, option-W8)

Other

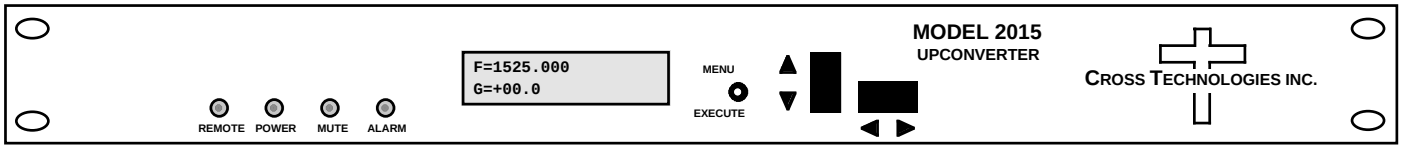
RF Connector	Type F (female)
IF Connectors	BNC (female)
10 MHz Conn. (In & Out)	BNC (female) (option-E)
Alarm/Remote Connector	DB9 (female) - NO or NC contact closure on Alarm
Size	19 inch, 1RU standard chassis 1.75"high X 16.0" deep
Power	100-240± 10% VAC, 47-63 Hz, 45 watts max

Available Options

E – External 10 MHz ref input & output w/ RF insertion
H – High Stability (±0.01ppm) internal reference
V – SSPB Voltage, +24VDC, 2.5 amps
Q – RS485 Remote Interface
T – Temperature Sensor
W8- Ethernet M&C Remote Interface
Z – Attenuator 0.1 dB on Upconverter
Connectors/Impedance
B – 75Ω BNC (RF), 75Ω BNC (IF)
C – 50Ω BNC (RF), 75Ω BNC (IF)
D – 50Ω BNC (RF), 50Ω BNC (IF)
N – 50Ω N-type (RF), 75Ω BNC (IF)
M – 50Ω N-type (RF), 50Ω BNC (IF)

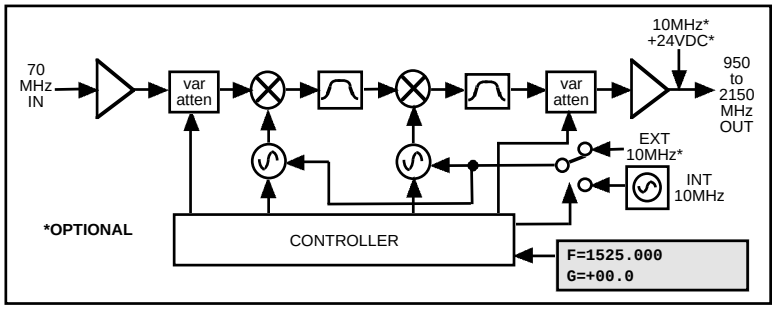
2015-22 Upconverter, 950 - 2150 MHz, 70 MHz IF

The 2015-22 L-band Upconverter converts 70 ± 18 MHz to 950 to 2150 MHz in 1kHz, 10kHz, or 125kHz steps (user selectable) with low group delay and flat frequency response. Synthesized local oscillators (LO) provide very low phase noise and ±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 100-240± 10% VAC power supply, and housed in a 1 3/4" X 19 " X 16" rack mount chassis.



Front Panel

EQUIPMENT SPECIFICATIONS*



Block Diagram

Input Characteristics (IF)

Impedance/Return Loss	75Ω /18 dB
Frequency	70 ± 18 MHZ
Input Level	-40 to -10 dBm

Output Characteristics (RF)

Impedance/Return Loss	75Ω/12 dB
Frequency	950 to 2150 MHz
Output level	-20 to 0 dBm
Output 1 dB comp.	+5 dBm

Channel Characteristics

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

Synthesizer Characteristics

Frequency Accuracy	± .01 ppm internal reference
Frequency Step	1kHz, 10kHz, or 125kHz (user selectable)
10 MHz In/Out Level	3 dBm ± 3 dB (option E)

Phase Noise @ Freq	100 Hz	1kHz	10kHz	100kHz	1 MHz
dBC/Hz	-75	-85	-88	-110	-120

Controls, Indicators

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

Other

RF Connector	Type F (female)
IF Connector	BNC (female)
10 MHz Connectors	BNC (female), 50Ω/75Ω (option E)
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± 10% VAC, 47-63 Hz, 45 watts max

Available Options

E - External 10 MHz ref input & output w/ RF insertion
V - SSPB Voltage, +24VDC, 2.5 amps
Q - RS485 Remote Interface
T - Temperature Sensor
Z - Attenuator 0.1 dB on Upconverter

Connectors/Impedance
B - 75Ω BNC (RF), 75Ω BNC (IF)
C - 50Ω BNC (RF), 75Ω BNC (IF)
D - 50Ω BNC (RF), 50Ω BNC (IF)
N - 50Ω N-type (RF), 75Ω BNC (IF)
M - 50Ω N-type (RF), 50Ω BNC (IF)

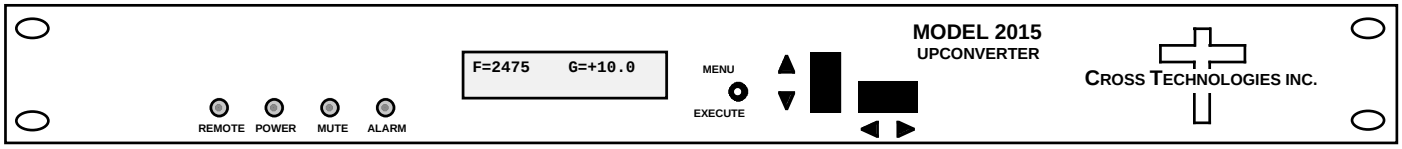
*10˚C to 40˚C; Specifications subject to change without notice

CROSS TECHNOLOGIES, INC.

DATA SHEET
Rev. D
04/01/08

2015-25, -26 Upconverter, 70 MHz to 2.0 - 2.5 GHz

The 2015-25 S-band Upconverter converts 70 ± 18 MHz to 2000 to 2500 MHz in 1 MHz steps (0.5 MHz steps, option -5) 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 RF, IF and the optional external reference input and output. 10 MHz reference can be inserted on the RF line as an added option. The 10 MHz option includes a 10 MHz output connector which contains either the internal or external 10 MHz reference signal. A high stability (±0.01ppm) option is also available. 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

EQUIPMENT SPECIFICATIONS*

IInput Characteristics (IF)

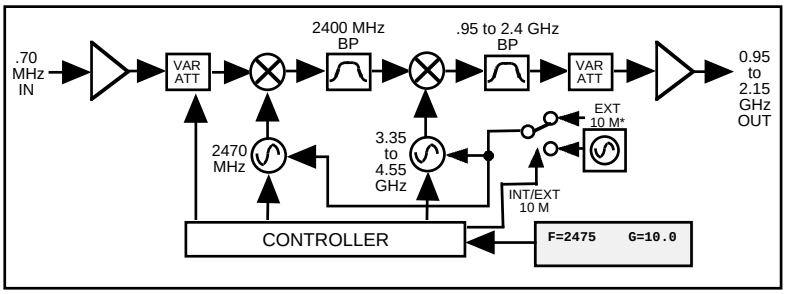
Impedance / Return Loss	75Ω / 18dB
Frequency	70 ± 18 MHz
Input Level Range	-40 to -10 dBm

Output Characteristics (RF)

Impedance / Return Loss	50Ω / 12dB
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
Image Rejection	> 50 dB, min.
Frequency Response	±1.5 dB, 2.0-2.5 GHz ; ± 0.5 dB, 36 MHz BW
Spurious Response	< -50 dBc, in band
Group Delay, max	0.01 ns/MHz^2 parabolic; 0.03 ns/MHz linear; 1 ns ripple
Frequency Sense	Non-inverting



Block Diagram

Synthesizer Characteristics

Frequency Accuracy	± 1.0 ppm internal reference (±0.01 ppm, option H)
Frequency Step	1.0 MHz (0.5 MHz, option -5)
10 MHz In/Out Level	3 dBm ± 3 dB (option E)

Phase Noise

@ Freq	100Hz	1kHz	10kHz	100kHz	1MHz
dBC/Hz	< -70	< -70	< -80	< -105	< -115

Controls, Indicators

Freq/Gain Selection	direct readout LCD; manual or remote selection
Pwr; Alarm; Rem; Mute	Green LED; Red LED; Yellow LED; Yellow LED
Remote	RS232C, 9600 baud (RS485, option Q)

Other

RF, IF Connectors	BNC (female)
10MHz Connectors	BNC (female), 50Ω/75Ω (option E)
Alarm/Remote Connector	DB9 (female) - NO or NC contact closure on Alarm
Size	19 inch, 1RU standard chassis 1.75"high X 16.0" deep
Power	100-240± 10% VAC, 47-63 Hz, 45 W max

Available Options

E - External 10 MHz ref input & output
H - High Stability (±0.01ppm) Internal Ref
Q - RS485 Remote Interface
Z - Attenuator 0.1 dB steps on Upconverter
-5 - 0.5 MHz Frequency Steps
Connectors/Impedance
B - 75Ω BNC (RF), 75Ω BNC (IF)
D - 50Ω BNC (RF), 50Ω BNC (IF)
N - 50Ω N-type (RF), 75Ω BNC (IF)
M - 50Ω N-type (RF), 50Ω BNC (IF)

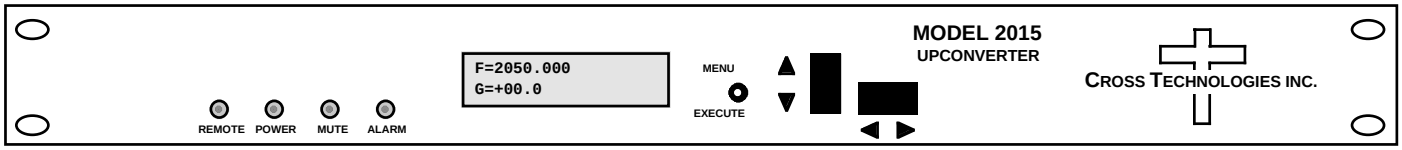
*10˚C to 40˚C; Specifications subject to change without notice

CROSS TECHNOLOGIES, INC.

DATA SHEET
Rev. C
04/01/08

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

The 2015-225 Upconverter converts 70 ± 18 MHz to 2000 to 2500 MHz in 1kHz, 10kHz, 100kHz, or 125kHz steps (user selectable) with low group delay and flat frequency response. Synthesized local oscillators (LO) provide very low phase noise and ±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 Input, RF output and the optional external reference input and output. The External 10 MHz option includes a 10 MHz input and output connector. 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

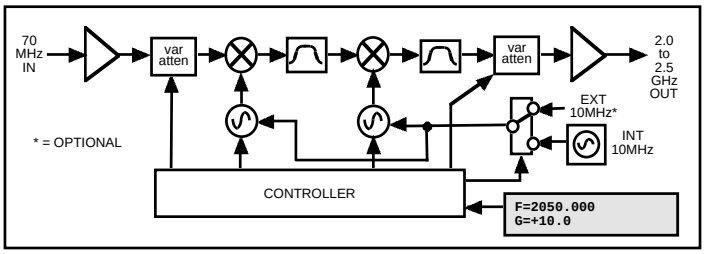
EQUIPMENT SPECIFICATIONS*

Input Characteristics (IF)

Impedance / Return Loss	50Ω / 18dB
Frequency	70 ± 18 MHz
Input Level	-40 to -10 dBm

Output Characteristics (RF)

Impedance / Return Loss	50Ω / 12dB
Frequency	2.0 to 2.5 GHz
Output level	-20 to 0 dBm
Output 1 dB comp.	+5 dBm



Block Diagram

Channel Characteristics

Gain range (adjustable)	-10 to +30 dB
Frequency Response	±1.5 dB, 2.0-2.5 GHz ; ± 0.5 dB, 36 MHz BW
Spurious Response	< -50 dBc, in band
Group Delay, max	0.01 ns/MHz^2 parabolic; 0.03 ns/MHz linear; 1 ns ripple
Frequency Sense	Non-inverting

Synthesizer Characteristics

Frequency Accuracy	± .01 ppm internal ref.					
Frequency Step	1kHz, 10kHz, 100kHz, or 125kHz (user selectable)					
10 MHz In/Out Level	3 dBm ± 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; manual or remote selection
Gain Selection	direct readout LCD; manual or remote selection
Pwr; Alarm; Rem; Mute	Green LED; Red LED; Yellow LED; Yellow LED
Remote	RS232C, 9600 baud (RS485, option Q)

Other

IF, RF Connectors	BNC (female)
10 MHz Connector	BNC (female), 50Ω/75Ω (option E)
Alarm/Remote Connector	DB9 (female) - NO or NC contact closure on Alarm
Size	19 inch, 1RU standard chassis 1.75"high X 16.0" deep
Power	100-240 ± 10% VAC, 47-63 Hz, 45 W max

Available Options

E - External 10 MHz ref input & output
Q - RS485 Remote Interface
Z - Attenuator 0.1 dB on Upconverter Connectors/Impedance
B - 75Ω BNC (RF), 75Ω BNC (IF)
C - 50Ω BNC (RF), 75Ω BNC (IF)
N - 50Ω N-type (RF), 75Ω BNC (IF)
M - 50Ω N-type (RF), 50Ω BNC (IF)

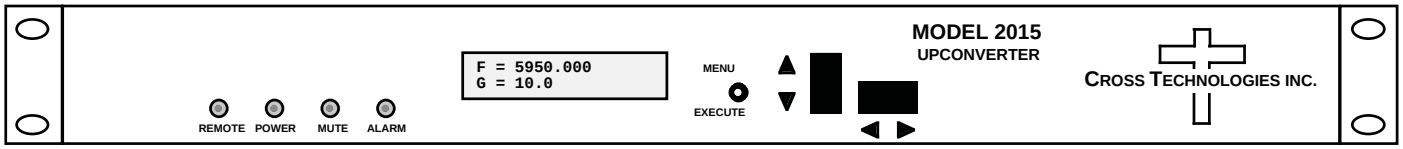
*10˚C to 40˚C; Specifications subject to change without notice

CROSS TECHNOLOGIES, INC.

DATA SHEET
Rev. C
06/10/09

2015-58 Upconverter, 5.85 - 6.425 GHz

The 2015-58 Upconverter converts 70 ± 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 and ±1.0 ppm stability frequency selection. Push button switches select the RF frequency, gain, and other parameters. Front panel LEDs provide indication of DC power (green), remote operation (yellow), PLL alarm (red), 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 input and 10MHz reference input and output, and Type N female for the RF output (other connector configurations available). The 2015-58 is powered by a 100-240 ± 10% VAC power supply; and housed in a 1.75" X 19" X 16" rack mount chassis.



Front Panel

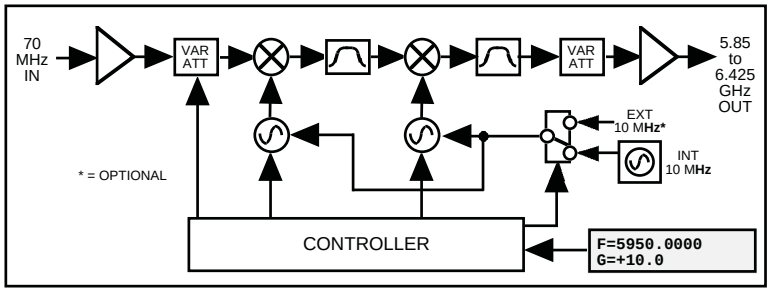
EQUIPMENT SPECIFICATIONS*

Input Characteristics (IF)

Impedance/Return Loss	75Ω /18 dB
Frequency	70 ± 18 MHZ
Input Level	-40 to -10 dBm

Output Characteristics (RF)

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



Block Diagram

Channel Characteristics

Gain range (adjustable)	-10 to +30 dB
Spurious Response	<-50 dBC
Frequency Response	±1.5 dB, 5.85-6.425 GHz ; ± 0.5 dB, 36 MHz BW
Group Delay, max	0.01 ns/MHz^2 parabolic; 0.03 ns/MHz linear, 1 ns ripple
Frequency Sense	Non-inverting

Synthesizer Characteristics

Frequency Accuracy	± 0.01 ppm internal reference; external reference input
Frequency Step	125 kHz minimum
10 MHz In/Out Level	3 dBm ± 3 dB

Phase Noise @ F (Hz) >	*100*	*1K*	*10K*	*100K*	*1M*
dBC/Hz	*-70*	*-70*	*-80*	*-95*	*-105*

Controls, Indicators

Freq/Gain Selection	direct readout LCD; pushbutton switches or remote selection
Pwr; 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 Connectors	BNC (female), 50Ω/75Ω
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± 10% VAC, 47-63 Hz, 45 watts max

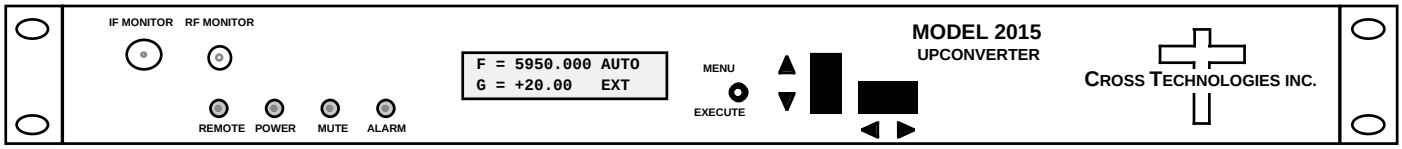
Available Options

Q - RS485 Remote Interface
Connectors/Impedance
M - 50Ω N-type (RF), 50Ω BNC (IF)

*10˚C to 40˚C; Specifications subject to change without notice

2015-61-01 Upconverter, 5.85 - 6.745 GHz, Monitors

The 2015-61-01 Upconverter converts 70 ± 18 MHz to 5.85 to **6.745** GHz in 1kHz, 10kHz, 100kHz, or 125kHz steps (user selectable) with low group delay and flat frequency response. Push button switches select the RF frequency, gain, and other parameters. Front panel connectors provide -20 dB monitors of the IF and RF signals. Front panel LEDs provide indication of DC power (green), remote operation (yellow), PLL alarm (red), or the TX carrier is muted (yellow). Variable attenuators for the IF input and RF output provide a gain range of +10 to +30 dB as adjusted by the front panel pushbutton switches. Remote operation allows selection of frequency and gain. Parameter selection and frequency, gain and 10MHz reference source settings appear on the LCD display. Connectors are BNC for IF input, IF monitor, and 10MHz reference input and output, and Type N for the RF output and SMA for the RF monitor. The 2015-61-01 is powered by a 100-240 ±10% VAC power supply; and housed in a 1.75" X 19 " X 16" rack mount chassis.



Front Panel

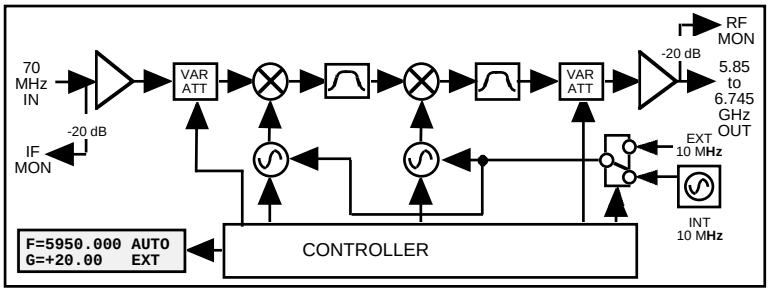
EQUIPMENT SPECIFICATIONS*

Input Characteristics (IF)

Impedance/Return Loss	50Ω /18 dB
Frequency	70 ± 18 MHZ
Input Level	-40 to -20 dBm

Output Characteristics (RF)

Impedance/Return Loss	50Ω/14 dB
Frequency	5.85 to **6.745** GHz
Output level	-20 to 0 dBm
Output 1 dB compression	+9 dBm
Carrier Mute	-60 dBC



Block Diagram

Channel Characteristics

Gain range (adjustable)	+10 to +30 dB, 0.25 db steps
Spurious Response	<-55dBC @ 0dBm output
Intermodulation	<-38 dBC for two carriers each at 0 dBm output
Frequency Response	±1.5 dB, 5.85-**6.745** GHz ; ± 0.5 dB, 36 MHz BW; 0.1dB /MHz Gain slope max
AM/PM Conversion:	0.1 deg/dB max @ -5 dBm output
Gain Stability	± 0.25 dB/day
Group Delay, max	0.01 ns/MHz^2 parabolic; 0.03 ns/MHz linear, 1 ns ripple
Frequency Sense	Non-inverting

Synthesizer Characteristics

Frequency Accuracy	± 0.01 ppm internal reference; Auto locks to external reference at 0 ± 3 dBm input					
Frequency Step	1, 10, 100, or 125 kHz (selectable)					
10 MHz In/Out Level	3 dBm ± 3 dB					
Phase Noise	@ Freq	100Hz	1kHz	10kHz	100kHz	1MHz
	dBc/Hz	< -65	< -75	< -85	< -105	< -115

Controls, Indicators, Monitors

Freq/Gain/Ref Selection	direct readout LCD; pushbutton switches or remote selection
Pwr; Alarm; Rem; Mute	Green LED; Red LED; Yellow LED; Yellow LED
Remote	RS232C, 9600 baud
Monitors	IF: -20dB of input, 75Ω BNC, female / RF: -20dB of output, 50Ω SMA, female
Other	
RF/IF/Mon Connectors	RF-Type N (female); IF-BNC (female): RF Monitor-SMA (female); IF Monitor-BNC (female)
10 MHz Connectors	BNC (female), 75Ω; works for 50 or 75 ohm impedance
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 ±10% VAC, 47-63 Hz, 45 watts max

***0˚C to 50˚C**; Specifications subject to change without notice

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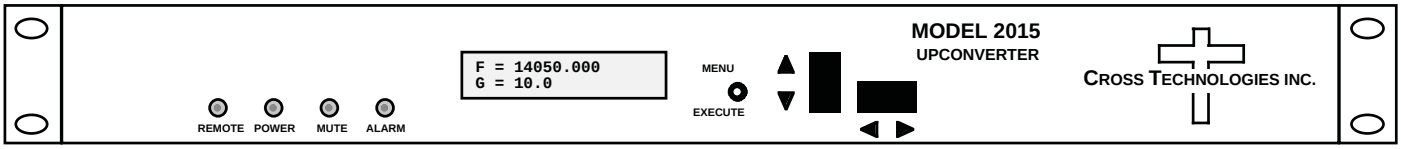
DATA SHEET
Rev. B
04/01/08

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

The Model 2015-145 Upconverter converts 70 ± 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, ± 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, external reference input and 10MHz reference output, and SMA (female) for the RF output. The unit is powered by a 100-240 ±10% VAC power supply, and housed in a 1.75" X 19" X 16" 1RU chassis.



Front Panel

EQUIPMENT SPECIFICATIONS*

Input Characteristics

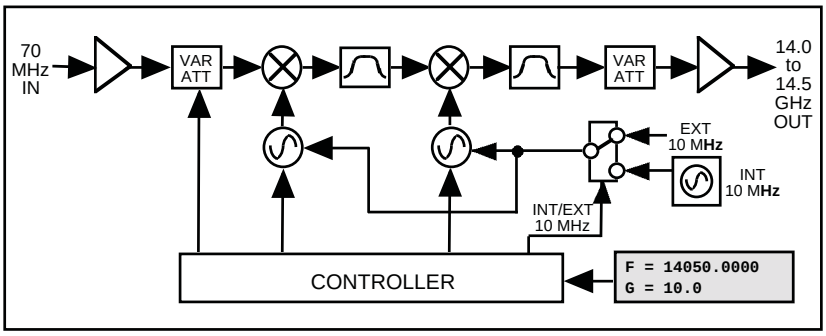
Impedance/Return Loss	75Ω /18 dB
Frequency	70 ± 18 MHZ
Input Level	-30 to -10 dBm

Output Characteristics

Impedance/Return Loss	50Ω/15 dB
Frequency (See Models)	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	±1.5 dB, 14.0-14.5 GHz ; ± 0.5 dB, 36 MHz BW
Group Delay, max	0.01 ns/MHz^2, parabolic, 0.03 ns/MHz, linear, 1 ns ripple
Frequency Sense	Non-inverting



Block Diagram

Synthesizer Characteristics

Frequency Accuracy	± 0.01 ppm internal reference; external reference input					
Frequency Step	125 kHz minimum					
10 MHz In/Out Level	3 dBm, ± 3 dB					
Phase Noise	@ Freq	100Hz	1kHz	10kHz	100kHz	1MHz
	dBc/Hz	< -70	< -70	< -80	< -95	< -105

Available Options

Q - RS485 Remote Interface
Z - Attenuator 0.1 dB on Upconverte Connectors/Impedance
M - 50Ω N-type (RF), 50Ω BNC (IF)
N - 50Ω N-type (RF), 75Ω BNC (IF)
S - 50Ω SMA (RF), 50Ω BNC (IF)

Controls, Indicators

Freq/Gain Selection	direct readout LCD; pushbutton switches or remote selection
Pwr; 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 Connectors	BNC (female), 50Ω/75Ω
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 ±10% VAC, 47-63 Hz, 45 watts max

*10˚C to 40˚C; Specifications subject to change without notice

II. AGILE DOWNCONVERTERS

MODEL NUMBER	PAGE# OR WEB	BAND	RF RANGE (GHz)	IF FREQ (MHz)	IF BW (MHz)	FREQ INCR (Hz)	GAIN RANGE (dB)	10 kHz ø NOISE dBC/Hz
2016-275	15	L	0.25-0.750	70	36	1K	0to+50	-90
2016-02	16	L	0.95-2.150	70	36	1M	0to+50	-80
2016-03	WEB	L	0.95-1.525	70	36	1M	0to+50	-85
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	-85
2016-22	17	L	0.95-2.150	70	36	1K	0to+50	-88
2016-24	17	L	0.95-2.150	140	72	1K	0to+50	-88
2016-25	18	S	2.0-2.5	70	36	1M	0to+50	-80
2016-26	19	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	20	S	2.0-2.5	70	36	1K	0to+50	-88
2016-34	21	C	3.400-4.20	70	36	1K	+30to+50	-88
2016-37	22	C	3.625-4.20	70	36	125K	+30to+50	-80
2016-38	WEB	C	3.400-4.20	140	72	1K	+30to+50	-88
2016-109	WEB	Ku	10.95-11.7	70	36	125K	+30to+50	-80
2016-117	23	Ku	11.7-12.2	70	36	125K	+30to+50	-80

SEE PAGE 48 FOR OPTIONS

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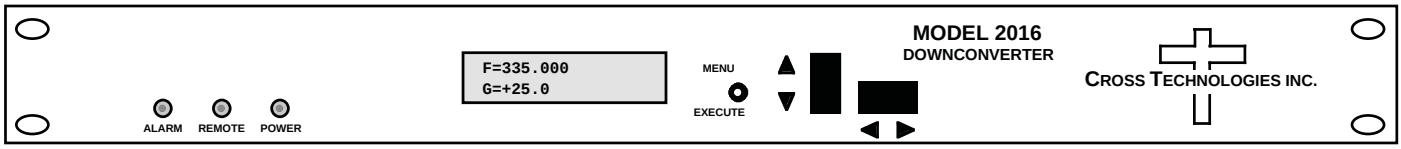
2016-275 Downconverter, 250 - 750 MHz

The 2016-**275** L-band Downconverter converts **250 - 750** MHz to 70 ± 18 MHz in 1 kHz, 10 kHz, 100 kHz, or 125 kHz steps (user selectable) with low group delay and flat frequency response. Synthesized local oscillators (LO) provide very low phase noise and ±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. 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 ±10% VAC power supply, and housed in a 1 3/4" X 19" X 16" rack mount chassis.



Front Panel

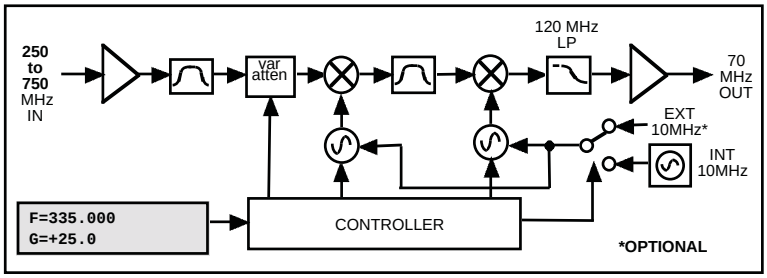
EQUIPMENT SPECIFICATIONS*

IInput Characteristics (RF)

Impedance/Return Loss	75Ω /12 dB
Frequency	**250 to 750 MHz**
Noise Figure, max.	15 dB (max gain)
Input Level Range	-70 to -20 dBm
Input 1dB compression	-15 dBm

Output Characteristics (IF)

Impedance/Return Loss	75Ω/18 dB
Frequency	70 ± 18 MHz
Output level/max linear	-20dBm / -10dBm
Output 1 dB compression	-5 dBm



Block Diagram

Channel Characteristics

Gain range (adjustable)	0.0 to +50.0 dB
Image Rejection	> 50 dB, min.
Frequency Response	±1.5 dB, **250 to 750** MHz ; ± 0.5 dB, 36 MHz BW
Spurious Response	< -50 dBc, in band
Group Delay, max	0.01 ns/MHz^2 parabolic; 0.03 ns/MHz linear; 1 ns ripple
Frequency Sense	Inverting or Non-inverting, selectable

Synthesizer Characteristics

Frequency Accuracy	± .01 ppm internal reference
Frequency Step	**1kHz, 10kHz, 100Khz, or 125kHz** (user selectable)
10 MHz In/Out Level	3 dBm ± 3 dB (option E)

Phase Noise @ Freq	*100Hz*	*1kHz*	*10kHz*	*100kHz*	*1MHz*
dBC/Hz	*-75*	*-85*	*-90*	*-110*	*-120*

Controls, Indicators

Freq/Gain Selection	direct readout LCD; manual or remote selection
Pwr; Alarm; Rem; Mute	Green LED; Red LED; Yellow LED
Remote	RS232C, 9600 baud (Options: RS485, Ethernet)

Other

RF, IF Connectors	Type F (female), BNC (female)
10MHz Connectors	BNC (female), 50Ω/75Ω (option E)
Alarm/Remote Connector	DB9 (female) - NO or NC contact closure on Alarm
Size	19 inch, 1RU standard chassis 1.75" high X 16.0" deep
Power	100-240 ± 10% VAC, 47-63 Hz, 45 W max

Available Options

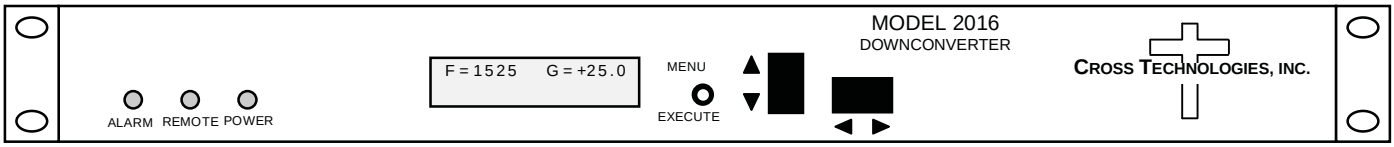
E - External 10 MHz ref input & output w/ RF insertion
Optional M&C: (RS-232 Std.)
Q - RS485 Remote Interface
W8 - Ethernet; w/Web Browser
W18 - Ethernet; w/SNMP
W28 - Ethernet; TCP/IP addressable
T - Temperature Sensor

Connectors/Impedance:
B - 75Ω BNC (RF), 75Ω BNC (IF)
C - 50Ω BNC (RF), 75Ω BNC (IF)
D - 50Ω BNC (RF), 50Ω BNC (IF)
N - 50Ω N-type (RF), 75Ω BNC (IF)
NN - 50Ω N-type (RF & IF)
M - 50Ω N-type (RF), 50Ω BNC (IF)

*10˚C to 40˚C; Specifications subject to change without notice

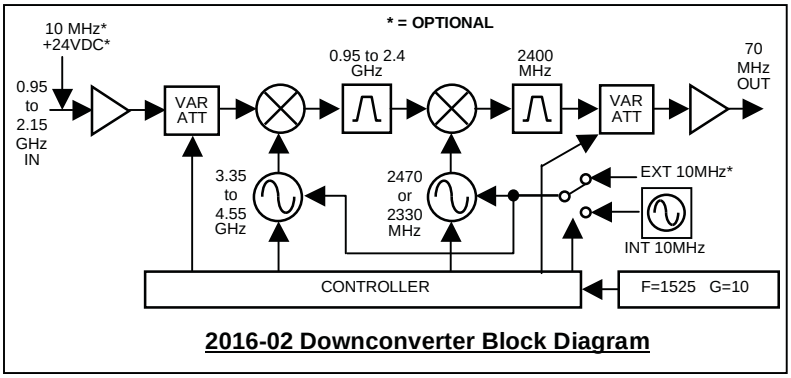
2016-02 L-Band Downconverter

The 2016-02 (CE) Downconverter converts 950 to 2150 MHz to 70 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 input frequency, gain, and other parameters. Front panel LEDs provide indication of DC power, PLL alarm or Remote operation. Gain is adjustable manually (MGC) over a 0 to 50 dB range. The frequency and gain are remotely selectable. Parameter selection and frequency and gain settings appear on the LCD display. Connectors are Type F female for the RF, and BNC female for the IF and optional external 10 MHz reference input and output (option -E). Table 2.2 shows other connector options. LNB +24 VDC (option -L) and 10 MHz reference (option -E) can be inserted on the RF lines. The 2016-02 (CE) is powered by a 100-240 ±10% VAC, 47-63 Hz power supply, and is contained in a 1 3/4" X 19 " X 16" rack mount chassis.



2016-02 Downconverter Front Panel

EQUIPMENT SPECIFICATIONS*



2016-02 Downconverter Block Diagram

Input Characteristics (RF)	
Impedance/Return Loss	75 Ω /12 dB
Frequency	950 to 2150 MHz
Noise Figure, max.	15 dB (max gain)
Input Level Range	-70 to -20 dBm
Input 1dB compression	-15 dBm
Output Characteristics (IF)	
Impedance/Return Loss	75 Ω/18 dB
Frequency	70 ± 18 MHz
Output level/max linear	-20dBm / -10dBm
Output 1 dB comp.	-5 dBm
Channel Characteristics	
Gain range (adjustable)	0.0 to +50.0 dB
Image Rejection	> 50 dB, min.
Frequency Response	±1.5 dB, 950 to 2150 MHz ; ± 0.5 dB, 36 MHz BW
Spurious Response	< -40 dBc, in band
Group Delay, max	0.01 ns/MHz^2 parabolic; 0.03 ns/MHz linear; 1 ns ripple
Frequency Sense	Inverting or Non-inverting, selectable
Synthesizer Characteristics	
Frequency Accuracy	± 1.0 ppm max over temp (±0.01 ppm, option H)
Frequency Step	1.0 MHz (as low as 1 kHz steps available)
Phase Noise	@ Freq | 100Hz 1kHz 10kHz 100kHz 1 MHz dBC/Hz | <-70 <-70 <-80 <-90 <-100
10 MHz Level (In or Out)	3 dBm, ± 3 dB, 75 ohms (option E)
Controls, Indicators	
Frequency Selection	direct readout LCD; manual or remote selection
Gain Selection	direct readout LCD; manual or remote selection
Power; Alarm; Remote	Green LED; Red LED; Yellow LED
Remote	RS232C, 9600 baud (RS485, option Q)
Other	
RF Connector	Type F (female)
IF, 10 MHz Connectors	BNC (female) Option E
Alarm/Remote Connector	DB9 (female) - NO or NC contact closure on Alarm
Size	19 inch, 1RU standard chassis 1.75"high X 16.0" deep
Power	100-240 ± 10% VAC, 47-63 Hz, 45 watts max

Available Options

E – External 10 MHz ref input & output w/RF insertion
H – High Stability (±0.01ppm) internal reference
L – LNB Voltage, +24VDC, 0.4 amps
Q – RS485 Remote Interface
T – Temperature Sensor
X – 125 kHz Frequency step size
SW1 – Switch-system specific option

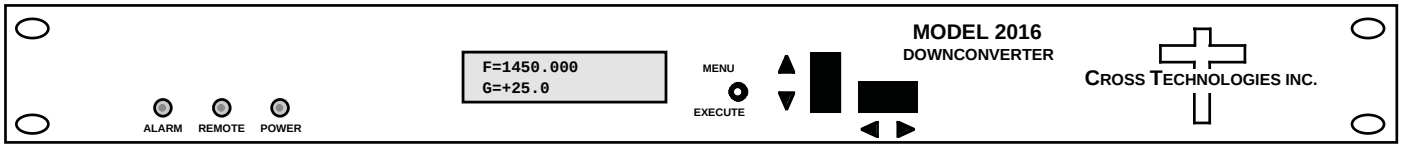
Connectors/Impedance

STD – 75Ω Type F (RF), 75Ω BNC (IF)
B – 75Ω BNC (RF), 75Ω BNC (IF)
C – 50Ω BNC (RF), 75Ω BNC (IF)
D – 50Ω BNC (RF), 50Ω BNC (IF)
F – 75Ω Type F (RF), 75Ω Type F (IF)
FN – 75Ω Type N (RF), 75Ω Type N (IF)
J – 75Ω Type F (RF), 50Ω BNC (IF)
K – 75Ω BNC (RF), 50Ω BNC (IF)
M– 50Ω Type-N (RF), 50Ω BNC (IF)
N – 50Ω Type-N (RF), 75Ω BNC (IF)
S – 50Ω SMA (RF), 50Ω BNC (IF)

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

2016-22, -24 Downconverter, 950 - 2150 MHz

The 2016-22 L-band Downconverter converts 950 to 2150 MHz in 1 kHz, 10 kHz, or 125 kHz steps (user selectable) to 70 ± 18 MHz with low group delay and flat frequency response. Synthesized local oscillators (LO) provide very low phase noise and ±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 90-260 VAC power supply, and housed in a 1 3/4" X 19 " X 16" rack mount chassis.



Front Panel

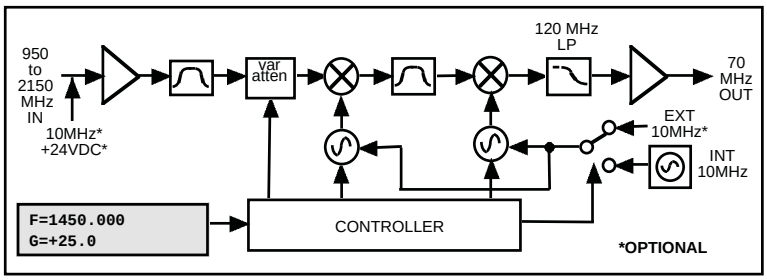
EQUIPMENT SPECIFICATIONS*

IInput Characteristics (RF)

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

Output Characteristics (IF)

Impedance/Return Loss	75Ω/18 dB
Frequency	70 ± 18 MHz
Output level/max linear	-20dBm / -10dBm
Output 1 dB compression	-5 dBm



Block Diagram

Channel Characteristics

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

Synthesizer Characteristics

Frequency Accuracy	± .01 ppm internal reference					
Frequency Step	1kHz, 10kHz, or 125kHz (user selectable)					
10 MHz In/Out Level	3 dBm ± 3 dB (option E)					
Phase Noise	@ Freq	100Hz	1kHz	10kHz	100kHz	1MHz
	dBC/Hz	< -75	< -85	< -90	< -110	< -120

Controls, Indicators

Freq/Gain Selection	direct readout LCD; manual or remote selection
Pwr; Alarm; Rem; Mute	Green LED; Red LED; Yellow LED; Red LED
Remote	RS232C, 9600 baud (RS485, option Q)

Other

RF, IF Connectors	Type F (female), BNC (female)
10MHz Connectors	BNC (female), 50Ω/75Ω (option E)
Alarm/Remote Connector	DB9 (female) - NO or NC contact closure on Alarm
Size	19 inch, 1RU standard chassis 1.75"high X 16.0" deep
Power	100-240 ± 10% VAC, 47-63 Hz, 45 W max

Available Options

E - External 10 MHz ref input & output w/ RF insertion
L - LNB Voltage, +24VDC, 0.4 amps
Q - RS485 Remote Interface
T - Temperature Sensor

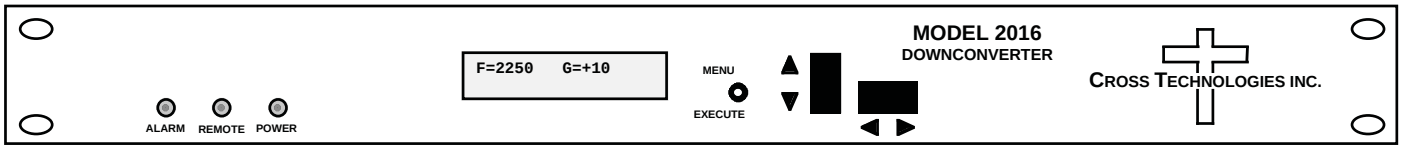
Connectors/Impedance
B - 75Ω BNC (RF), 75Ω BNC (IF)
C - 50Ω BNC (RF), 75Ω BNC (IF)
D - 50Ω BNC (RF), 50Ω BNC (IF)
N - 50Ω N-type (RF), 75Ω BNC (IF)
M - 50Ω N-type (RF), 50Ω BNC (IF)

CROSS TECHNOLOGIES, INC.

DATA SHEET
REV. D
07/15/09

2016-25 Downconverter, 2.0 - 2.5 GHz to 70 MH

The 2016-25 Downconverter converts 2000 to 2500 MHz to 70 ± 18 MHz in 1 MHz step **(500 kHz, option -5)** 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), remote operation (yellow), 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, IF and optional 10 MHz Input and Output signals (**option E**). 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

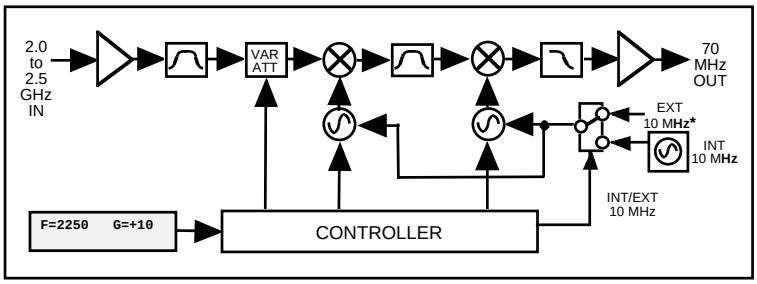
EQUIPMENT SPECIFICATIONS*

Input Characteristics (RF)

Impedance/Return Loss	50Ω / 12 dB
Frequency	2.0 to 2.5 GHz
Level Range	-70 to -20 dBm
Input 1dB compression	-15 dBm

Output Characteristics (IF)

Impedance/Return Loss	75Ω / 18 dB
Frequency	70 ± 18 MHz
Level Range	-30 to -20 dBm
Output 1 dB compression	-15 dBm



Block Diagram

Channel Characteristics

Gain range (adjustable)	0.0 to +50.0 dB
Image Rejection	> 50 dB, min.
Frequency Response	±1.5 dB, 2.0 - 2.5 GHz; ± 0.5 dB, 36 MHz BW
Spurious Response	< -45 dBC, in band
Group Delay, max	0.01 ns/MHz^2 parabolic; 0.03 ns/MHz linear; 1 ns ripple
Frequency Sense	Inverting or Non-inverting (selectable)

Synthesizer Characteristics

Frequency Accuracy	±1.0 ppm internal reference (±0.01 ppm, **option H**)
Frequency Step	1.0 MHz (500 kHz, **option -5**) (125 kHz, option X)
10 MHz In/Out Level	+3 dBm ± 3 dB (**option E**)

Phase Noise @ F (Hz) >	*100*	*1K*	*10K*	*100K*	*1M*
dBC/Hz	*-70*	*-70*	*-80*	*-95*	*-105*

Controls, Indicators

Freq/Gain Selection	direct readout LCD; manual or remote selection
Pwr; Alarm; Rem; Mute	Green LED; Red LED; Yellow LED; Red LED
Remote	RS232C, 9600 baud (RS485, **option Q**)

Other

RF, IF Connectors	BNC (female)
10MHz Connectors	BNC (female), 50Ω/75Ω (**option E**)
Alarm/Remote Connector	DB9 (female) - NO or NC contact closure on Alarm
Size	19 inch, 1RU standard chassis 1.75"high X 16.0" deep
Power	100-240 ± 10% VAC, 47-63 Hz, 45 W max

Available Options

E - External 10 MHz ref input 7 output
H - Stability internal reference (±0.01 ppm)
L - LNB +24VDC,0.4 Amps, current readout
Q - RS-422/RS-485 Remote capability
T - Temperature Sensor
V - SSPB +24 VDC, 2.5 Amps max, with readout of current
X - 125 kHz step size
W1 - Output Level Detector
W8 - Ethernet M&C Remote Interface
Z - Attenuator 0.1 dB step size
-5 - 500 kHz frequency steps

Connectors/Impedance
B - 75Ω BNC (RF), 75Ω BNC (IF)
D - 50Ω BNC (RF), 50Ω BNC (IF)
N - 50Ω N-type (RF), 75Ω BNC (IF)
M - 50Ω N-type (RF), 50Ω BNC (IF)

*10˚C to 40˚C; Specifications subject to change without notice

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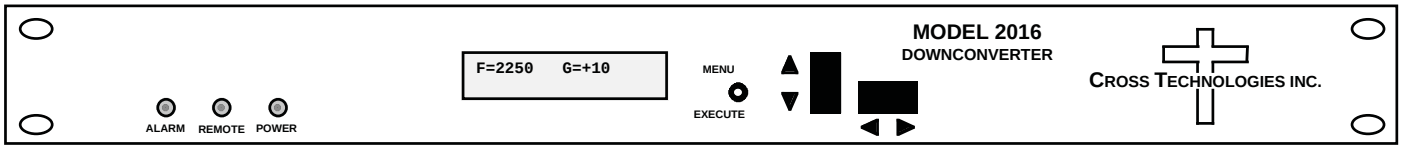
DATA SHEET
7/30/08

2016-26 Downconverter, 2.0 - 2.5 GHz to 140 MHz

The 2016-26 Downconverter converts 2000 to 2500 MHz to 140 ± 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), remote operation (yellow), 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, IF and optional 10 MHz Input and Output signals (**option E**). 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

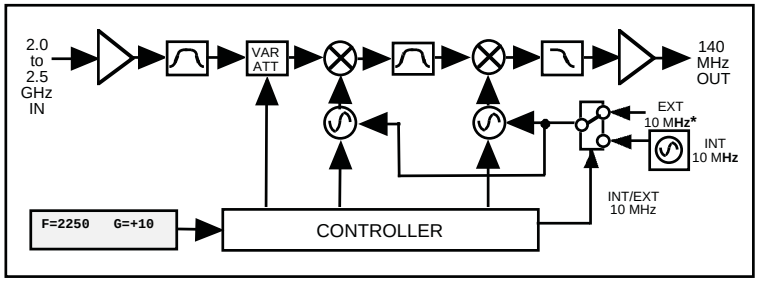
EQUIPMENT SPECIFICATIONS*

Input Characteristics (RF)

Impedance/Return Loss	50Ω / 12 dB
Frequency	2.0 to 2.5 GHz
Level Range	-70 to -20 dBm
Input 1dB compression	-15 dBm

Output Characteristics (IF)

Impedance/Return Loss	75Ω / 18 dB
Frequency	140 ± 36 MHz
Level Range	-30 to -20 dBm
Output 1 dB compression	-15 dBm



Block Diagram

Channel Characteristics

Gain range (adjustable)	0.0 to +50.0 dB
Image Rejection	> 50 dB, min.
Frequency Response	±1.5 dB, 2.0 - 2.5 GHz; ± 0.5 dB, 36 MHz BW
Spurious Response	< -45 dBC, in band
Group Delay, max	0.01 ns/MHz^2 parabolic; 0.03 ns/MHz linear; 1 ns ripple
Frequency Sense	Inverting or Non-inverting (selectable)

Synthesizer Characteristics

Frequency Accuracy	±1.0 ppm internal reference (±0.01 ppm, **option H**)
Frequency Step	1.0 MHz
10 MHz In/Out Level	+3 dBm ± 3 dB (**option E**)

Phase Noise @ Freq	100 Hz	1kHz	10kHz	100kHz	1 MHz
dBC/Hz	-70	-70	-80	-95	-105

Controls, Indicators

Freq/Gain Selection	Direct readout LCD; manual or remote selection
Pwr; Alarm; Rem; Mute	Green LED; Red LED; Yellow LED; Red LED
Remote	RS232C, 9600 baud (RS485, **option Q**)

Other

RF, IF Connectors	BNC (female), 50Ω/75Ω
10MHz Connectors	BNC (female), 75Ω (**option E**)
Alarm/Remote Connector	DB9 (female) - NO or NC contact closure on Alarm
Size	19 inch, 1RU standard chassis 1.75"high X 16.0" deep
Power	100-240 ± 10% VAC, 47-63 Hz, 45 W max.

Available Options

E - External 10 MHz ref input & output
H - High Stability Internal Ref (±0.01 ppm)
Q - RS485 Remote Interface
X - 125 kHz Frequency Steps

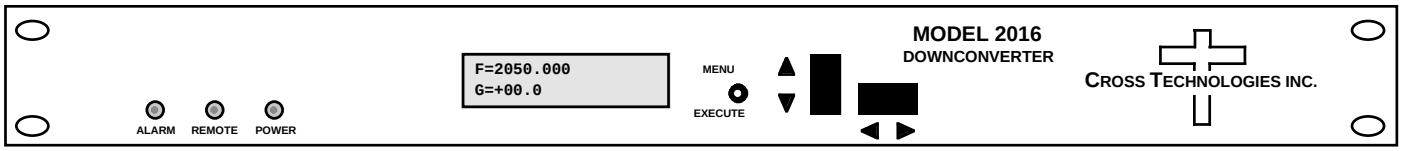
Connectors/Impedance

B - 75Ω BNC (RF), 75Ω BNC (IF)
D - 50Ω BNC (RF), 50Ω BNC (IF)
N - 50Ω N-type (RF), 75Ω BNC (IF)
M - 50Ω N-type (RF), 50Ω BNC (IF)

*10˚C to 40˚C; Specifications subject to change without notice

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

The 2016-225 Downconverter converts 2000 to 2500 MHz to 70 ± 18 MHz in 1kHz, 10kHz, 100kHz or 125kHz steps (user selectable) with low group delay and flat frequency response. Synthesized local oscillators (LO) provide very low phase noise and ±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). Variable attenuators for the IF input and output provide a gain range of 0 to +50 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 Input, RF output and the optional external reference input and output. The External 10MHz option includes a 10MHz input and output connector. The unit is powered by a 90-260 VAC power supply, and housed in a 1RU X 16" chassis.



Front Panel

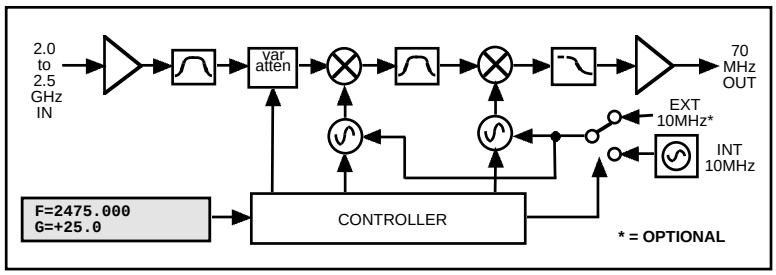
EQUIPMENT SPECIFICATIONS*

IInput Characteristics (RF)

Impedance / Return Loss	50Ω / 12dB
Frequency	2.0 to 2.5 GHz
Input Level Range	-70 to -20 dBm
Input 1dB compression	-15 dBm

Output Characteristics (IF)

Impedance / Return Loss	50Ω / 18dB
Frequency	70 ± 18 MHz
Output level/max linear	-20dBm / -10dBm
Output 1 dB compression	-5 dBm



Block Diagram

Channel Characteristics

Gain range (adjustable)	0 to +50 dB
Image Rejection	> 50 dB, min.
Frequency Response	±1.5 dB, 2.0-2.5 GHz ; ± 0.5 dB, 36 MHz BW
Spurious Response	< -50 dBc, in band
Group Delay, max	0.01 ns/MHz^2 parabolic; 0.03 ns/MHz linear; 1 ns ripple
Frequency Sense	Inverting or Non-inverting (selectable)

Synthesizer Characteristics

Frequency Accuracy	± .01 ppm internal reference					
Frequency Step	1kHz, 10kHz, 100kHz, or 125kHz (user selectable)					
10 MHz In/Out Level	3 dBm ± 3 dB (option E)					
Phase Noise	@ Freq	100Hz	1kHz	10kHz	100kHz	1MHz
	dBC/Hz	< -75	< -85	< -90	< -115	< -118

Controls, Indicators

Freq/Gain Selection	direct readout LCD; manual or remote selection
Pwr; Alarm; Rem; Mute	Green LED; Red LED; Yellow LED; Red LED
Remote	RS232C, 9600 baud (RS485, option Q)

Other

RF, IF Connectors	BNC (female)
10MHz Connectors	BNC (female), 50Ω/75Ω (option E)
Alarm/Remote Connector	DB9 (female) - NO or NC contact closure on Alarm
Size	19 inch, 1RU standard chassis 1.75"high X 16.0" deep
Power	100-240 ± 10% VAC, 47-63 Hz, 45 W max

Available Options

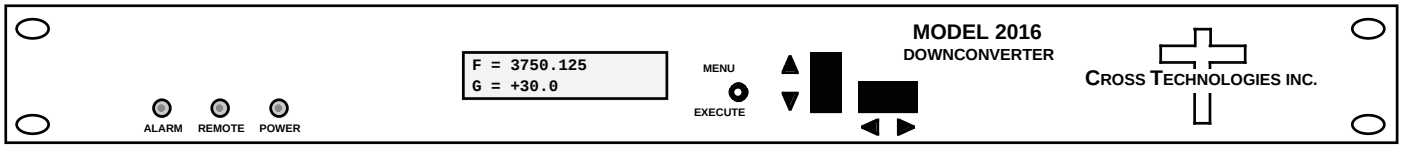
E - External 10 MHz ref input & output
Q - RS485 Remote Interface
T - Temperature Sensor

Connectors/Impedance
B - 75Ω BNC (RF), 75Ω BNC (IF)
C - 50Ω BNC (RF), 75Ω BNC (IF)
N - 50Ω N-type (RF), 75Ω BNC (IF)
M - 50Ω N-type (RF), 50Ω BNC (IF)

*10˚C to 40˚C; Specifications subject to change without notice

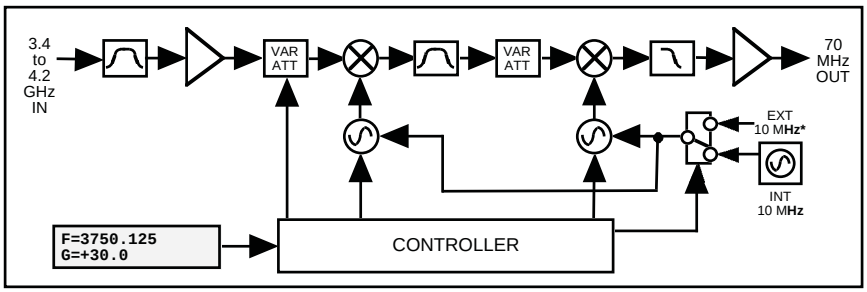
2016-34 Downconverter, 3.4 - 4.2 GHz to 70 MHz IF

The 2016-34 Downconverter converts 3.4 to 4.2 GHz in 1 kHz steps to 70 ± 18 MHz with low group delay and flat frequency response. Synthesized local oscillators (LO) provide very low phase noise and ±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 ± 10% VAC power supply, and housed in a 1 3/4" X 19 " X 16" rack mount chassis.



Front Panel

EQUIPMENT SPECIFICATIONS



Block Diagram

***Input Characteristics (RF)**

Impedance/Return Loss	50Ω /14 dB
Frequency	3.4 to 4.2 GHz
Noise Figure, max.	12 dB (max gain)
Level	-70 to -30 dBm
1dB compression	-15 dBm

Output Characteristics (IF)

Impedance/Return Loss	75Ω/18 dB
Frequency	70 ± 18 MHz
Level	-25 to -5 dBm
1dB compression	+5 dBm
Intermodulation	< -55 dBC; -60 dBC typ. (2 carriers @ -10 dBm input)

Channel Characteristics

Gain range (adjustable)	+30 to +50 dB
Image Rejection	> 50 dB, min
Spurious Response	<-50 dBC, in band
Frequency Response	±1.5 dB, 3.4-4.2 GHz ; ± 0.6 dB, 36 MHz BW
Group Delay, max	0.01 ns/MHz^2 parabolic; 0.03 ns/MHz linear; 1 ns ripple
Frequency Sense	Non-inverting

Synthesizer Characteristics

Frequency Accuracy	± 0.01 ppm internal reference; external reference input
Frequency Step	1, 10, 100, or 125 kHz (user selectable)
10 MHz In/Out Level	3 dBm ± 3 dB

Phase Noise @ Freq	100 Hz	1kHz	10kHz	100kHz	1 MHz
dBC/Hz	-70	-80	-88	-100	-120

Controls, Indicators

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

Other

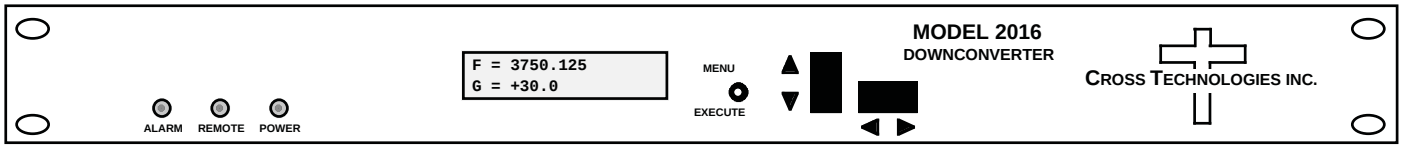
RF Connector	Type N (female)
IF Connector	BNC (female)
10 MHz Connectors	BNC (female), 50Ω/75Ω
Alarm/Remote Connector	DB9 - NO or NC contact closure on Alarm
Size	19 inch, 1RU standard chassis 1.75"high X 16.0" deep
Power	100-240 ± 10% VAC, 47-63 Hz, 45 watts max

Available Options

Q - RS485/RS422 Remote Interface
Connectors/Impedance
M - 50Ω Type N (RF), 50Ω BNC (IF)

2016-37 Downconverter, 3.625 - 4.2 GHz

The 2016-37 Downconverter converts 3.625 to 4.2 GHz in 125 kHz steps to 70 ± 18 MHz with low group delay and flat frequency response. Synthesized local oscillators (LO) provide very low phase noise and **±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 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 90-260 VAC power supply, and housed in a 1 3/4" X 19" X 16" rack mount chassis.



Front Panel

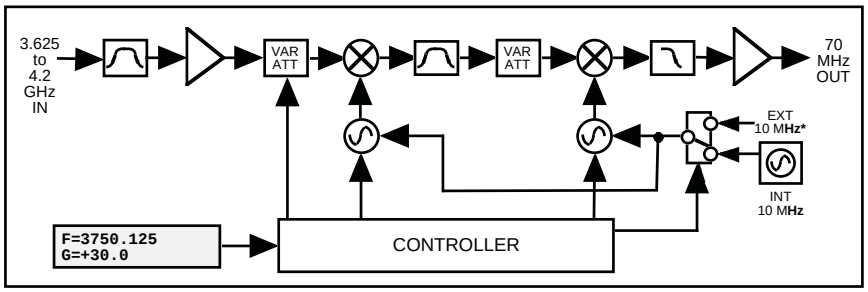
EQUIPMENT SPECIFICATIONS*

Input Characteristics (RF)

Impedance/Return Loss	50Ω /14 dB
Frequency	3.625 to 4.2 GHz
Level	-70 to -30 dBm
1dB compression	-15 dBm

Output Characteristics (IF)

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



Block Diagram

Channel Characteristics

Gain range (adjustable)	+30 to +50 dB
Image Rejection	> 50 dB, min
Spurious Response	<-50 dBC
Frequency Response	±1.5 dB, 3.625-4.2 GHz ; ± 0.6 dB, 36 MHz BW
Group Delay, max	0.01 ns/MHz^2 parabolic; 0.03 ns/MHz linear; 1 ns ripple
Frequency Sense	Non-inverting

Synthesizer Characteristics

Frequency Accuracy	**± 0.01** ppm internal reference; external reference input
Frequency Step	125 kHz minimum
10 MHz In/Out Level	3 dBm ± 3 dB

Phase Noise @ Freq	100 Hz	1kHz	10kHz	100kHz	1 MHz
	-60	-70	-80	-90	-100

Controls, Indicators

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

Other

RF Connector	Type N (female)
IF Connector	BNC (female)
10 MHz Connectors	BNC (female), 50Ω/75Ω
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 ± 10% VAC, 47-63 Hz, 45 watts max

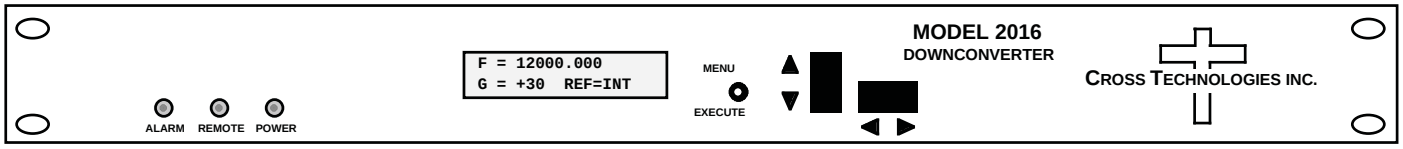
Available Options

Q - RS485/RS422 Remote Interface
Connectors/Impedance
M - 50Ω Type N (RF), 50Ω BNC (IF)

*10˚C to 40˚C; Specifications subject to change without notice

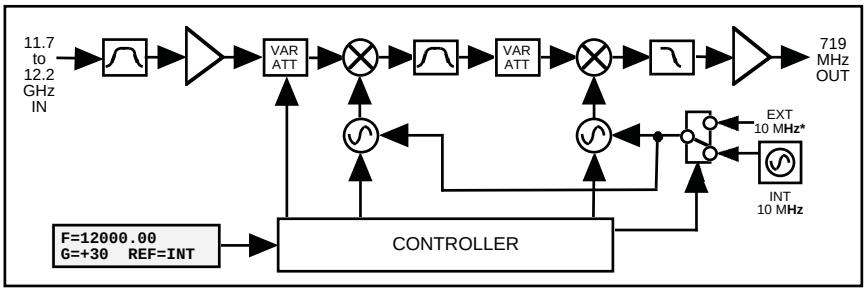
2016-117 Downconverter, 11.7 - 12.2 GHz

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 ± 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 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

EQUIPMENT SPECIFICATIONS*



Block Diagram

Input Characteristics (RF)

Impedance/Return Loss	50Ω /14 dB
Frequency	11.7 to 12.2 GHz
Level	-70 to -40 dBm
1dB Compression	-30 dBm @ +30 dB gain

Output Characteristics (IF)

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

Channel Characteristics

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

Synthesizer Characteristics

Frequency Accuracy	± 0.01 ppm internal reference; external reference input
Frequency Step	125 kHz minimum
10 MHz In/Out Level	3 dBm ± 3 dB

Phase Noise @ Freq	100 Hz	1kHz	10kHz	100kHz	1 MHz
dBC/Hz	-60	-70	-80	-90	-100

Controls, Indicators

Freq/Gain Selection	direct readout LCD; pushbutton switches or remote selection
Pwr; Alm; Remote; Mute	Green LED; Red LED; Yellow LED; Yellow LED
Remote	RS232C, 9600 baud

Other

RF Connector	SMA (female)
IF Connector	BNC (female)
10 MHz Connectors	BNC (female), 50Ω/75Ω
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 ±10% VAC, 47-63 Hz, 45 watts max

Available Options

Q - RS485 Remote Interface
Z - Attenuator 0.1 dB on Upconverter Connectors/Impedance
M - 50Ω N-type (RF), 50Ω BNC (IF)
N - 50Ω N-type (RF), 75Ω BNC (IF)
S - 50Ω SMA (RF), 50Ω BNC **(IF)**

*10˚C to 40˚C; Specifications subject to change without notice

III. AGILE UP/DOWNCONVERTER COMBOS

MODEL NUMBER	PAGE# OR WEB	BAND	RF RANGE (GHz)	IF FREQ (MHz)	IF BW (MHz)	FREQ STEPS (Hz)	GAIN RANGE (dB)	10 kHz ø NOISE dBC/Hz
2017-81	27	UHF	0.81-0.990	70	36	1M	-10to+30	-85
2017-95	28	UHF	0.25-.950	70	36	1M	-10to+30	-80
2017-02	WEB	L,L	0.95-2.15	70	36	1M	L-band	-80
2017-03	29	L,L	0.95-1.525	70	36	1M	L-band	-85
2017-03A	30	L,L	0.95-1.525	70	36	1M	L-band	-85
2017-25	WEB	S, UP	2.-2.5	70	36	1M	-10to+30	-80
		S, DN	2.-2.5	70	36	1M	0to+50	-80
2017-26	WEB	S, UP	2.-2.5	140	36	1M	-10to+30	-80
		S, DN	2.-2.5	140	36	1M	0to+50	-80
2017-35	31	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
2017-65	32	C, UP	5.85-6.425	70	36	1M	0to+30	-80
		C, DN	3.625-4.20	70	36	1M	+30to+50	-80
2017-74	33	C, UP	6.70-7.00	70	36	1M	-10to+20	-80
		C, DN	4.50-4.80	70	36	1M	+30to+50	-80

SEE PAGE 48 FOR OPTIONS

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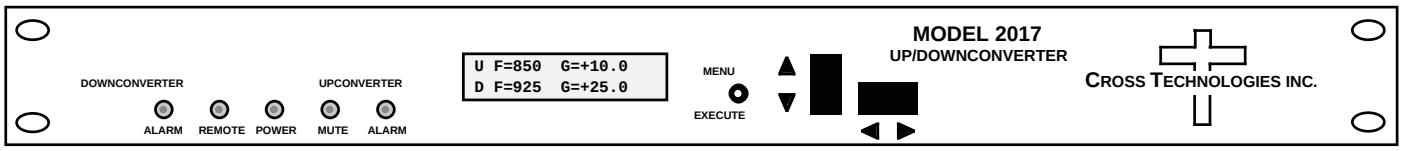
2017-81 Up/Downconverter, 810 - 990 MHz

The 2017-81 L-band Up/Downconverter converts 70 MHz to 810 - 990 MHz (Up) and 810 - 990 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 can be 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 multifunction 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 (±0.01ppm) option is also available. It is powered by a 100-240 ±10% VAC power supply and housed in a 1.75" X 19" X 16" 1RU chassis.



Front Panel

EQUIPMENT SPECIFICATIONS*

----------UPCONVERTER----------

Input Characteristics (IF)

Impedance/Return Loss	75Ω /18 dB
Frequency	70 ± 18 MHz
Level	-40 to -10 dBm

Output Characteristics (RF)

Impedance/Return Loss	75Ω/12 dB
Frequency	810 to 990 MHz
Level	-20 to 0 dBm
1dB compression	+5 dBm

Channel Characteristics

Gain range (adjustable)	-10 to +30 dB, 1dB steps
Frequency Sense	Non-inverting

---------DOWNCONVERTER---------

Input Characteristics (RF)

Impedance/Return Loss	75Ω /12 dB
Frequency	810 to 990 MHz
Noise Figure, max.	15 dB (max gain)
Level	-70 to -20 dBm
1dB compression	-15 dBm

Output Characteristics (IF)

Impedance/Return Loss	75Ω/18 dB
Frequency	70 ± 18 MHz
Level/Max Linear	-20 dBm / -10 dBm
1dB compression	-5 dBm

Channel Characteristics

Gain range (adjustable)	0 to +50 dB, 1dB steps
Image Rejection	> 50 dB, min
Frequency Sense	Inverting or Non-inverting (selectable)

--------UP and DOWNCONVERTER--------

Channel Characteristics

Frequency Response	±1.5 dB, in band; ±0.5 dB, 36 MHz BW
Spurious Response	<-50 dBC
Group Delay, max	0.01 ns/MHz^2 parabolic; 0.03 ns/MHz linear; 1 ns ripple

Synthesizer Characteristics

Frequency Accuracy	± 1.0 ppm internal reference (±0.01 ppm, **option-H**)
Frequency Step	1 MHz (125 kHz (**option-X**)

Phase Noise @ Freq	100 Hz	1kHz	10kHz	100kHz	1 MHz
dBC/Hz	-75	-75	-85	-100	-120

10 MHz In/Out Level	3 dBm ± 3 dB, 75 ohms (**option-E**)

Controls, Indicators

Freq/Gain Selection	direct readout LCD; pushbutton switches or remote selection
Power; Alarm; Remote	Green LED; Red LED; Yellow LED
Remote	RS232C, 9600 baud (RS485,**option-Q**, Ethernet Remote Interface, **option-W8**)

Other

RF Connector	Type F (female)
IF Connector	BNC (female)
10 MHz Connectors	BNC (female), 50Ω/75Ω
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 ± 10% VAC, 47-63 Hz, 45 watts max

Available Options

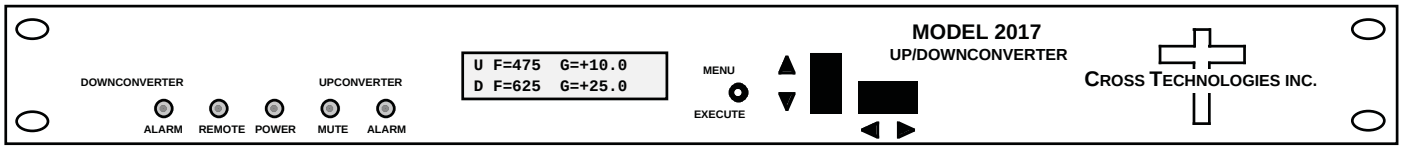
E - External 10 MHz ref with RF insertion
H - High Stability (±0.01ppm) internal ref
L - LNB Voltage, +24VDC, 0.4 amps
V - SSPB Voltage, +24VDC, 2.5 amps
Q - RS485 Remote Interface
T - Temperature Sensor
X - 125 kHz frequency step
W8 - Ethernet Interface

Connectors/Impedance

B - 75Ω BNC (RF), 75Ω BNC (IF)
C - 50Ω BNC (RF), 75Ω BNC (IF)
D - 50Ω BNC (RF), 50Ω BNC (IF)
J - 75Ω F-type (RF), 50Ω BNC (IF)
N - 50Ω N-type (RF), 75Ω BNC (IF)
M - 50Ω N-type (RF), 50Ω BNC (IF)
S- SMA, 50Ω (RF), 50Ω BNC (IF)

2017-95 Up/Downconverter, 250 - 950 MHz

The 2017-95 L-band Up/Downconverter converts 70 MHz to 250-950 MHz (Up) and 250-950 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 can be 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 (±0.01ppm) option is also available. It is powered by a 100-240 ±10% VAC power supply and housed in a 1.75" X 19" X 16" 1RU chassis.



Front Panel

EQUIPMENT SPECIFICATIONS

----------UPCONVERTER----------

Input Characteristics (IF)

Impedance/Return Loss	75Ω /18 dB
Frequency	70 ± 18 MHz
Level	-40 to -10 dBm

Output Characteristics (RF)

Impedance/Return Loss	75Ω/10 dB
Frequency	250 to 950 MHz
Level	-20 to 0 dBm
1dB compression	+5 dBm

Channel Characteristics

Gain range (adjustable)	-10 to +30 dB, 1dB steps
Frequency Sense	Non-inverting

---------DOWNCONVERTER---------

Input Characteristics (RF)

Impedance/Return Loss	75Ω /10 dB
Frequency	250 to 950 MHz
Noise Figure, max.	15 dB (max gain)
Level	-70 to -20 dBm
1dB compression	-15 dBm

Output Characteristics (IF)

Impedance/Return Loss	75Ω/18 dB
Frequency	70 ± 18 MHz
Level/Max Linear	-20 dBm / -10 dBm
1dB compression	-5 dBm

Channel Characteristics

Gain range (adjustable)	0 to +50 dB, 1dB steps
Image Rejection	> 50 dB, min
Frequency Sense	Inverting or Non-inverting (selectable)

--------UP and DOWNCONVERTER--------

Channel Characteristics

Frequency Response	±1.5 dB, in band; ±0.5 dB, 36 MHz BW
Spurious Response	<-50 dBC
Group Delay, max	0.01 ns/MHz^2 parabolic; 0.03 ns/MHz linear; 1 ns ripple

Synthesizer Characteristics

Frequency Accuracy	± 1.0 ppm internal reference (±0.01 ppm, **option H**)
Frequency Step	1 MHz (125 kHz, **option X**)
10 MHz In/Out Level	3 dBm ± 3 dB

Phase Noise @ F (Hz) >	*100Hz*	*1kHz*	*10kHz*	*100kHz*	*1MHz*
dBC/Hz	*-70*	*-70*	*-80*	*-90*	*-100*

Controls, Indicators

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

Other

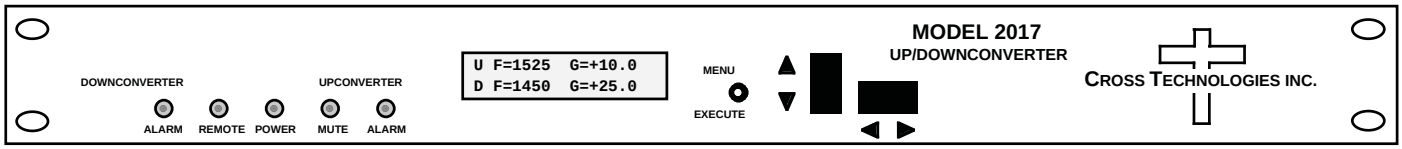
RF Connector	Type F (female)
IF Connector	BNC (female)
10 MHz Connectors	BNC (female), 50Ω/75Ω
Alarm/Remote Connector	DB9 - NO or NC contact closure on Alarm
Size	19 inch, 1RU standard chassis 1.75"high X 16.0" deep
Power	100-240 ±10% VAC, 47-63 Hz, 45 watts max

Available Options

E - External 10 MHz ref with RF insertion
H - High Stability (±0.01ppm) internal ref
L - LNB Voltage, +24VDC, 0.4 amps
V - SSPB Voltage, +24VDC, 2.5 amps
Q - RS485 Remote Interface
T - Temperature Sensor
W8 - Ethernet M&C Remote Interface
X- 125 Khz frequency steps
Connectors/Impedance
B - 75Ω BNC (RF), 75Ω BNC (IF)
C - 50Ω BNC (RF), 75Ω BNC (IF)
D - 50Ω BNC (RF), 50Ω BNC (IF)
J - 75Ω F-type (RF), 50Ω BNC (IF)
N - 50Ω N-type (RF), 75Ω BNC (IF)
M - 50Ω N-type (RF), 50Ω BNC (IF)

2017-03 Up/Downconverter, 950 - 1525 MHz

The 2017-03 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. 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 can be 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 (±0.01ppm) option is also available. It is powered by a 100-240 ±10% VAC power supply and housed in a 1.75" X 19" X 16" 1RU chassis.



Front Panel

EQUIPMENT SPECIFICATIONS*

----------UPCONVERTER----------

Input Characteristics (IF)

Impedance/Return Loss	75Ω /18 dB
Frequency	70 ± 18 MHz
Level	-40 to -10 dBm

Output Characteristics (RF)

Impedance/Return Loss	75Ω/12 dB
Frequency	950 to 1525 MHz
Level	-20 to 0 dBm
1dB compression	+5 dBm

Channel Characteristics

Gain range (adjustable)	-10 to +30 dB, 1dB steps
Frequency Sense	Non-inverting

---------DOWNCONVERTER---------

Input Characteristics (RF)

Impedance/Return Loss	75Ω /12 dB
Frequency	950 to 1525 MHz
Noise Figure, max.	15 dB (max gain)
Level	-70 to -20 dBm
1dB compression	-15 dBm

Output Characteristics (IF)

Impedance/Return Loss	75Ω/18 dB
Frequency	70 ± 18 MHz
Level/Max Linear	-20 dBm / -10 dBm
1dB compression	-5 dBm

Channel Characteristics

Gain range (adjustable)	0 to +50 dB, 1dB steps
Image Rejection	> 50 dB, min
Frequency Sense	Inverting or Non-inverting (selectable)

--------UP and DOWNCONVERTER--------

Channel Characteristics

Frequency Response	±1.5 dB, in band; ±0.5 dB, 36 MHz BW
Spurious Response	<-50 dBC
Group Delay, max	0.01 ns/MHz^2 parabolic; 0.03 ns/MHz linear; 1 ns ripple

Synthesizer Characteristics

Frequency Accuracy	± 1.0 ppm internal reference (±0.01 ppm, **option-H**)
Frequency Step	1 MHz (125 kHz (**option-X**)

Phase Noise @ Freq	100 Hz	1kHz	10kHz	100kHz	1 MHz
dBC/Hz	-75	-75	-85	-100	-120

10 MHz In/Out Level	3 dBm ± 3 dB, 75 ohms (**option-E**)

Controls, Indicators

Freq/Gain Selection	direct readout LCD; pushbutton switches or remote selection
Power; Alarm; Remote	Green LED; Red LED; Yellow LED
Remote	RS232C, 9600 baud (RS485,**option-Q**, Ethernet Remote Interface, **option-W8**)

Other

RF Connector	Type F (female)
IF Connector	BNC (female)
10 MHz Connectors	BNC (female), 50Ω/75Ω
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 ± 10% VAC, 47-63 Hz, 45 watts max

Available Options

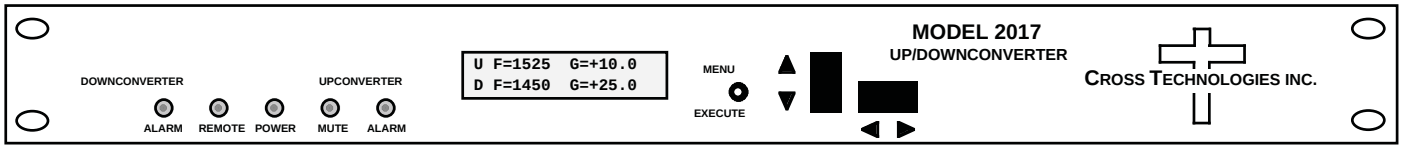
E - External 10 MHz ref with RF insertion
H - High Stability (±0.01ppm) internal ref
L - LNB Voltage, +24VDC, 0.4 amps
V - SSPB Voltage, +24VDC, 2.5 amps
Q - RS485 Remote Interface
T - Temperature Sensor
X - 125 kHz frequency step
W8 - Ethernet Interface

Connectors/Impedance

B - 75Ω BNC (RF), 75Ω BNC (IF)
C - 50Ω BNC (RF), 75Ω BNC (IF)
D - 50Ω BNC (RF), 50Ω BNC (IF)
J - 75Ω F-type (RF), 50Ω BNC (IF)
N - 50Ω N-type (RF), 75Ω BNC (IF)
M - 50Ω N-type (RF), 50Ω BNC (IF)
S- SMA, 50Ω (RF), 50Ω BNC (IF)

2017-03A Up/Downconverter, 950 - 1525 MHz

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 (±0.01ppm) option is also available. It is powered by a 100-240 ± 10% VAC power supply and housed in a 1.75" X 19" X 16" 1RU chassis.



Front Panel

EQUIPMENT SPECIFICATIONS*

----------UPCONVERTER----------

Input Characteristics (IF)

Impedance/Return Loss	75Ω /18 dB
Frequency	70 ± 18 MHz
Level	-40 to -10 dBm

Output Characteristics (RF)

Impedance/Return Loss	75Ω/12 dB
Frequency	950 to 1525 MHz
Level	**-35 to -15 dBm**
1dB compression	**-10 dBm**

Channel Characteristics

Gain range (adjustable)	**-25 to +15 dB**, 1dB steps
Frequency Sense	Non-inverting

---------DOWNCONVERTER---------

Input Characteristics (RF)

Impedance/Return Loss	75Ω /12 dB
Frequency	950 to 1525 MHz
Noise Figure, max.	15 dB (max gain)
Level	**-60 to -10 dBm**
1dB compression	**-5 dBm**

Output Characteristics (IF)

Impedance/Return Loss	75Ω/18 dB
Frequency	70 ± 18 MHz
Level	**-10 to 0 dBm**
1dB compression	**+5 dBm**

Channel Characteristics

Gain range (adjustable)	0 to +50 dB, 1dB steps
Image Rejection	> 50 dB, min
Frequency Sense	Inverting or Non-inverting (selectable)

--------UP and DOWNCONVERTER--------

Channel Characteristics

Frequency Response	±1.5 dB, in band; ±0.5 dB, 36 MHz BW
Spurious Response	<-50 dBC
Group Delay, max	0.01 ns/MHz^2 parabolic; 0.03 ns/MHz linear; 1 ns ripple

Synthesizer Characteristics

Frequency Accuracy	± 1.0 ppm internal reference (±0.01 ppm, **option H**)
Frequency Step	1 MHz (125 kHz, **option X**)
10 MHz In/Out Level	3 dBm ± 3 dB

Phase Noise	@ Freq	100Hz	1kHz	10kHz	100kHz	1MHz
	dBc/Hz	< -75	< -75	< -85	< -100	< -120

Controls, Indicators

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

Other

RF Connector	Type F (female)
IF Connector	BNC (female)
10 MHz Connectors	BNC (female), 50Ω/75Ω
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 ± 10% VAC, 47-63 Hz, 25 watts max

Available Options

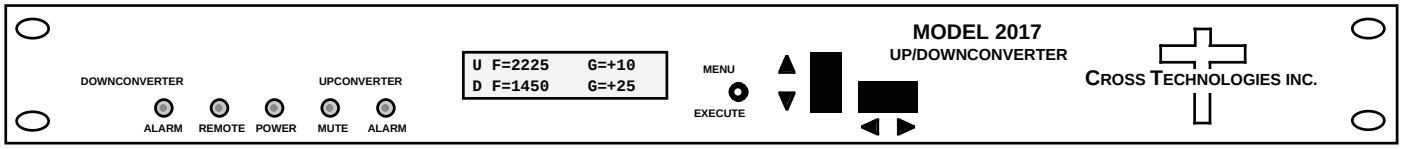
E - External 10 MHz ref
H - High Stability (±0.01ppm) internal ref
Q - RS485 Remote Interface
T - Temperature Sensor
X - 125 kHz frequency step

Connectors/Impedance
B - 75Ω BNC (RF), 75Ω BNC (IF)
C - 50Ω BNC (RF), 75Ω BNC (IF)
D - 50Ω BNC (RF), 50Ω BNC (IF)
J - 75Ω F-type (RF), 50Ω BNC (IF)
N - 50Ω N-type (RF), 75Ω BNC (IF)
M - 50Ω N-type (RF), 50Ω BNC (IF)

*10˚C to 40˚C; Specifications subject to change without notice

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

The 2017-35 RF Up/Downconverter converts 950-1525 MHz to 70 MHz (Down) and 70 MHz to 2.0-2.5 GHz (Up) 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 BNC female for RF. A high stability (±0.01ppm) option is also available. It is powered by a 100-240 ± 10% VAC power supply and housed in a 1.75" X 19" X 16" 1RU chassis.



Front Panel

EQUIPMENT SPECIFICATIONS*

----------UPCONVERTER----------

Input Characteristics (IF)

Impedance/Return Loss	75Ω /18 dB
Frequency	70 ± 18 MHz
Level	-40 to -10 dBm

Output Characteristics (RF)

Impedance/Return Loss	50Ω/12 dB
Frequency	2000 to 2500 GHz
Level	-20 to 0 dBm
1dB compression	+5 dBm

Channel Characteristics

Gain range (adjustable)	-10 to +30 dB
Frequency Sense	Non-inverting
Frequency Response	±1.5 dB, 2.0-2.5 GHz; ±0.5 dB, 36 MHz BW

---------DOWNCONVERTER---------

Input Characteristics (RF)

Impedance/Return Loss	50Ω /12 dB
Frequency	950 to 1525 MHz
Noise Figure, max.	15 dB (max gain)
Level	-70 to -20 dBm
1dB compression	-15 dBm at min. gain

Output Characteristics (IF)

Impedance/Return Loss	75Ω/18 dB
Frequency	70 ± 18 MHz
Level/Max Linear	-20 dBm / -10 dBm
1dB compression	-5 dBm

Channel Characteristics

Gain range (adjustable)	0 to +50 dB
Image Rejection	> 50 dB, min
Freq. Sense (selectable)	Inverting or Non-inverting
Frequency Response	±1.5 dB, 950-1525 MHz ±0.5 dB, 36 MHz BW

--------UP and DOWNCONVERTER--------

Channel Characteristics

Spurious Response	<-50 dBC
Group Delay, max	0.01 ns/MHz^2 parabolic; 0.03 ns/MHz linear; 1 ns ripple

Synthesizer Characteristics

Frequency Accuracy	± 1.0 ppm internal reference (±0.01 ppm, **option H**)
Frequency Step	1 MHz (125 kHz, **option X**)
10 MHz In/Out Level	+3 dBm ± 3 dB (**option E**)

Phase Noise

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

Controls, Indicators

Freq/Gain Selection	direct readout LCD; manual or remote selection
Power; Alarm; Remote	Green LED; Red LED; Yellow LED
Remote	RS232C, 9600 baud (RS485, **option Q**)

Other

RF Connector	BNC (female), 50Ω
IF Connector	BNC (female), 75Ω
10 MHz Connectors	BNC (female), 50Ω/75Ω
Alarm/Remote Connector	DB9 (female) - NO or NC contact closure on Alarm
Size	19 inch, 1RU standard chassis 1.75"H X 16.0" D
Power	100-240 ± 10% VAC, 47-63 Hz, 45 watts max

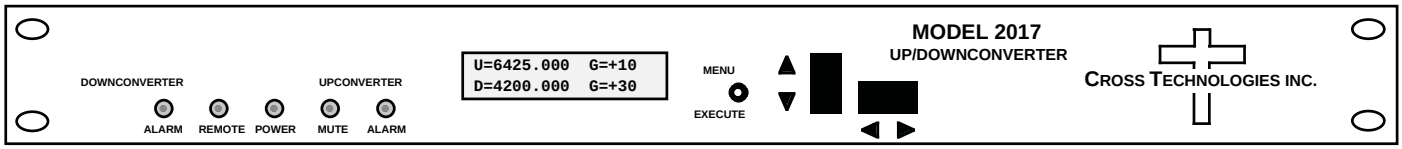
Available Options

E - External 10 MHz reference
H - High Stability (±0.01ppm) internal ref
L - LNB Voltage, +24VDC, 0.4 amps
Q - RS485 Remote Interface
T - Temperature Sensor
X- 125 Khz frequency steps
Connectors/Impedance
B - 75Ω BNC (RF), 75Ω BNC (IF)
N - 50Ω N-type (RF), 75Ω BNC (IF)
M - 50Ω N-type (RF), 50Ω BNC (IF)
S - 50Ω SMA (RF), 50Ω BNC (IF)

*10˚C to 40˚C; Specifications subject to change without notice

2017-65 Up/Downconverter, C-Band

The 2017-65 C-band Up/Downconverter converts 70 MHz to 5.85-6.425 **GHz** (Up) and 3.625-4.2 **GHz** to 70 MHz (Down) in 0.125 MHz steps with low group delay and flat frequency response. Synthesized local oscillators (LO's) provide simultaneous, concurrent frequency selection for the Up and Down converter. 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 (±0.01ppm) option is also available. It is powered by a 100-240 ± 10% VAC power supply and housed in a 1.75" X 19" X 16" 1RU chassis.



Front Panel

EQUIPMENT SPECIFICATIONS*

----------UPCONVERTER----------

Input Characteristics (IF)

Impedance/Return Loss	75Ω /18 dB
Frequency	70 ± 18 MHz
Level	-40 to -10 dBm

Output Characteristics (RF)

Impedance/Return Loss	50Ω/14 dB
Frequency	5.85 to 6.425 GHz
Level	-20 to 0 dBm
1dB compression	+10 dBm

Channel Characteristics

Gain range (adjustable)	0 to +30 dB, 1dB steps
Frequency Sense	Non-inverting

---------DOWNCONVERTER---------

Input Characteristics (RF)

Impedance/Return Loss	50Ω /14 dB
Frequency	3.625 to 4.2 GHz
Noise Figure, max.	15 dB (max gain)
Level	-60 to -30 dBm
1dB compression	-10 dBm (min gain)

Output Characteristics (IF)

Impedance/Return Loss	75Ω/18 dB
Frequency	70 ± 18 MHz
Output Level Range	-15 dBm to +5 dBm
1dB compression	+15 dBm

Channel Characteristics

Gain range (adjustable)	+30 to +50 dB
Image Rejection	> 50 dB, min
Frequency Sense	Non-inverting

--------UP and DOWNCONVERTER--------

Channel Characteristics

Frequency Response	±1.5 dB, in band; ±0.5 dB, 36 MHz BW
Spurious Response	<-50 dBC
Group Delay, max	0.015 ns/MHz^2 parabolic; 0.05 ns/MHz linear; 1 ns ripple

Synthesizer Characteristics

Frequency Accuracy	± 1.0 ppm internal reference (±0.01 ppm, **option H**)
Frequency Step	1 MHz (125 kHz, **option X**)

Phase Noise @ Freq	100 Hz	1kHz	10kHz	100kHz	1 MHz
dBC/Hz	-60	-70	-80	-90	-100

Controls, Indicators

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

Other

RF Connector	N (female)
IF Connector	BNC (female)
10 MHz Connectors	BNC (female), 50Ω/75Ω (**option E**)
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 ± 10% VAC, 47-63 Hz, 45 watts max

Available Options

H - High Stability (±0.01ppm) internal ref
O - Frequency Reference Offset Adjust
Q - RS485 Remote Interface
T - Temperature Sensor
X- 125 kHz frequency steps

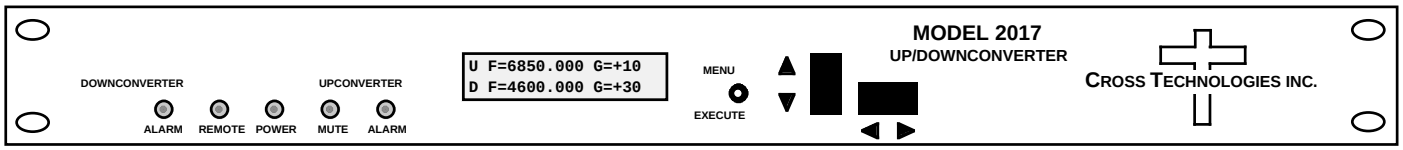
Connectors/Impedance

M - 50Ω N-type (RF), 50Ω BNC (IF)

*10˚C to 40˚C; Specifications subject to change without notice

2017-74 Up/Downconverter, C-Band

The 2017-74 C-band Up/Downconverter converts 70 MHz to **6.7 - 7.0** GHz (Up) and **4.5 - 4.8** GHz 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 (±0.01ppm) option is also available. It is powered by a 100-240 ± 10% VAC power supply and housed in a 1.75" X 19" X 16" 1RU chassis.



Front Panel

EQUIPMENT SPECIFICATIONS*

----------UPCONVERTER----------

Input Characteristics (IF)

Impedance/Return Loss	75Ω /18 dB
Frequency	70 ± 18 MHz
Level	-40 to -10 dBm

Output Characteristics (RF)

Impedance/Return Loss	50Ω/14 dB
Frequency	**6.7 - 7.0** GHz
Level	-20 to 0 dBm
1dB compression	+10 dBm

Channel Characteristics

Gain range (adjustable)	**-10 to +20 dB, 1dB steps**
Frequency Sense	Non-inverting

--------UP and DOWNCONVERTER--------

Channel Characteristics

Frequency Response	±1.5 dB, in band; ±0.5 dB, 36 MHz BW
Spurious Response	<-50 dBC
Group Delay, max	0.015 ns/MHz^2 parabolic; 0.05 ns/MHz linear; 1 ns ripple

Synthesizer Characteristics

Frequency Accuracy	±0.01 ppm
Frequency Step	1MHz (125 kHz frequency steps **option X**)
10 MHz In/Out Level	3 dBm ± 3 dB (**option E**)

Phase Noise @ Freq	100 Hz	1kHz	10kHz	100kHz	1 MHz
dBC/Hz	-60	-70	-80	-90	-100

Controls, Indicators

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

Other

RF Connector	N (female)
IF Connector	BNC (female)
10 MHz Connectors	BNC (female), 50Ω/75Ω (**option E**)
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 ± 10% VAC, 47-63 Hz, 45 watts max

---------DOWNCONVERTER---------

Input Characteristics (RF)

Impedance/Return Loss	50Ω /14 dB
Frequency	**4.5 - 4.8** GHz
Noise Figure, max.	15 dB (max gain)
Level	-60 to -30 dBm
1dB compression	-10 dBm (min gain)

Output Characteristics (IF)

Impedance/Return Loss	75Ω/18 dB
Frequency	70 ± 18 MHz
Output Level Range	-10 dBm to 0 dBm
1dB compression	+10 dBm

Channel Characteristics

Gain range (adjustable)	+30 to +50 dB
Image Rejection	> 50 dB, min
Frequency Sense	Non-inverting

Available Options

E - External 10 MHz ref with RF insertion
O - Frequency Reference Offset Adjust
Q - RS485 Remote Interface
T - Temperature Sensor
X- 125 kHz frequency steps

Connectors/Impedance

M - 50Ω N-type (RF), 50Ω BNC (IF)

*10˚C to 40˚C; Specifications subject to change without notice

IV. FREQUENCY TRANSLATORS

MODEL NUMBER	PAGE# OR WEB	TRANS-LATION	INVERT OR NON-INVERT	IN RANGE (MHz)	OUT RANGE (MHz)	BAND-WIDTH (MHz)	FREQ STEPS (Hz)	GAIN RANGE (dB)	10 kHz ø NOISE dBC/Hz
2083-714A	37	70>140	NON-INVERT	70	110-170	36	1M	-10 to 0	-85
IF to IF		140>70	NON-INVERT	110-170	70	36	1M	-10 to 0	-85
2083-22	38	U > L	NON-INVERT	225-295	950-1020	70	FIXED	0to+30	-85
UHF to L									
2083-1205	39	L>U,LO	NON-INVERT	950-1200	250-500	250	FIXED	0to+20	-85
L to UHF		L>U,HI	NON-INVERT	950-1200	500-750	250	FIXED	0to+20	-85
2083-1207	40	L>U,LO	NON-INVERT	950-1200	495-745	250	FIXED	0to+20	-85
L to UHF		L>U,HI	NON-INVERT	950-1200	515-765	250	FIXED	0to+20	-85
2083-1217	41	BYPASS	NON-INVERT	950-1450	950-1450	500	BYPASS	0	N/A
L to L		L>L,HI	NON-INVERT	950-1200	1450-1700	250	FIXED	0to+10	-90
2083-1721	42	L > L	NON-INVERT	1350-1700	1800-2150	350	FIXED	0to+20	-80
L to L									
2083-2215	43	L>L	INVERT	1725-2175	950-1400	450	FIXED		-80
Dual L>L		L>L							
2083-1222	44	L>L, HI	INVERT	950-1200	1650-1900	250	FIXED	0to+20	-85
L to L		L>L, HI	INVERT	950-1200	1900-2150	250	FIXED	0to+20	-85
2116-6T4	45	C>C	NON-INVERT	5845-6425	3620-4200	580	FIXED	-30, -50	-90
C to C								FIXED	
2116-14T11	WEB	Ku>Ku	NON-INVERT	14,000-14,500	10,950-11,450	500	FIXED	-40, -50	-90
Ku to Ku								FIXED	
2116-14T12	46	Ku>Ku	NON-INVERT	14,000-14,500	11,700-12,200	500	FIXED	-30, -50	-90
Ku to Ku								FIXED	
2116-14T17	WEB	Ku>Ku	NON-INVERT	14,000-14,500	11,200-11,700	500	FIXED	-30, -50	-90
Ku to Ku								FIXED	

SEE INDIVIDUAL DATA SHEETS FOR OPTIONS

Current pricing for most products can be found on our website at:
www.crosstechnologies.com

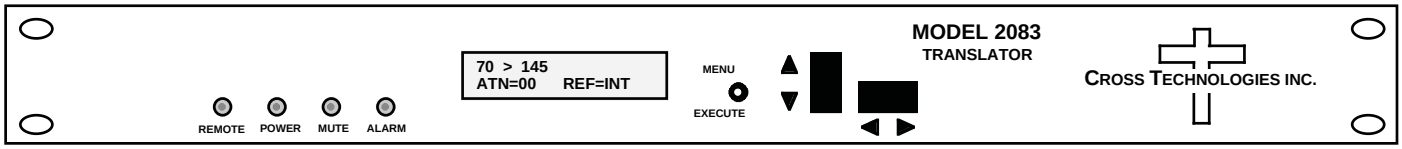
CROSS TECHNOLOGIES, INC.

DATA SHEET

03/28/2007

2083-714A Agile IF-to-IF Translator

The 2083-714A Frequency Translator converts 70 MHz to 110-170 MHz or 110-170 MHz to 70 MHz with no spectrum inversion, low group delay, and flat frequency response. The IF input signal is mixed with synthesized local oscillator (LO) signals, first to 1750 MHz and finally to the IF output signal. Multifunction push button switches select the frequency translation, attenuation (0 to 10 dB, adjustable), and 10 MHz reference. These three 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 input and output and 10 MHz input and output. The 2083-714A 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

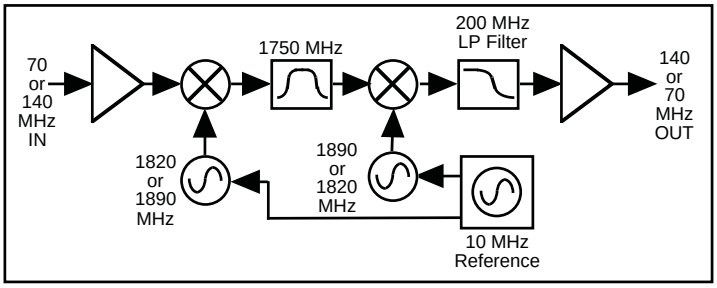
EQUIPMENT SPECIFICATIONS*

Input Characteristics

Input Impedance/RL	75Ω /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



Block Diagram

Channel Characteristics

Attenuation	0 to 10 dB; selectable in 1dB steps
Spurious Response	<-50 dBC
Bandwidth	±18MHz, ±0.5dB; ±40MHz, ±1.0dB
Group Delay, max	0.01 ns/MHz^2 parabolic; 0.03 ns/MHz linear; 1 ns ripple
10MHz In/Out Level	3 dB ± 3 dB
Frequency Sense	Non-inverting

Synthesizer Characteristics

Frequency Accuracy	±1.0 ppm internal reference (±0.01 ppm **option -H**)				
Step Size	1 MHz, 110 to 170 MHz center frequency (140MHz side)				
10 MHz In/Out Level	3 dBm ± 3 dB				
Phase Noise	@ Freq	1kHz	10kHz	100kHz	1MHz
	dBC/Hz	< -80	< -85	< -100	< -110

Controls, Indicators

Frequency Translation	Direct readout LCD display; push-button switches or remote selection
Gain Selection	Direct readout LCD display; push-button switches or remote selection
Power; Alarm; Mute	Green LED; Red LED; Yellow LED
Remote	Yellow LED; RS232C, 9600 baud

Other

IF Connectors	BNC (female), 75Ω
10MHz Connectors	BNC (female), 50Ω/75Ω
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, 45 watts max.

Available Options

H - High Stability (±0.01) Internal Ref
Q - RS485 Remote Interface

Connectors/Impedance
D - 50Ω BNC (RF), 50Ω BNC (IF)

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

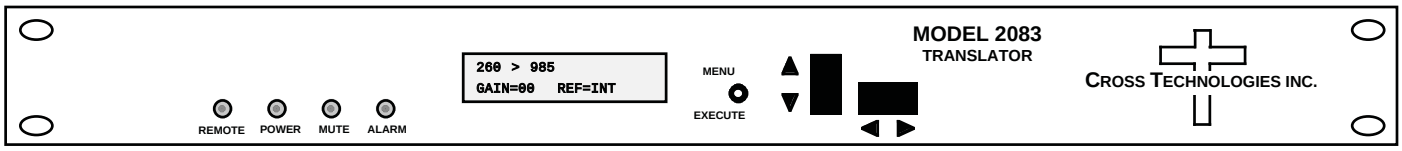
CROSS TECHNOLOGIES, INC.

DATA SHEET

REV. A 6/25/2009

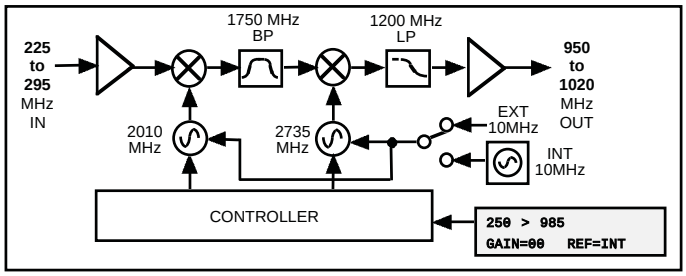
2083-22 Translator

The **2083-22** Frequency Translator converts **225-295** MHz to **950-1020** MHz with no spectrum inversion, low group delay, and flat frequency response. The input signal is mixed with synthesized local oscillator (LO) signals, first to 1750 MHz and finally to the output signal. Multifunction push button switches select the gain (-10 to +30 dB, adjustable), and 10 MHz reference. These 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 input, output, 10 MHz input, and 10 MHz output. The 2083-22 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.



2083-22 Front Panel

EQUIPMENT SPECIFICATIONS*



2083-22 Block Diagram

Input Characteristics

Input Impedance/RL	50Ω /14 dB
Frequency	**225 to 295 MHz**
Input Level	-40 to -10 dBm
Input 1 dB compression	0 dBm

Output Characteristics

Impedance/RL	50Ω/12 dB
Frequency	**950 to 1020 MHz**
Output level	0 to -20 dBm
Output 1 dB comp.	+5 dBm

Channel Characteristics

Gain, adjustable	-10 to +30 dB, 1dB steps
Spurious Response	<-50 dBC
Bandwidth	**±35MHz, ±0.7dB**
Group Delay, max	**0.0035 ns/MHz^2** parabolic; **0.03 ns/MHz** linear; 1 ns ripple
10MHz In/Out Level	3 dB ± 3 dB
Frequency Sense	Non-inverting

Synthesizer Characteristics

Frequency Accuracy	±1.0 ppm internal reference (±0.01 ppm **option -H**)

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

Controls, Indicators

Frequency Translation	Direct readout LCD display
Gain Selection	Direct readout LCD display; push-button switches or remote selection
Power; Alarm; Mute	Green LED; Red LED; Yellow LED
Remote	Yellow LED; RS232C, 9600 baud

Other

Input/Output Connectors	BNC (female), 50 Ω
10MHz 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, 45 watts max.

Options

- H	High Stability, ± 0.01 ppm internal reference

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

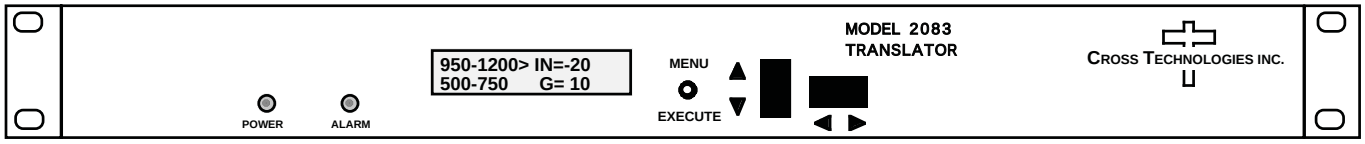
CROSS TECHNOLOGIES, INC.

DATA SHEET

4/3009

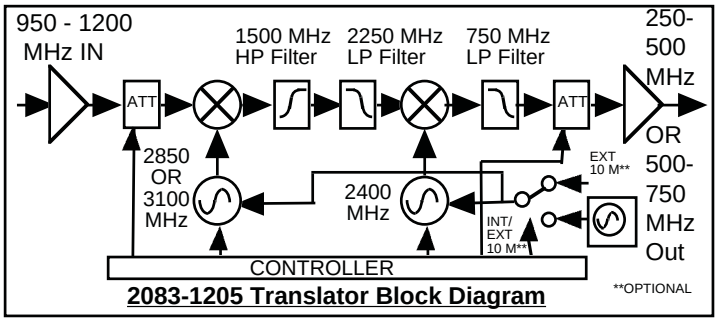
Series 2083-1205 Agile L to UHF Translator

2083-1205 Agile L to UHF Translator - The 2083-1205 Agile L to UHF Translator converts a 950-1200 MHz block to 250-500 MHz and 500-750 MHz with no 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 and then with an LO signal of 2400 MHz to 250-500 MHz and 500-750 MHz. 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 RF input and output and for **(optional)** external 10 MHz reference (+3± 3 dBm in).
The 2083-1205 Translator is housed in an 1 3/4" X 19 " X 16" deep rack mount chassis.



2083-1205 Agile L to UHF Translator

EQUIPMENT SPECIFICATIONS*



2083-1205 Translator Block Diagram

Input Characteristics

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

Output Characteristics

Impedance/RL	75 Ω/12 dB
Output Level, Range	-10 **to -30 dBm**
Output 1 dB compression	0 dBm
Frequency	250-500 MHz
	OR 500-750 MHz

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, LO out
Group Delay, max	0.01 ns/MHz^2, parabolic, 0.03ns/MHz, linear, 1 ns ripple any 36 MHz BW
Frequency Sense	**Non-Inverting**

Synthesizer Characteristics

Frequency Accuracy	± 1 ppm max over temp: Optional, High Stability (± 0.01 ppm) Option -H
Reference	10 MHz Internal;Internal/External selectable is Option -E

Phase Noise @ F (Hz) >	*100*	*1K*	*10K*	*100K*	*1M*
dBC/Hz	***-65***	***-75***	***-85***	***-95***	***-110***

Controls, Indicators

Frequency Translation	pushbutton switches; setting shown on LCD display; Set for low or high block
Input Level Selection	pushbutton switches; setting shown on LCD display; Set to composite input level
Gain Selection	pushbutton switches; setting 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 In and Out and (optional) external 10 MHz reference In, BNC, female, 75 ohm
Connector, Alarm	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, 30 watts max.

OPTIONS

-E	External 10 MHz reference In
- D	BNC, female, 50 ohms for RF In and Out
- H	High Stability (± 0.01 ppm) internal reference

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

CROSS TECHNOLOGIES, INC.

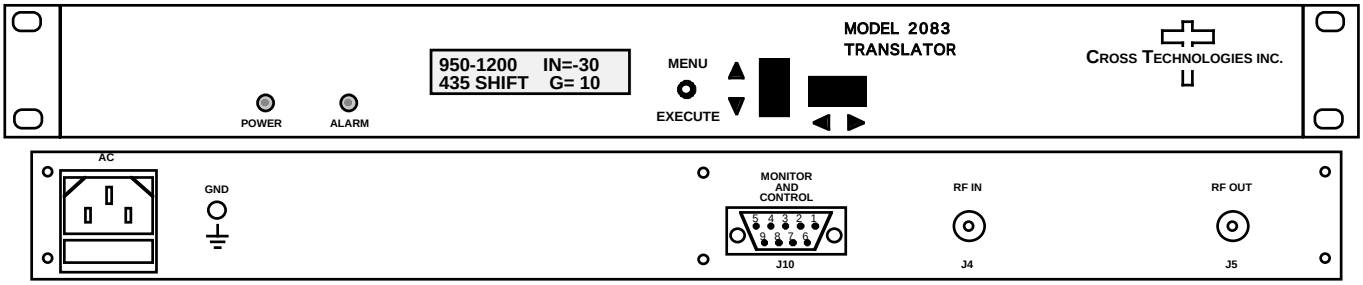
DATA SHEET

2/18/09

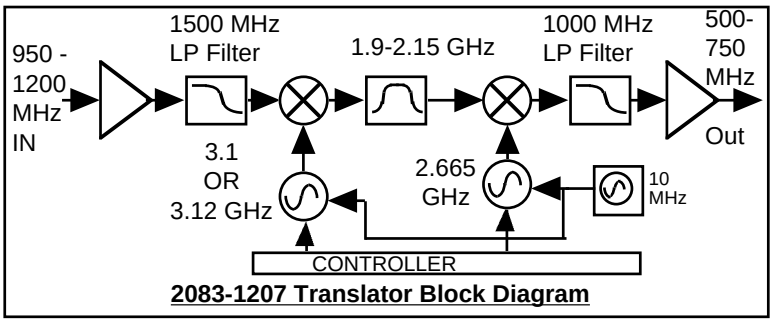
PRELIMINARY **Rev. 0**

2083-1207 Translator

2083-1207 Translator - The 2083-1207 Translator converts a 950-1200 MHz block to 500-750 MHz with a 435 MHz or 455 MHz translation (selectable) with no spectrum inversion, low group delay and flat frequency response. The 950-1200 MHz input is mixed with synthesized local oscillator (LO) signals, first to 1.9 to 2.15 GHz and finally to the 500 - 750 MHz block output. Multi-function push button switches select the translation, input level, and gain (0 to +20 dB, selectable in 1 dB steps) and these settings appear on the LCD display and can be set by the RS232C remote control interface. All connectors are 75 ohm BNC female. Front panel LEDs light when DC power is applied (green) and when a PLL alarm occurs (red). The 2083-1207 is powered by a 100-240 ± 10% VAC power supply and housed in a 1.75" X 19" X 16" 1RU chassis. **Option -R** provides redundant power supplies.



EQUIPMENT SPECIFICATIONS*



2083-1207 Translator Block Diagram

Input Characteristics

Input Impedance/RL	75 Ω /12 dB
Frequency,	950-1200 MHz
Input Level	-20 to **-50** dBm
Input 1 dB compression	-10 dBm, min gain

Output Characteristics

Impedance/RL	75 Ω/12 dB
Output Level, Range	-20 to -40 dBm
Output 1 dB compression	-10 dBm
Frequency	500-750 MHz

Channel Characteristics

Gain at band center	0 to +20 ± 1.0 dB, selectable in 1 dB steps
Frequency Response	±1.0 dB, 0.5-0.75 GHz out; ± 0.5 dB, any 36 MHz increment
Frequency Sense	Non-Inverting
Intermodulation	<-50 dBC for two carriers each at -23 dBm out
Spurious Response	<-40 dBC, for 0.95 to 1.2 GHz input to 0.5 to 0.75 GHz out
0.95-1.2 GHz Feedthru	<-40 dBC, min
LO rejection	<-40 dBm, LO at the input or output

Synthesizer Characteristics

Frequency shift	435 MHz or 455 MHz, selectable
Frequency Accuracy	± 1.0 ppm max

Phase Noise @ F (Hz) >	*100*	*1K*	*10K*	*100K*	*1M*
dBC/Hz	***-70***	***-80***	**-85**	***-95***	***-110***

Controls, Indicators

Frequency Shift	Direct readout LCD display; push-button switches or remote selection; 435 MHz or 455 MHz shift
Input Level Selection	Direct readout LCD display; push-button switches or remote selection
Gain Selection	Direct readout LCD display; push-button switches or remote selection
Remote Interface	RS232C, 9600 baud
DC Power; PLL Alarm	Green LED; Red LED

Other

Connectors, RF	RF in and RF Out, BNC, female, 75 ohm
Connector, Remote, Alarm	DB9 - NO or NC contact closure on Alarm
Size	19 inch, 1RU standard chassis 1.75"H X 16.0"D
Power	100-240 ± 10% VAC, 47-63 Hz, 15 watts max

*+10 to +40 degrees C; 2000 meters max elevation; 80% max humidity; Specifications subject to change without notice

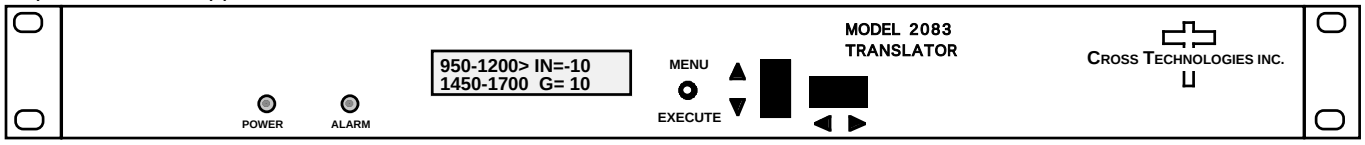
CROSS TECHNOLOGIES, INC.

DATA SHEET

PRELIMINARY 3/09/09

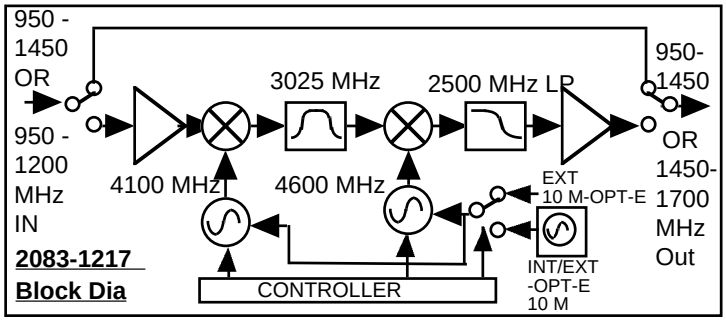
Series 2083-1217 L to L Translator

2083-1217 L to L Translator - The 2083-1217 L to L Translator converts a 950-1200 MHz block to 1450-1700 MHz or switches the 950-1450 input to the output (selectable) with no spectrum inversion, low group delay and flat frequency response. The 950-1200 MHz input is mixed with synthesized local oscillator (LO) signals, first to 3025 MHz center frequency and finally to the 1450-1700 MHz. A SPDT switch at the input and output allows switching the 950-1450 input to the output. Multi-function push button switches select the translation or by-pass, input level, and gain. Frequency translation or by-pass, input level, and gain (0 to +10 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 (Also for the **Optional -E** external 10 MHz reference (+3± 3 dBm in)). The 2083-1217 Translator is housed in an 1 3/4" X 19 " X 16" deep rack mount chassis. **Option -H** provides a 0.01 ppm reference.



2083-1217 L to L Translator

EQUIPMENT SPECIFICATIONS*



Input Characteristics

Input Impedance/RL	75 Ω /12 dB
Frequency,	950-1200 MHz
Input Level	**-10 to -20 dBm**
Input 1 dB compression	0 dBm

Output Characteristics

Impedance/RL	75 Ω/12 dB
Output Level, Range	**-10 to -20 dBm**
Output 1 dB compression	0 dBm
Frequency	1450-1700 MHz
OR	Input

Channel Characteristics

Gain	**0 to +10** ± 0.5 dB, selectable in 1 dB steps
Frequency Response	± 1.0 dB, 250 MHz bandwidth; ± 0.5 dB, any 36 MHz increment
Spurious Response	<-50 dBC in band ;< -50 dBC out of band
Group Delay, max	0.01 ns/MHz^2, parabolic, 0.03ns/MHz, linear, 1 ns ripple any 36 MHz BW
Frequency Sense	Non-inverting

Synthesizer Characteristics

Frequency Accuracy	± 1 ppm max over temp: Optional, High Stability (± 0.01 ppm) **Option -H**
Reference	10 MHz Internal; (Internal or External (selectable) is **Option -E**)

Phase Noise @ F (Hz) >	*100*	*1K*	*10K*	*100K*	*1M*
dBC/Hz	***-70***	***-80***	**-90**	***-95***	***-110***

Controls, Indicators

Frequency Translation	pushbutton switches; setting shown on LCD display; Set for block or by-pass
Input Level Selection	pushbutton switches; setting shown on LCD display; Set to composite input level
Gain Selection	pushbutton switches; setting 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 ohm
Connector, Alarm	DB9 - NO or NC contact closure on Alarm
Size	19 inch standard chassis 1.75" high X 16.0" deep
Power	90 - 260 VAC, 47 - 63 Hz, 30 watts max.

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

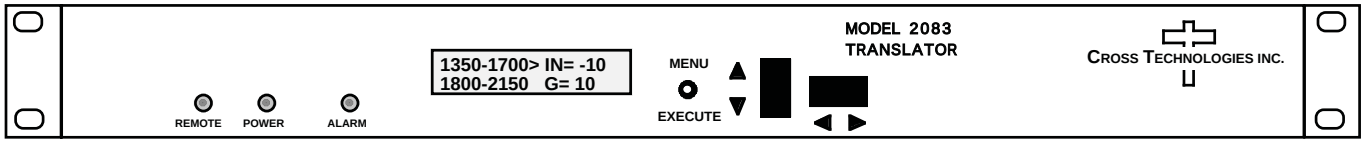
CROSS TECHNOLOGIES, INC.

DATA SHEET

4/30/09

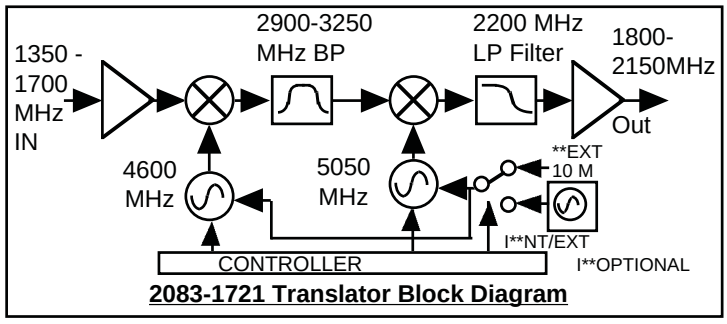
Series 2083-1721 Agile L to L Translator

2083-1721 Agile L to L Translator - The 2083-1721 Agile L to L Translator converts a 1350-1700 MHz block to 1800-2150 MHz block with no spectrum inversion, low group delay and flat frequency response. The 1350-1700 MHz input is mixed with synthesized local oscillator (LO) signals, first to 3100 MHz center frequency and finally to the 1800-2150 MHz block output. Multi-function push button switches select the 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 RF input and output and for **(optional)** external 10 MHz reference (+3± 3 dBm in). The 2083-1721 is housed in an 1 3/4" X 19 " X 16" deep rack mount chassis. **Option -H** provides a 0.01 ppm reference.



2083-1721 Agile L to L Translator

EQUIPMENT SPECIFICATIONS*



2083-1721 Translator Block Diagram

Input Characteristics

Input Impedance/RL	75 Ω /12 dB
Frequency,	1350-1700 MHz
Input Level	-10 to **-30 dBm**
Input 1 dB compression	0 dBm

Output Characteristics

Impedance/RL	75 Ω/12 dB
Output Level, Range	-10 to **-30 dBm**
Output 1 dB compression	0 dBm
Frequency	1800-2150 MHz

Channel Characteristics

Gain	0 to +20 **± 1** dB, selectable in 1 dB steps
Frequency Response	± 1.0 dB, 350 MHz bandwidth; ± 0.5 dB, any 36 MHz increment
Spurious Response	<**-45** dBC in band ; < **-50 dBm** out of band
Group Delay, max	0.01 ns/MHz^2, parabolic, 0.03ns/MHz, linear, 1 ns ripple any 36 MHz BW
Frequency Sense	Non-inverting

Synthesizer Characteristics

Frequency Accuracy	± 1 ppm max over temp: Optional, High Stability (± 0.01 ppm) Option -H
Reference	10 MHz Internal;Internal/External selectable is Option -E

Phase Noise @ F (Hz) >	*100*	*1K*	*10K*	*100K*	*1M*
dBC/Hz	***-65***	***-70***	***-80***	***-90***	***-100***

Controls, Indicators

Frequency Translation	Setting shown on LCD display
Input Level Selection	pushbutton switches; setting shown on LCD display; Set to composite input level
Gain Selection	pushbutton switches; setting 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 In and Out and (optional) external 10 MHz reference In, BNC, female, 75 ohm
Connector, Alarm	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, 30 watts max.

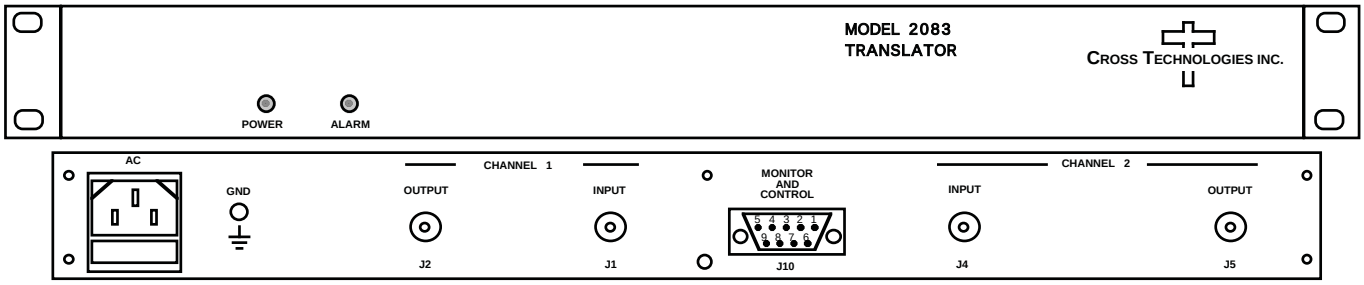
OPTIONS

- E	External 10 MHz reference In
- D	BNC, female, 50 ohms for L-Band In and Out
- H	High Stability (± 0.01 ppm) internal reference

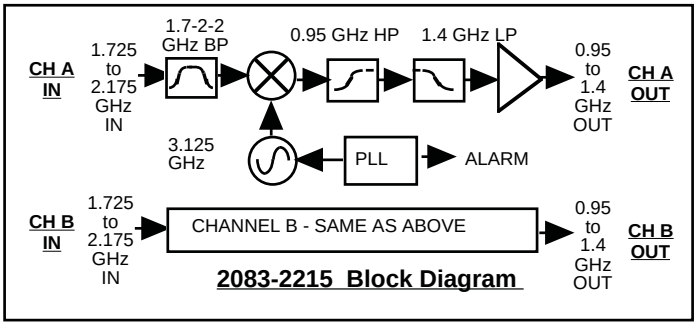
*+10 to +40 degrees C; Specifications subject to change without notice

2083-2215 Dual Translator

2083-2215 Dual Translator - Consists of two converters (inverted spectrums) each of which convert a **1.725 - 2.175** GHz signal to a **0.95-1.4** GHz (**LO =3.125 GHz**). The two 1.725 - 2.175 GHz inputs are bandpass filtered and then mixed with a 3.125 GHz synthesized local oscillator (LO) signal to 0.95-1.4 GHz. The mixer output is applied to the output filters and amplifier. The converters have a nominal gain of 0 dB. All connectors are 75 ohm BNC female. Front panel LEDs light when DC power is applied (green) and when a PLL alarm occurs (red). The 2083-2215 is powered by a 100-240 ± 10% VAC power supply and housed in a 1.75" X 19" X 16" 1RU chassis.



EQUIPMENT SPECIFICATIONS*



2083-2215 Block Diagram

Input Characteristics

Input Impedance/RL	75 Ω /12 dB
Frequency,	**1.725-2.175** GHz
Input Level	-10 to -30 dBm
Input 1 dB compression	0 dBm

Output Characteristics

Impedance/RL	75 Ω/12 dB
Output 1 dB compression	0 dBm
Output Level, Range	-10 to -30 dBm
Frequency	**0.95-1.4** GHz

Channel Characteristics

Gain at band center	0 dB ±2 dB, fixed
Frequency Response	±1.5 dB, 0.95-1.4 GHz out; ± 0.7 dB, any 36 MHz increment
Frequency Sense	Inverting (**1.725 GHz Translates to 1.4 GHz, 2.175 GHz Translates to 0.95 GHz**)
Intermodulation	<-50 dBC for two carriers each at -13 dBm out
Spurious Response	**<-40 dBC, for 1.725-2.175 GHz input to 0.95 to 1.4 GHz out**
0.95-1.4 GHz Feedthru	**<-30 dBC, min, <-40 dBC, goal**
1.725-2.2 GHz Feedthru	**<-10 dBC, min, <-20 dBC, goal**
LO rejection	**<-40 dBm, LO at the output**

Synthesizer Characteristics

LO frequency	**3.125 GHz**
Frequency Accuracy	± 1.0 ppm max

Phase Noise @ F (Hz) >	*100*	*1K*	*10K*	*100K*	*1M*
dBC/Hz	***-70***	***-80***	***-80***	***-95***	***-110***

Indicators

DC Power; PLL Alarm	Green LED; Red LED

Other

Connectors	RF in and RF Out, BNC, female, 75 ohm
Connector, Alarm	DB9 - NO or NC contact closure on Alarm
Size	19 inch, 1RU standard chassis 1.75"H X 16.0"D
Power	100-240 ± 10% VAC, 47-63 Hz, **15** watts max

*+10 to +40 degrees C; 2000 meters max elevation; 80% max humidity; Specifications subject to change without notice

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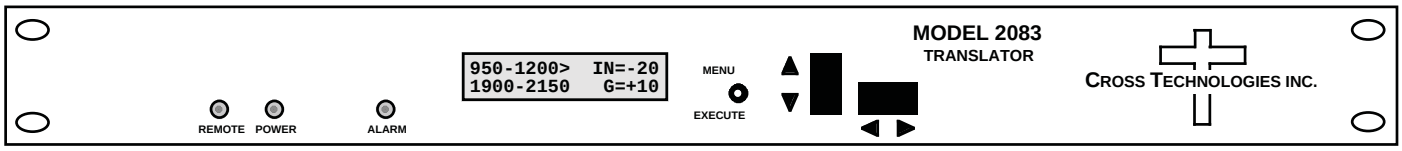
DATA SHEET

06/04/2007

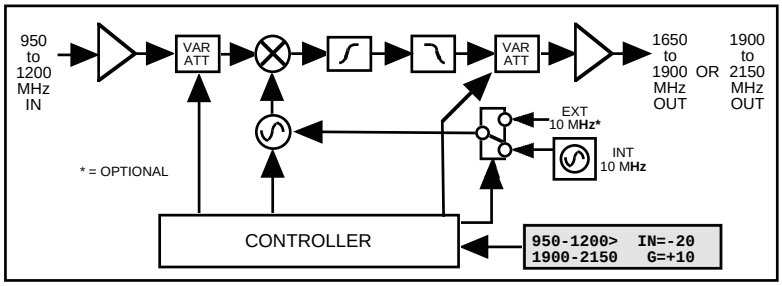
2083-1222 Agile L-Band to L-Band Translator

The 2083-1222 Agile L-Band to L-Band 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 to1900-2150 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 indicate DC power (green), remote control (yellow), or a PLL alarm (red). Connectors are BNC female for RF input and output and for optional external 10 MHz reference (+3± 3 dBm in, option E). 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

EQUIPMENT SPECIFICATIONS*



Block Diagram

Input Characteristics

Impedance/Return Loss	75Ω / 12 dB
Frequency	950-1200 MHz
Input Level	-30 to -10 dBm

Output Characteristics

Impedance/Return Loss	75Ω / 12 dB
Frequency	1650-1900 MHz OR 1900-2150 MHz
Output level	-30 to -10 dBm

Channel Characteristics

Gain range (adjustable)	0 to +20 dB, selectable in 1 dB steps
Frequency Response	±1.0 dB, 250 MHz BW, ±0.5 dB, any 36 MHz increment
Intermodulation	< -50 dBm for two carriers each at -13 dBm out
Spurious Response	< -60 dBm in band; < -50 dBm out of band < -40 dBC, .95-1.2 GHz out; < -45 dBC, 1.65-2.15 GHz out; < -50 dBm, LO out
Group Delay, max	0.01 ns/MHz^2 parabolic; 0.03 ns/MHz linear; 1 ns ripple - any 36MHz BW
Frequency Sense	Inverting

Synthesizer Characteristics

Frequency Accuracy	± 1.0 ppm internal reference (±0.01 ppm, option H)					
10 MHz In/Out Level	3 dBm ± 3 dB (option E)					
Phase Noise	@ Freq	100Hz	1kHz	10kHz	100kHz	1MHz
	dBC/Hz	< -65	< -75	< -85	< -95	< -110

Controls, Indicators

Frequency Selection	direct readout LCD; pushbutton switches or remote selection; Set for low or high block
Input Level Selection	direct readout LCD; pushbutton switches or remote selection; Set to composite input level
Gain Selection	direct readout LCD; pushbutton switches or remote selection; Set to 0 to +20 dB (-10 dBm max output level)
Power; Alarm; Remote	Green LED; Red LED; Yellow LED
Remote	RS232C, 9600 baud (RS485, option Q)

Other

RF Connectors	BNC (female)
10MHz Connectors	BNC (female) 50Ω/75Ω (option E)
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 ± 10% VAC, 47-63 Hz, 45 watts max

Available Options

E - External 10 MHz ref input & output
H - High Stability (±0.01ppm) int ref
Q - RS485 Remote Interface

Connectors/Impedance
D - 50Ω BNC (In), 50Ω BNC (Out)

*10˚C to 40˚C; Specifications subject to change without notice

2116-6T4 Test Translator, 5.845 - 6.425 GHz to 3.62 - 4.20 GHz

The 2116-6T4 Test Translator converts 5.845 - 6.425 GHz to 3.62 - 4.20 GHz with a local oscillator at 2.225 GHz. Front panel LEDs provide indication of external 10 MHz (yellow), PLL alarm (red), and DC power (green). The gain is -30 dB to Output #1 and -50 to Output #2. Connectors are N-type female for RF and BNC female for the external reference input and reference output. A three-way switch controls which 10 MHz reference is being used. In the INT position, the internal reference is used, in the EXT position, the external reference is used, and in the AUTO position, the internal reference is used unless a +3 dBm ± 3 dB, 10MHz reference signal is connected to the external reference input. The 2116 is powered by a 100-240 ±10% VAC power supply, and housed in a 1 3/4" X 19" X 14" rack mount chassis.

Front Panel

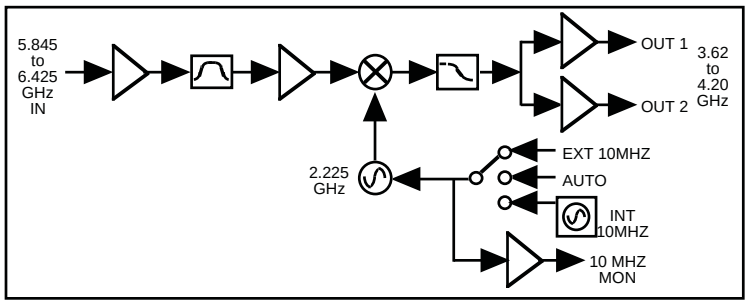
EQUIPMENT SPECIFICATIONS*

Input Characteristics

Impedance/Return Loss	50Ω/15 dB
Frequency	5.845 to 6.425 GHz
Input Level range	-10 to -30 dBm
Input 1 dB compression	0 dBm

Output Characteristics

Impedance/Return Loss	50Ω /15 dB
Frequency	3.62 to 4.20 GHz
Output Level Range (#1)	-40 to -60 dBm
Output Level Range (#2)	-60 to -80 dBm



Block Diagram

Channel Characteristics

Gain	-30 dB ±2 dB (Output #1); -50 dB ±2 dB (Output #2)
Input/Output Isolation	60 dB, min
Intermodulation	<-50 dBC for two carriers each at -10 dBm
Frequency Response	±1.5 dB, over frequency band; ± 0.5 dB, 40 MHz BW
Frequency Sense	Non-inverting

LO Characteristics

LO Frequency	2.225 GHz
Frequency Accuracy	± 0.01 ppm max over temp internal reference; ext. ref. input
10 MHz In/Out Level	+3 dBm ± 3 dB

Phase Noise @ Freq	100 Hz	1kHz	10kHz	100kHz	1 MHz
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 selected (rear panel DPDT switch)
10 MHz Reference	3-way Switch (selects INTERNAL, EXTERNAL, or AUTO mode)

Other

RF Connectors	N-type (female)
10 MHz Connectors	BNC (female), 50Ω/75Ω
Alarm Connector	DB9 (female) - NO or NC contact closure on Alarm
Size	19 inch standard chassis 1.75" high X 14" deep
Power	100-240 ±10% VAC, 47 - 63 Hz, 45 watts max.

Available Options

Connectors/Impedance
SS - 50Ω SMA (RF)

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DATA SHEET

REV_D 06/08/09

2116-14T12 Test Translator, 14.0 - 14.5 GHz to 11.7 - 12.2 GHz

The 2116-14T12 Test Translator converts 14.0 - 14.5 GHz to 11.7 - 12.2 GHz with a local oscillator at 2.3 GHz. Front panel LEDs provide indication of external 10 MHz (yellow), PLL alarm (red), and DC power (green). The gain is -30 dB to Output #1 and -50 to Output #2. Connectors are SMA female for RF and BNC female for the external reference input and reference output. A three-way switch controls which 10 MHz reference is being used. In the INT position, the internal reference is used, in the EXT position, the external reference is used, and in the AUTO position, the internal reference is used unless a +3 dBm ± 3 dB, 10MHz reference signal is connected to the external reference input. The 2116 is powered by a 100-240 ±10% VAC power supply, and housed in a 1 3/4" X 19" X 14" rack mount chassis.

Front Panel

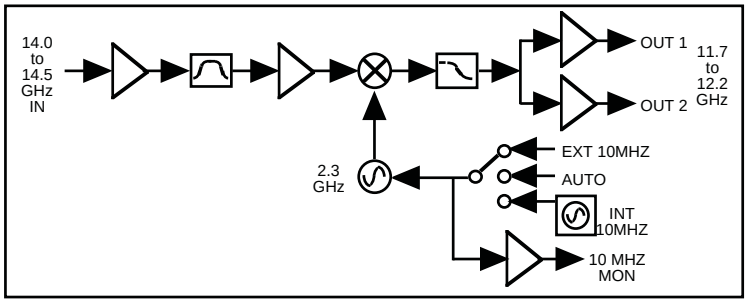
EQUIPMENT SPECIFICATIONS*

Input Characteristics

Impedance / Return Loss	50Ω / 15 dB
Frequency	14.0 to 14.5 GHz
Input Level range	-30 to 0 dBm
Input 1 dB compression	0 dBm

Output Characteristics

Impedance/Return Loss	50Ω / 15 dB
Frequency	11.7 to 12.2 GHz
Output Level Range (#1)	-60 to -30 dBm
Output Level Range (#2)	-80 to -50 dBm



Block Diagram

Channel Characteristics

Gain	-30 dB ±2 dB (Output #1); -50 dB ±2 dB (Output #2)
Input/Output Isolation	60 dB, min
Intermodulation	< -50 dBC for two carriers each at -13 dBm in
Spurious	< -45 dBC
Frequency Response	±1.5 dB, over frequency band; ± 0.5 dB, 40 MHz BW
Frequency Sense	Non-inverting

LO Characteristics

LO Frequency	2.3 GHz
Frequency Accuracy	± 0.01 ppm max over temp internal reference; ext. ref. input
10 MHz In/Out Level	+3 dBm ± 3 dB

Phase Noise @ F (Hz) >	*100*	*1K*	*10K*	*100K*	*1M*
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 selected (rear panel DPDT switch)
10 MHz Reference	3-way Switch (selects INTERNAL, EXTERNAL, or AUTO mode)

Other

RF Connectors	SMA (female), 50Ω
10 MHz Connectors	BNC (female), 50Ω/75Ω
Alarm Connector	DB9 - NO or NC contact closure on Alarm
Size	19 inch standard chassis 1.75" high X 14" deep
Power	100-240 ±10% VAC, 47 - 63 Hz, 45 watts max.

Available Options

Connectors/Impedance
NN - 50Ω N-type (RF)

*0˚C to 50˚C; Specifications subject to change without notice

V. OPTIONS, AGILE CONVERTERS

	FEATURE OPTIONS	
#	DESCRIPTION	2015-16-17
E	The External 10 MHz reference	Y Y Y
H	High Stability (±0.01 ppm) internal reference	Y Y Y
L	LNB Power, +24 VDC, 0.5 Amps	N Y Y
V	SSPB Voltage, +24 VDC, 2.5 Amps	Y N Y
V41	SSPB, +48 VDC, 2.1 Amps, 100 W	Y N Y
V48	SSPB, +48 VDC, 1.25 Amps, 60 W	Y N Y
Q	RS-485 M&C Interface, incl. RS232	Y Y Y
R	Redundant Power Supply	Y Y Y
X	125 KHz Frequency Step Size	Y Y Y
Z	Attenuator, 0.1 dB Steps	Y N Y
SAWx	SAW Filter Option where x=bandwidth	N Y Y
W8	Ethernet M & C Remote Interface	Y Y Y
W8S	Ethernet M & C Remote Interface with SNMP	Y Y Y
	CONNECTOR OPTIONS	
#	DESCRIPTION	2015-16-17
B	ALL RF & IF Connectors 75 Ω BNC	Y Y Y
C	RF - 50 Ω BNC / IF - 75 Ω BNC	Y Y Y
D	ALL RF & IF Connectors 50 Ω BNC	Y Y Y
F	RF - 75 Ω F-type / IF - 75 Ω F-type	Y Y Y
J	RF - 75 Ω F-type / IF - 50 Ω BNC	Y Y Y
K	RF - 75 Ω BNC / IF - 50 Ω BNC	Y Y Y
M	RF – 50 Ω N-type / IF - 50 Ω BNC	Y Y Y
N	RF – 50 Ω N-type / IF - 75 Ω BNC	Y Y Y
NF	RF – 50 Ω N-type / IF - 75 Ω F-type	Y Y Y
NN	ALL RF & IF Connectors 50 Ω N-type	Y Y N
NS	RF – 50 Ω N-type / IF - 50 Ω SMA	Y Y Y
SN	RF – 50 Ω SMA / IF - 50 Ω N-type	Y Y Y
SS	ALL RF & IF Connectors 50 Ω SMA	Y Y Y
S	RF – 50 Ω SMA / IF - 50 Ω BNC	Y Y Y
S7	RF – 50 Ω SMA / IF - 75 Ω BNC	Y Y Y
SF	RF – 50 Ω SMA / IF - 75 Ω F-type	Y Y Y

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VI. BLOCK UPCONVERTERS

MODEL NUMBER	PAGE# OR WEB	BAND	RF OUT RANGE (GHz)	RF IN RANGE (GHz)	LO FREQ (GHz)	GAIN (dB)	10 kHz ø NOISE dBC/Hz
2115-34	WEB	C	3.4-4.2	0.95-1.75	11.26/8.81	20	-85
2115-58	51	C	5.85-6.425	0.95-1.525	7.375	20	-85
2115-59	WEB	C	5.85-6.65	0.95-1.75	4.9	20	-85
2115-109	WEB	Ku	10.95-11.7	0.95-1.7	10	20	-85
2115-114	52	Ku	11.45-12.25	0.95-1.75	10.5	20	-85
2115-122	WEB	Ku	12.2-12.7	0.95-1.45	11.25	20	-85
2115-125	WEB	Ku	12.2-12.75	0.95-1.5	11.25	20	-85
2115-139	WEB	Ku	13.95-14.45	1.20-1.70	12.75	20	-85
2115-140	53	Ku	14.0-14.5	0.95-1.45	13.05	20	-85
2115-202	54	Ka	19.7-20.2	UHF, LBAND	18.05	0	-85
2115-222	55	Ka	21.35-22.35	2.5-3.5	18.85	0	-85

CONNECTOR OPTIONS, BLOCK CONVERTERS

#	DESCRIPTION	2115/2116
NN	ALL RF & IF Connectors 50 Ω N-type	Y / Y
NS	RF – 50 Ω N-type / IF - 50 Ω SMA	Y / Y
SN	RF – 50 Ω SMA / IF - 50 Ω N-type	Y / Y
SS	ALL RF& IF Connectors 50 Ω SMA	Y / Y

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DATA SHEET

5/16/05

2115-58 Block Upconverter, 5.85 - 6.425 GHz

The 2115-58 Block Upconverter converts 0.95 - 1.525 GHz to 5.850 - 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 ± 3 dB, 10MHz reference signal is connected to the external reference input. The 2115 is powered by a 100-240 ± 10% VAC power supply, and mounted in a 1 3/4" X 19 " X 14" rack mount chassis.

Front Panel

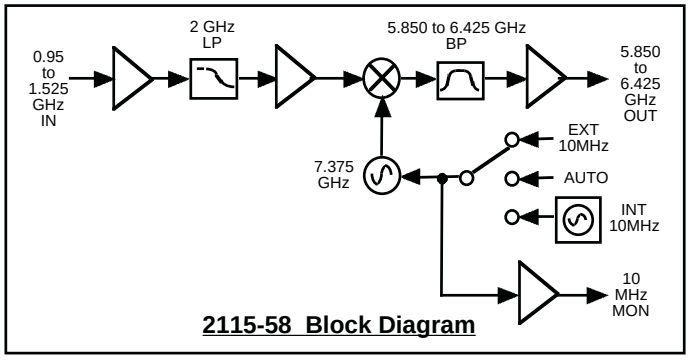
EQUIPMENT SPECIFICATIONS*

Input Characteristics (L-Band)

Impedance/Return Loss	50Ω/14 dB
Frequency	0.95 to 1.525 GHz
Noise Figure, Max.	20 dB max gain
Input Level range	-40 to -20 dBm
Input 1 dB compression	-10 dBm

Output Characteristics (RF)

Impedance/Return Loss	50 Ω /14 dB
Frequency	5.85 to 6.425 GHz
Output Level Range	-20 to 0 dBm
Output 1 dB compression	+10 dBm



2115-58 Block Diagram

Channel Characteristics

Gain	+20 dB ±1 dB
Image Rejection	> 60 dB, min
Spurious, Inband	SIGNAL RELATED<-60 dBC in band, 0 dBm out; SIGNAL INDEPENDENT,<-60 dBm
Spurious, Out of band	<-50 dBm
Intermodulation	<-55 dBC for two carriers each at -10 dBm out
Frequency Response	±1 dB, 5.850 - 6.425 GHz out; ± 0.5 dB, 40 MHz BW
Frequency Sense	Inverting

LO Characteristics

LO Frequency	7.375 GHz
Frequency Accuracy	± 0.01 ppm max over temp internal reference; external reference input
10 MHz level	3 dBm, ± 3 dB, 75 ohms, External In or Internal out

Phase Noise

@ Freq	100Hz	1kHz	10kHz	100kHz	1MHz
dBC/Hz	< -70	< -80	< -85	< -100	< -110

Controls, Indicators

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

Other

RF Connector	Type-N (female), 50Ω
L-Band Connector	BNC (female), 50Ω
10 MHz Connectors	BNC (female), 50Ω/75Ω
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 ± 10% VAC, 47 - 63 Hz, 45 watts max.

Available Options

Connectors/Impedance
FN - 50Ω N-type (RF), 75Ω F-type (L-Band)
N - 50Ω SMA (RF), 75Ω BNC (L-Band)
NN - 50Ω N-type (RF), 50Ω N-type (L-Band)
NS - 50Ω SMA (RF), 50Ω N-type (L-Band)
S - 50Ω SMA (RF), 50Ω BNC (L-Band)

*10˚C to 40˚C; Specifications subject to change without notice

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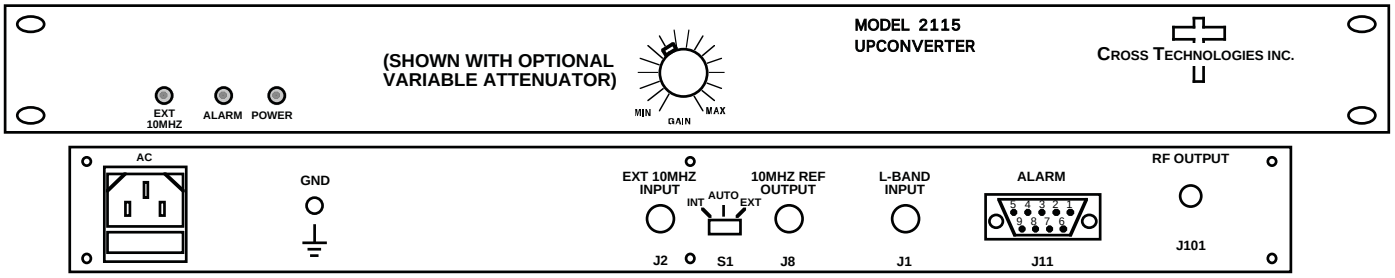
DATA SHEET

REV B 03/19/08

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 ± 3 dB, 10MHz reference signal is connected to the external reference input. The 2115 is powered by a 100-240 ± 10% VAC power supply, and mounted in a 1 3/4" X 19 " X 14" rack mount chassis.



Front and Rear Panels

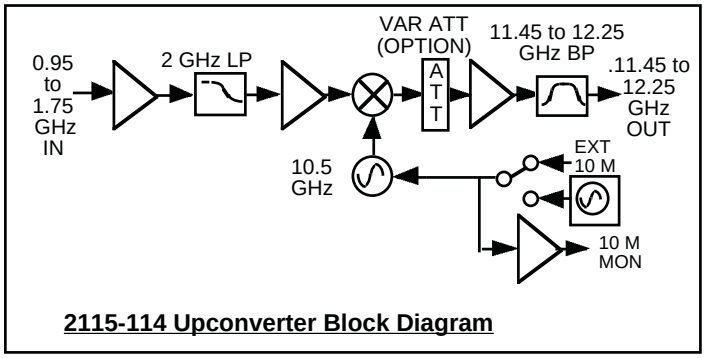
EQUIPMENT SPECIFICATIONS*

Input Characteristics

Impedance/Return Loss	50Ω/14 dB
Frequency	0.95 to 1.75 GHz
Noise Figure, Max.	20 dB max gain
Input Level range	-40 to -25 dBm
Input 1 dB compression	-15 dBm

Output Characteristics

Impedance/Return Loss	50 Ω /14 dB
Frequency	11.45 to 12.25 GHz
Output Level Range	-20 to -5 dBm



2115-114 Upconverter Block Diagram

Channel Characteristics

Gain	+20 ±1 dB, (+20 to +5 dB continuously variable with Variable Attenuator Option)
Image Rejection	> 60 dB, min
Spurious, Inband	SIGNAL RELATED<-60 dBC in band, -5 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	±1 dB, 11.45 - 12.25 GHz out; ± 0.5 dB, 40 MHz BW
Frequency Sense	Non-inverting

LO Characteristics

LO Frequency	10.5 GHz
Frequency Accuracy	± 0.01 ppm max over temp internal reference; ext. ref. input

Phase Noise @ F (Hz) >	*100*	*1K*	*10K*	*100K*	*1M*
dBC/Hz	*-70*	*-80*	*-85*	*-100*	*-110*

10 MHz level	+3 dBm, ± 3 dB, 75 ohms, External In or Internal out

Controls, Indicators

Attenuator Option -VA	Provides +20 to +5 dB continuously variable gain via front panel variable potentiometer.
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 Connector	SMA (female), 50Ω
L-Band Connector	BNC (female), 50Ω
10 MHz connectors	BNC (female), 75Ω connector;Works for 50Ω or 75Ω
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 ±10% VAC, 47 - 63 Hz, 25 watts max.

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

Available Connector Options

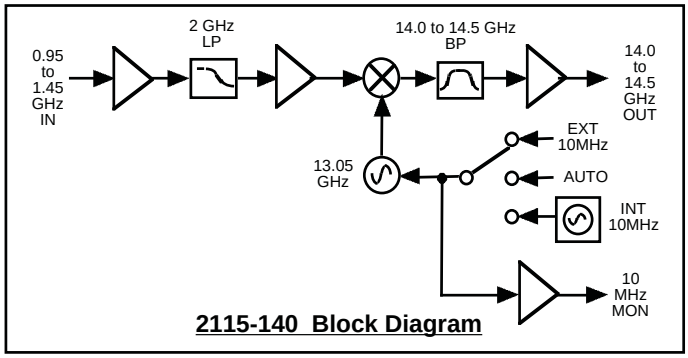
M - 50Ω N-type (RF), 50Ω BNC (L-BAND)
N - 50Ω N-type (RF), 75Ω BNC (L-BAND)
NF - 50Ω N-type (RF), 75Ω F-type (L-BAND)
NN - 50Ω N-type (RF), 50Ω N-type (L-BAND)
S7 - 50Ω SMA (RF), 75Ω BNC (L-BAND)
SF- 50Ω SMA (RF), 75Ω F-type (L-BAND)
SN - 50Ω SMA (RF), 50Ω N-type (L-BAND)
SS - 50Ω SMA (RF), 50Ω SMA (L-BAND)

2115-140 Block Upconverter

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 ± 3 dB, 10MHz reference signal is connected to the external reference input. The 2115 is powered by a 100-240 ± 10% VAC power supply, and mounted in a 1 3/4" X 19 " X 14" rack mount chassis.

2115-140 Upconverter

EQUIPMENT SPECIFICATIONS*



2115-140 Block Diagram

Input Characteristics

Impedance/Return Loss	50Ω/14 dB
Frequency	0.95 to 1.45 GHz
Noise Figure, Max.	20 dB max gain
Input Level range	-40 to -20 dBm
Input 1 dB compression	-10 dBm

Output Characteristics

Impedance/Return Loss	50 Ω /14 dB
Frequency	14.0 to 14.5 GHz
Output Level Range	-20 to -5 dBm
Output 1 dB compression	+10 dBm

Channel Characteristics

Gain	+20 dB ±1 dB
Image Rejection	> 60 dB, min
Spurious, Inband	SIGNAL RELATED<-60 dBC in band, 0 dBm out; SIGNAL INDEPENDENT,<-60 dBm
Spurious, Out of band	<-50 dBm
Intermodulation	<-55 dBC for two carriers each at -10 dBm out
Frequency Response	±1 dB, 14.0 - 14.5 GHz out; ± 0.5 dB, 40 MHz BW
Frequency Sense	Non-inverting

LO Characteristics

LO Frequency	13.05 GHz
Frequency Accuracy	± 0.01 ppm max over temp internal reference; external reference input
Phase Noise	< -70 @ 100Hz; < -80 @ 1kHz; < -90 @ 10kHz; < -100 @ 100kHz; < -110 @ 1MHz
10 MHz level	3 dBm, ± 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 (female), 50Ω
L-Band Connector	BNC (female), 50Ω (BNC, 75Ω; Type-F, 75Ω; Type-N, 50Ω optional)
10 MHz Connectors	BNC (female), 50Ω/75Ω
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 ± 10% VAC, 47 - 63 Hz, 45 watts max.

Options

Connectors	Contact Cross Sales for option numbers

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

CROSS TECHNOLOGIES, INC.

DATA SHEET

9/29/08

2115-202 Block Upconverter, 18.3 to 20.2 GHz

The 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 0 ±3 dB. Connectors are SMA female for the RF and BNC female for the IF and external reference input and reference output. The 2115 is powered by a 100-240 ±10% VAC power supply, and housed in a 1RU chassis.

Front Panel

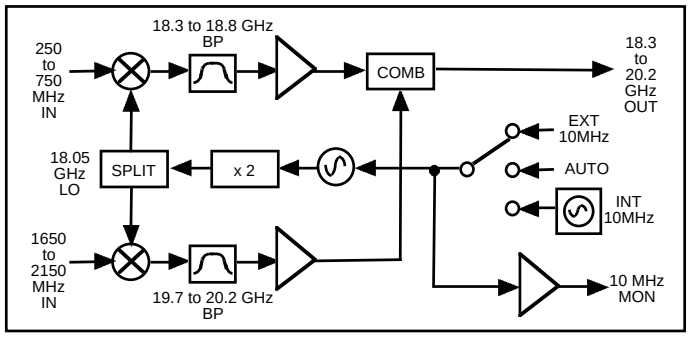
EQUIPMENT SPECIFICATIONS*

Input Characteristics

Impedance/Return Loss	50Ω / 14 dB
Frequency, Input 1	250 to 750 MHz
Frequency, Input 2	1650 to 2150 MHz
Noise Figure, Max.	20 dB max gain
Input Lvl Range - comp	-11 to -31 dBm
Input Lvl Range/carrier	-22 to -42 dBm
Input 1 dB compression	+4 dBm

Output Characteristics

Impedance/Return Loss	50Ω / 10 dB
Frequency	18.3 to 20.2 GHz
Output Lvl Range - comp	-11 to -31 dBm
Output Lvl Range/carrier	-22 to -42 dBm
Output 1 dB compression	+4 dBm



Block Diagram

Channel Characteristics

Gain	0 dB ±3 dB
Image Rejection	> 50 dB, min
Spurious, Inband	< -70 dBm
Spurious, Out of band, LO	< -60 dBm
Intermodulation	< -50 dBC for two carriers each at -14 dBm out
Frequency Response	± 2 dB, 18.3-18.8 GHz and 19.7-20.2 GHz out; ± 1 dB, 40 MHz BW
Frequency Sense	Non-inverting

LO Characteristics

LO Frequency	18.05 GHz
Frequency Accuracy	± 0.01 ppm max over temp internal reference; external reference input
10 MHz In/Out Level	3 dBm ± 3 dB

Phase Noise @ Freq	100 Hz	1kHz	10kHz	100kHz	1 MHz
dBC/Hz	-55	-65	-80	-100	-115

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 (female), 50Ω
L-Band Connector	BNC (female), 50Ω (BNC, 75Ω; Type-F, 75Ω; Type-N, 50Ω optional)
10 MHz Connectors	BNC (female), 50Ω/75Ω
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 ±10% VAC, 47 - 63 Hz, 45 watts max.

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

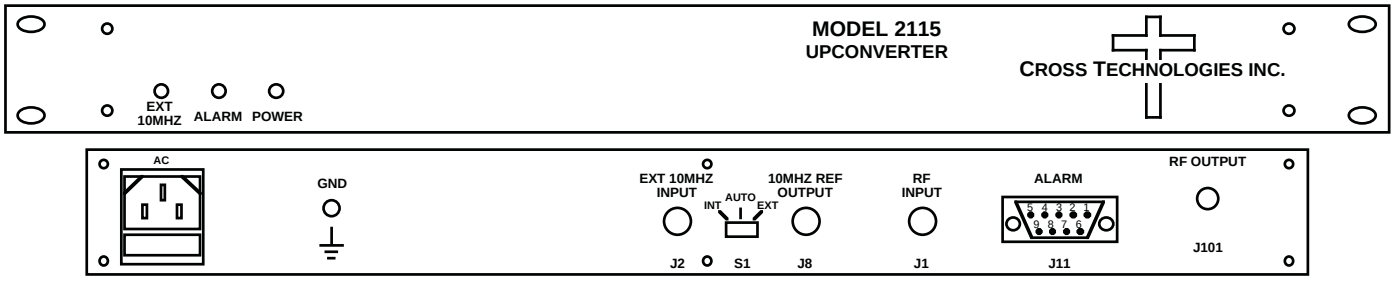
CROSS TECHNOLOGIES, INC.

DATA SHEET

REV. A 12/10/07

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 ± 3 dB, 10MHz reference signal is connected to the external reference input. The 2115 is powered by a 100-240 ±10% VAC power supply, and mounted in a 1 3/4" X 19 " X 14" rack mount chassis.



Front and Rear Panels

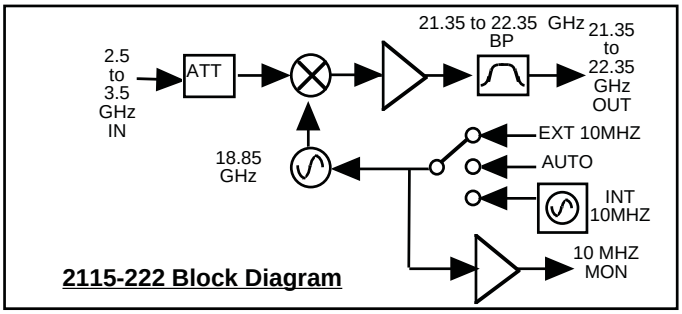
EQUIPMENT SPECIFICATIONS*

Input Characteristics

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

Output Characteristics

Impedance/Return Loss	50 Ω /10 dB
Frequency	21.35 to 22.35 GHz
Output Level Range	-10 to -30 dBm
Output 1 dB compression	+4 dBm



2115-222 Block Diagram

Channel Characteristics

Gain	0 dB ±3 dB
Image Rejection	> 55 dB, min
Spurious, Inband	SIGNAL RELATED<-50 dBC in band, -10 dBm out; SIGNAL INDEPENDENT,<-70 dBm
Spurious, Out of band, LO	<-60 dBm
Intermodulation	<-50 dBC for two carriers each at -13 dBm out
Frequency Response	±2 dB, 21.35-22.35 GHz out; ± 1.0 dB, 40 MHz BW
Frequency Sense	Non-inverting

LO Characteristics

LO Frequency	18.85 GHz
Frequency Accuracy	± 0.01 ppm max over temp internal reference; external reference input

Phase Noise @ F (Hz) >	*100*	*1K*	*10K*	*100K*	*1M*
dBC/Hz	*-55*	*-70*	*-80*	*-100*	*-115*

10 MHz In/Out level +3 dBm, ± 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), 50Ω
RF In Connector	BNC (female), 50Ω
10 MHz connectors	BNC (female), 75Ω connector;Works for 50Ω or 75Ω
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 ±10% VAC, 47 - 63 Hz, 25 watts max.

Available Connector Options

SN - 50Ω SMA (RF Out), 50Ω N-type (RF In)
SS - 50Ω SMA (RF Out), 50Ω SMA (RF In)

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

VII. BLOCK DOWNCONVERTERS

MODEL NUMBER	PAGE# OR WEB	BAND	RF IN RANGE (GHz)	RF OUT RANGE (GHz)	LO FREQ (GHz)	GAIN (dB)	10 kHz ø NOISE dBC/Hz
2116-25	WEB	S	2.0-2.5	1.2-1.7	3.8	35	-85
2116-34	59	C	3.4-4.2	0.95-1.75	5.15	35	-85
2116-72	60	X	7.25 - 7.75	0.95-1.45	6.3	35	-85
2116-105	WEB	Ku	10.55-11.7	0.95-2.10	9.6	35	-85
2116-107	WEB	Ku	10.7-11.7	0.95-1.95	9.75	35	-85
2116-109	WEB	Ku	10.95-11.7	0.95-1.7	10	35	-85
2116-114	WEB	Ku	11.45-12.25	0.95-1.75	10.5	35	-85
2116-117	61	Ku	11.7-12.75	0.95-2.00	10.75	35	-85
2116-118	WEB	Ku	11.7-12.5	0.95-1.75	10.75	35	-85
2116-125	WEB	Ku	12.2-12.75	0.95-1.5	11.25	35	-85
2116-126	WEB	Ku	12.25-12.75	0.95-1.5	11.3	35	-85
2116-137	62	Ku	13.75-14.5	0.95-1.70	12.8	35	-85
2116-184	63	Ka	17.3-18.4	0.95-2.05	16.35	25	-85
2116-222	64	Ka	21.35-22.35	2.5-3.5	18.85	20	-85

CONNECTOR OPTIONS, BLOCK CONVERTERS

#	DESCRIPTION	2115/2116
NN	ALL RF & IF Connectors 50 Ω N-type	Y / Y
NS	RF – 50 Ω N-type / IF - 50 Ω SMA	Y / Y
SN	RF – 50 Ω SMA / IF - 50 Ω N-type	Y / Y
SS	ALL RF& IF Connectors 50 Ω SMA	Y / Y

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2116-34 Block Downconverter, 3.4 - 4.2 GHz

The 2116-34 Downconverter converts 3.4 - 4.2 GHz to 0.95 - 1.75 GHz 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 ± 3 dB, 10MHz reference signal is connected to the external reference input. The 2116 is powered by a 100-240 ± 10% VAC power supply, and mounted in a 1 3/4" X 19 " X 14" rack mount chassis.

Front Panel

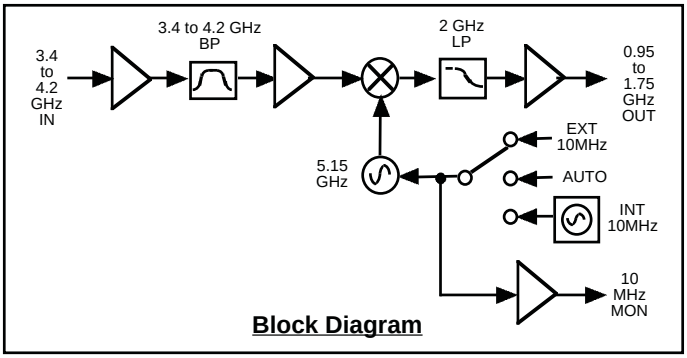
EQUIPMENT SPECIFICATIONS*

Input Characteristics (RF)

Impedance/Return Loss	50Ω/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 (L-Band)

Impedance/Return Loss	50Ω /14 dB
Frequency	0.95 to 1.75 GHz
Output Level Range	-20 to 0 dBm
Output 1 dB compression	+10 dBm



Block Diagram

Channel Characteristics

Gain	+35 dB ±2 dB
Image Rejection	> 60 dB, min
Spurious, In Band	SIGNAL RELATED<-60 dBC in band, 0 dBm out; SIGNAL INDEPENDENT,<-60 dBm
Spurious, Out of Band	<-50 dBm
Intermodulation	<-55 dBC for two carriers each at -10 dBm out
Frequency Response	±1.5 dB, 950 -1750 MHz out; ± 0.5 dB, 40 MHz BW
Frequency Sense	Inverting

LO Characteristics

LO Frequency	5.15 GHz
Frequency Accuracy	± 0.01 ppm max over temp internal reference; ext. ref. input
10 MHz In/Out Level	3 dBm, ± 3 dB

Phase Noise @ F (Hz) >	*100*	*1K*	*10K*	*100K*	*1M*
dBC/Hz	*-70*	*-80*	*-85*	*-100*	*-110*

Controls, Indicators

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

Other

RF Connector	N-type (female), 50Ω
L-Band Connector	BNC (female), 50Ω
10 MHz Connectors	BNC (female), 50Ω/75Ω
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 ± 10% VAC, 47 - 63 Hz, 45 watts max.

Available Options

Connectors/Impedance
FN - 50Ω N-type (RF), 75Ω F-type (L-Band)
N - 50Ω N-type (RF), 75Ω BNC (L-Band)
NN - 50Ω N-type (RF), 50Ω N-type (L-Band)
NS - 50Ω SMA (RF), 50Ω N-type (L-Band)

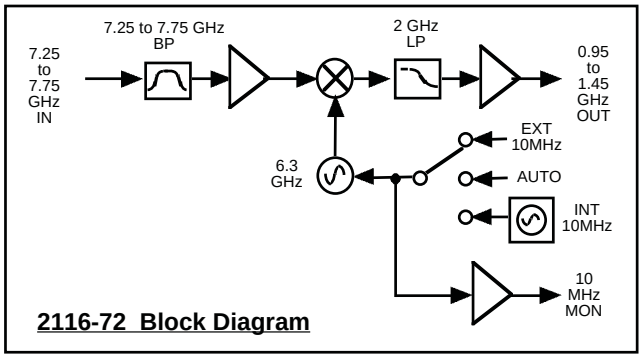
*10˚C to 40˚C; Specifications subject to change without notice

2116-72 Block Downconverter, 7.25 - 7.75 GHz

The 2116-72 Downconverter converts 7.25 - 7.75 GHz to 0.95 - 1.45 GHz (non-inverted) with low phase noise and flat frequency response. Frequency translation is via a **6.3** 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 3dBm ± 3dB, 10MHz reference signal is connected to the external reference input. The 2116-72 is powered by a 100-240 ±10% VAC power supply, and mounted in a 1 3/4" X 19" X 14" rack mount chassis.

Front Panel

EQUIPMENT SPECIFICATIONS



2116-72 Block Diagram

Input Characteristics (RF)

Impedance/Return Loss	50Ω/14 dB
Frequency	7.25 to 7.75 GHz
Noise Figure, Max.	15 dB max gain
Input Level range	-55 to -35 dBm
Input 1 dB compression	-25 dBm

Output Characteristics (L-Band)

Impedance/Return Loss	50Ω /14 dB
Frequency	0.95 to 1.45 GHz
Output Level Range	-20 to 0 dBm
Output 1 dB compression	+10 dBm

Channel Characteristics

Gain	+35 dB ±2 dB
Image Rejection	> 60 dB, min
Spurious, In Band	SIGNAL RELATED<-60 dBC in band, 0 dBm out; SIGNAL INDEPENDENT,<-60 dBm
Spurious, Out of Band	<-50 dBm
Intermodulation	<-55 dBC for two carriers each at -10 dBm out
Frequency Response	±1.5 dB, 0.95 to 1.45 GHz out; ± 0.5 dB, 40 MHz BW
Frequency Sense	**Non-Inverting**

LO Characteristics

LO Frequency	**6.3** GHz
Frequency Accuracy	± 0.01 ppm max over temp internal reference; ext. ref. input
10 MHz In/Out Level	3 dBm, ± 3 dB

Phase Noise @ Freq	100 Hz	1kHz	10kHz	100kHz	1 MHz
dBC/Hz	-70	-80	-85	-100	-110

Controls, Indicators

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

Other

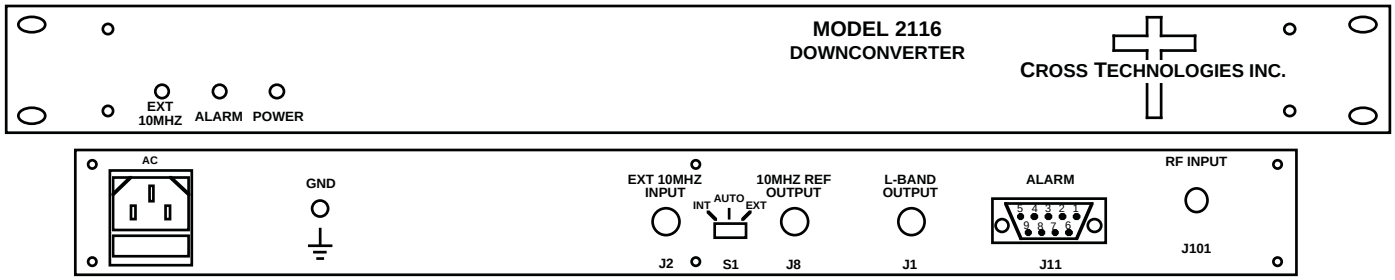
RF Connector	N-type (female), 50Ω
L-Band Connector	BNC (female), 50Ω
10 MHz Connectors	BNC (female), 50Ω/75Ω
Alarm Connector	DB9 - NO or NC contact closure on Alarm
Size	19 inch standard chassis 1.7" high X 14.0" deep
Power	100 - 240 ±10% VAC, 47 - 63 Hz, 45 watts max.

Available Connector Options-

N - 50Ω N-type (RF), 75Ω BNC (L-BAND)
NF - 50Ω N-type (RF), 75Ω F-type (L-BAND)
NN - 50Ω N-type (RF), 50Ω N-type (L-BAND)
S7 - 50Ω SMA (RF), 75Ω BNC (L-BAND)
SF- 50Ω SMA (RF), 75Ω F-type (L-BAND)
SN - 50Ω SMA (RF), 50Ω N-type (L-BAND)
SS - 50Ω SMA (RF), 50Ω SMA (L-BAND)

2116-117 Block Downconverter, 11.7 - 12.75 GHz to 0.95 - 2.00 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 (+25 dB for Option W25). Connectors are SMA female for the RF and BNC female for the L-Band and external reference input and reference output. A three-way switch controls which 10 MHz reference is being used. In the INT position, the internal reference is used, in the EXT position, the external reference is used, and in the AUTO position, the internal reference is used unless a +3 dBm ± 3 dB, 10MHz reference signal is connected to the external reference input. The 2116 is powered by a 100-240 ± 10% VAC power supply, and mounted in a 1 3/4" X 19 " X 14" rack mount chassis.



Front and Rear Panels

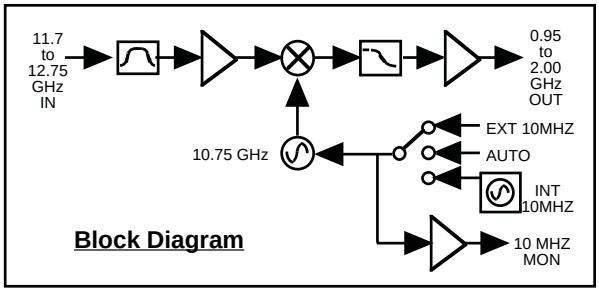
EQUIPMENT SPECIFICATIONS*

Input Characteristics (RF)

Impedance/Return Loss	50Ω/14 dB
Frequency	11.7 to 12.75 GHz
Noise Figure, Max.	12 dB max gain
Level	-55 to -35 dBm **(-45 to -25 dBm; OPTION W25)**
1dB Compression	-25 dBm **(-15dBm; OPTION W25)**

Output Characteristics (L-Band)

Impedance/Return Loss	50Ω/14 dB
Frequency	0.95 to 2.00 GHz
Level	-20 to 0 dBm
1dB Compression	+10 dBm



Block Diagram

Channel Characteristics

Gain	+35 dB ±2 dB**(+25 dB ±2 dB; OPTION W25)**
Image Rejection	> 60 dB, min
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 out
Frequency Response	±1.5 dB, 0.95-2.00 MHz out; ± 0.5 dB, 40 MHz BW
Frequency Sense	Non-inverting

LO Characteristics

LO Frequency	10.75 GHz
Frequency Accuracy	± 0.01 ppm max over temp internal reference; ext. ref. input
10 MHz level In/Out	+3 dBm ± 3 dB

Phase Noise @ F (Hz) >	*100*	*1K*	*10K*	*100K*	*1M*
dBC/Hz	*-70*	*-80*	*-85*	*-95*	*-110*

Controls, Indicators

INT/AUTO/EXT Switch	Selects internal or external 10 MHz (rear panel DP3T switch)
Ext 10 MHz	Yellow LED, indicates external 10 MHz reference selected
PLL Alarm	Red LED, External contact closure
Power	Green LED

Other

RF Connector	SMA (female), standard
IF Connector	BNC (female), 50Ω, standard
10 MHz connectors	BNC (female), 75Ω connector; works with 50Ω or 75Ω
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 ± 10% VAC, 47 - 63 Hz,25 watts max.

Available Options

W25, +25dB gain

Connectors/Impedance

M - 50Ω N-type (RF), 50Ω BNC (L-BAND)
N - 50Ω N-type (RF), 75Ω BNC (L-BAND)
NF - 50Ω N-type (RF), 75Ω F-type (L-BAND)
NN - 50Ω N-type (RF), 50Ω N-type (L-BAND)
S7 - 50Ω SMA (RF), 75Ω BNC (L-BAND)
SF- 50Ω SMA (RF), 75Ω F-type (L-BAND)
SN - 50Ω SMA (RF), 50Ω N-type (L-BAND)
SS - 50Ω SMA (RF), 50Ω SMA (L-BAND)

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

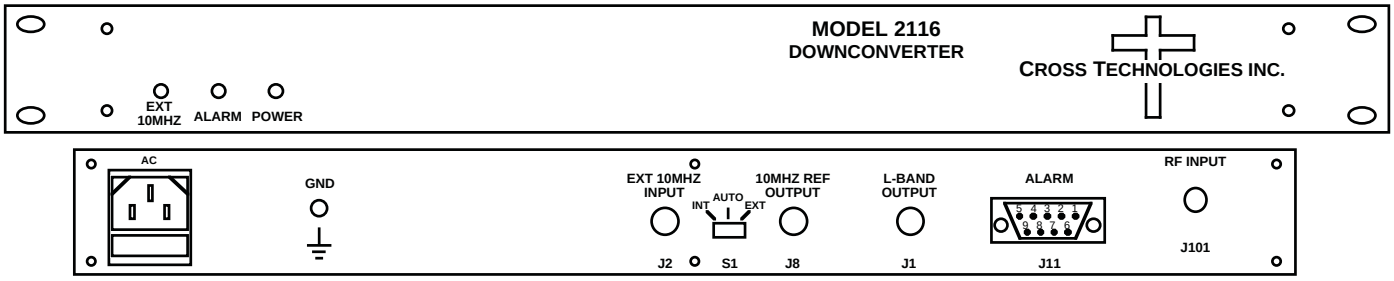
CROSS TECHNOLOGIES, INC.

DATA SHEET

04/07/09 Rev. B

2116-137 Block Downconverter, 13.75 - 14.5 GHz

The 2116-137 Block 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 ± 3 dB, 10MHz reference signal is connected to the external reference input. The 2116 is powered by a 100-240 ±10% VAC power supply, and mounted in a 1 3/4" X 19 " X 14" rack mount chassis.



Front and Rear Panels

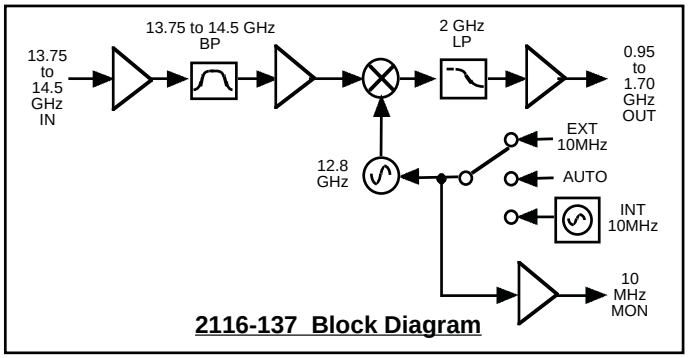
EQUIPMENT SPECIFICATIONS*

Input Characteristics

Impedance/Return Loss	50Ω/14 dB
Frequency	13.75 to 14.5 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	50Ω /14 dB
Frequency	0.95 to 1.70 GHz
Output Level Range	-20 to 0 dBm
Output 1 dB compression	+10 dBm



2116-137 Block Diagram

Channel Characteristics

Gain	+35 dB ±2 dB
Image Rejection	> 60 dB, min
Spurious, In Band	SIGNAL RELATED<-60 dBC in band, 0 dBm out; SIGNAL INDEPENDENT,<-60 dBm
Spurious, Out of Band	<-50 dBm
Intermodulation	<-55 dBC for two carriers each at -10 dBm out
Frequency Response	±1.5 dB, 0.95 - 1.7 GHz out; ± 0.5 dB, 40 MHz BW
Frequency Sense	Non-inverting

LO Characteristics

LO Frequency	12.8 GHz
Frequency Accuracy	± 0.01 ppm max over temp internal reference; ext. ref. input

Phase Noise @ F (Hz) >	*100*	*1K*	*10K*	*100K*	*1M*
dBC/Hz	*-70*	*-80*	*-85*	*-100*	*-110*

10 MHz level	3 dBm, ± 3 dB, 75 ohms, External In or Monitor out

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 Connector	SMA (female), 50Ω
L-Band Connector	BNC (female), 50Ω
10 MHz connectors	BNC (female), 75Ω connector;Works for 50Ω/75Ω
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 ±10% VAC, 47 - 63 Hz, 25 watts max.

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

Available Connector Options

M - 50Ω N-type (RF), 50Ω BNC (L-BAND)
N - 50Ω N-type (RF), 75Ω BNC (L-BAND)
NF - 50Ω N-type (RF), 75Ω F-type (L-BAND)
NN - 50Ω N-type (RF), 50Ω N-type (L-BAND)
S7 - 50Ω SMA (RF), 75Ω BNC (L-BAND)
SF- 50Ω SMA (RF), 75Ω F-type (L-BAND)
SN - 50Ω SMA (RF), 50Ω N-type (L-BAND)
SS - 50Ω SMA (RF), 50Ω SMA (L-BAND)

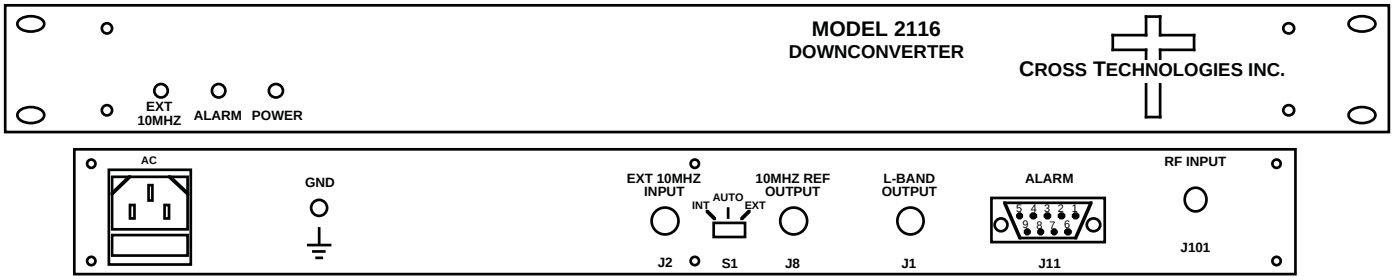
CROSS TECHNOLOGIES, INC.

DATA SHEET

12/06/07

2116-184 Block Downconverter

The 2116-184 Block Downconverter converts 17.3 - 18.4 GHz to 0.95 - 2.05 GHz with a local oscillator at16.35 GHz. Front panel LEDs provide indication of DC power, external 10 MHz, and PLL alarm. The RF to L-band gain is +25 dB. Connectors are SMA female for the RF and BNC female for the L-Band and external reference input and reference output. A three-way switch controls which 10 MHz reference is being used. In the INT position, the internal reference is used, in the EXT position, the external reference is used, and in the AUTO position, the internal reference is used unless a +3 dBm ± 3 dB, 10MHz reference signal is connected to the external reference input. The 2116 is powered by a 100-240 ±10% VAC power supply, and mounted in a 1 3/4" X 19 " X 14" rack mount chassis.



Front and Rear Panels

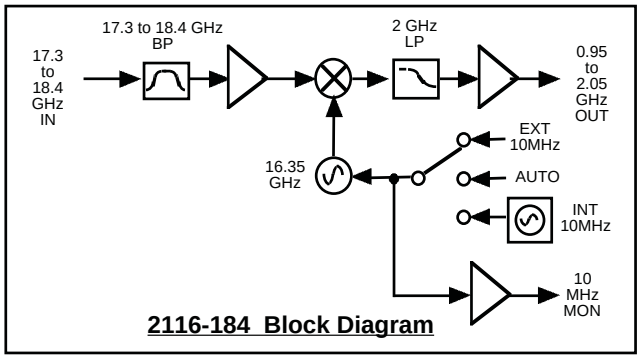
EQUIPMENT SPECIFICATIONS*

Input Characteristics

Impedance/Return Loss	50Ω/14 dB
Frequency	17.3 - 18.4 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 Ω /12 dB
Frequency	0.95 - 2.05 GHz
Output Level Range	-30 to -10 dBm
Output 1 dB compression	0 dBm



2116-184 Block Diagram

Channel Characteristics

Gain	+25 dB ±2 dB
Image Rejection	> 50 dB, min
Spurious, Inband	SIGNAL RELATED<-50 dBC in band, -10 dBm out; SIGNAL INDEPENDENT,<-60 dBm
Spurious, Out of band	<-50 dBm
Intermodulation	<-50 dBC for two carriers each at -13 dBm out
Frequency Response	±2.0 dB, 0.95 - 2.05 GHz out; ± 0.75 dB, 40 MHz BW
Frequency Sense	Non-inverting

LO Characteristics

LO Frequency	16.35 GHz
Frequency Accuracy	± 0.01 ppm max over temp internal reference; ext. ref. input

Phase Noise @ F (Hz) >	*100*	*1K*	*10K*	*100K*	*1M*
dBC/Hz	*-60*	*-70*	*-80*	*-100*	*-115*

10 MHz level	+3 dBm, ± 3 dB, 75 ohms, External In or Internal out

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 Connector	SMA (female), 50Ω
L-Band Connector	BNC (female), 50Ω
10 MHz connectors	BNC (female), 75Ω connector;Works for 50Ω/75Ω
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 ±10% VAC, 47 - 63 Hz, 25 watts max.

Available Connector Options

S7 - 50Ω SMA (RF), 75Ω BNC (L-BAND)
SF- 50Ω SMA (RF), 75Ω F-type (L-BAND)
SN - 50Ω SMA (RF), 50Ω N-type (L-BAND)
SS - 50Ω SMA (RF), 50Ω SMA (L-BAND)

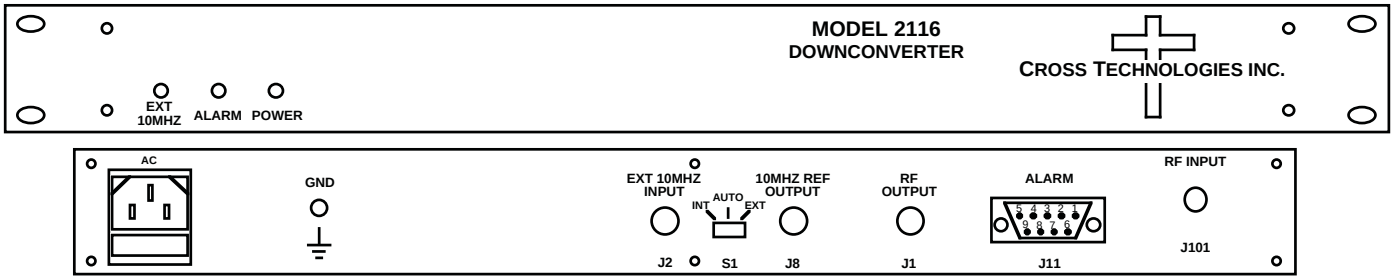
CROSS TECHNOLOGIES, INC.

DATA SHEET

REV. A 3/19/08

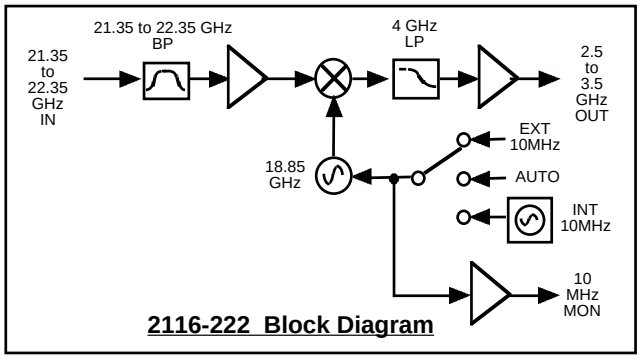
2116-222 Block Downconverter

The 2116-222 Block Downconverter converts 21.35 - 22.35 GHz to 2.5 - 3.5 GHz with a local oscillator at18.85 GHz. Front panel LEDs provide indication of DC power, external 10 MHz, and PLL alarm. The RF In to RF Out gain is +20 dB. Connectors are SMA female for the RF In and BNC female for the RF Out and external reference input and reference output. A three-way switch controls which 10 MHz reference is being used. In the INT position, the internal reference is used, in the EXT position, the external reference is used, and in the AUTO position, the internal reference is used unless a +3 dBm ± 3 dB, 10MHz reference signal is connected to the external reference input. The 2116 is powered by a 100-240 ±10% VAC power supply, and mounted in a 1 3/4" X 19 " X 14" rack mount chassis.



Front and Rear Panels

EQUIPMENT SPECIFICATIONS*



2116-222 Block Diagram

Input Characteristics

Impedance/Return Loss	50Ω/10 dB
Frequency	21.35 - 22.35 GHz
Noise Figure, Max.	20 dB max gain
Input Level range	-45 to -25 dBm
Input 1 dB compression	-15 dBm

Output Characteristics

Impedance/Return Loss	50 Ω /10 dB
Frequency	2.5 - 3.5 GHz
Output Level Range	-25 to -5 dBm
Output 1 dB compression	+5 dBm

Channel Characteristics

Gain	+20 dB ±2 dB
Image Rejection	> 55 dB, min
Spurious, Inband	SIGNAL RELATED<-50 dBC in band, -5 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	±2.0 dB, 2.5 - 3.5 GHz out; ± 1.0 dB, 40 MHz BW
Frequency Sense	Non-inverting

LO Characteristics

LO Frequency	18.85 GHz
Frequency Accuracy	± 0.01 ppm max over temp internal reference; ext. ref. input

Phase Noise @ F (Hz) >	*100*	*1K*	*10K*	*100K*	*1M*
dBC/Hz	*-55*	*-70*	*-80*	*-100*	*-110*

10 MHz level	+3 dBm, ± 3 dB, 75 ohms, External In or Internal out

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 In Connector	SMA (female), 50Ω
RF Out Connector	BNC (female), 50Ω
10 MHz connectors	BNC (female), 75Ω connector;Works for 50Ω/75Ω
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 ±10% VAC, 47 - 63 Hz, 25 watts max.

Available Connector Options

SN - 50Ω SMA (RF In), 50Ω N-type (RF Out)
SS - 50Ω SMA (RF In), 50Ω SMA (RF Out)

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

VIII. MULTI-BAND BLOCK CONVERTERS

MODEL NUMBER	PAGE# OR WEB	UP DOWN OR TRANSLATOR	BAND #	BAND CONVERSION	RF IN RANGE (GHz)	RF OUT RANGE (GHz)	TRANSLATION RANGE (GHz)	STEP SIZE (MHZ)
3115-51	67	UP	1	L-Ku	0.95-1.45	10.7-11.2	FIXED	N/A
INDOOR			2	L-Ku	0.95-1.45	11.2-11.7	FIXED	N/A
			3	L-Ku	0.95-1.45	11.7-12.2	FIXED	N/A
			4	L-Ku	0.95-1.45	12.2-12.7	FIXED	N/A
			5	L-Ku	0.95-1.45	12.25-12.75	FIXED	N/A
4116-T24	68	TRANSLATOR	1	UHF-UHF	0.2 - 0.4	0.2 - 0.4	0 - 0.2	0.1
OUTDOOR		TUNABLE						
4115-31	69	UP	1	L-C	0.95-2.05	5.85-6.95	FIXED	N/A
OUTDOOR			2	L-Ku	0.95-2.05	13.75-14.85	FIXED	N/A
			3	L-DBS	0.95-2.05	17.3-18.4	FIXED	N/A
4116-31	70	DOWN	1	C-L	3.4-4.2	0.95-1.75	FIXED	N/A
OUTDOOR			2	Ku-L	10.7-11.8	0.95-2.05	FIXED	N/A
			3	Ku-L	11.7-12.8	0.95-2.05	FIXED	N/A
4116-T51	71	TRANSLATOR	1	C-C	5.85-6.95	3.4-4.5	2.05-3.05	5
OUTDOOR			2	Ku-Ku	13.75-14.85	10.7-11.8	2.05-3.05	5
			3	Ku-Ku	13.75-14.85	11.7-12.8	2.05-3.05	5
			4	DBS-Ku	17.3-18.4	10.7-11.8	5.1-5.6	5
			5	DBS-Ku	17.3-18.4	11.7-12.8	6.6	FIXED
4116-T61	72	TRANSLATOR	1	C-C	5.85-6.95	3.4-4.5	2.05-3.05	1
OUTDOOR			2	Ku-Ku	13.75-14.85	10.7-11.8	2.05-3.05	1
			3	Ku-Ku	13.75-14.85	11.7-12.8	2.05-3.05	1
			4	Ku-Ku	13.75-14.85	11.7-12.8	1.24-1.80	1
			5	DBS-Ku	17.3-18.4	10.7-11.8	5.1-5.6	5
			6	DBS-Ku	17.3-18.4	11.7-12.8	6.6	FIXED
4116-267	73	TRANSLATOR	1	Ka-L	0.52 - 0.92	26.5-2.69	FIXED	N/A
OUTDOOR								
4115-300	74	UP	1	L-Ka	0.95-1.95	27.5-28.5	FIXED	N/A
OUTDOOR			2	L-Ka	0.95-1.95	28.0-29.0	FIXED	N/A
			3	L-Ka	0.95-1.95	29.0-30.0	FIXED	N/A
			4	L-Ka	0.95-1.95	30.0-21.0	FIXED	N/A
4116-200	75	DOWN	1	Ka-L	17.7-18.7	0.95-1.95	FIXED	N/A
OUTDOOR			2	Ka-L	18.3-19.3	0.95-1.95	FIXED	N/A
			3	Ka-L	19.2-20.2	0.95-1.95	FIXED	N/A
			4	Ka-L	20.2-21.2	0.95-1.95	FIXED	N/A
4116-T300	76	TRANSLATOR	1	Ka-Ka	27.5-28.5	17.7-18.7	8.3-10.3	5
OUTDOOR			2	Ka-Ka	28.0-29.0	18.3-19.3	8.3-10.3	5
			3	Ka-Ka	29.0-30.0	19.2-20.2	8.3-10.3	5
			4	Ka-Ka	30.0-21.0	20.2-21.2	8.3-10.3	5

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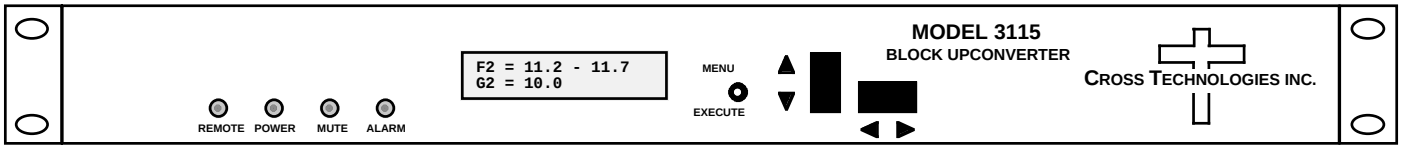
DATA SHEET

REV. A 2/02/09

3115-51 Block Upconverter, Five-Band

The 3115-51 Block Upconverter converts 0.95 - 1.45 GHz to one of five 500 MHz wide RF bands over the 10.7 to 12.75 GHz range. Push button switches select the RF band, gain, and other parameters. Front panel LEDs provide indication of DC power (green), remote operation (yellow), PLL alarm (red), or the TX carrier is muted (yellow). A variable attenuator for the L-band input provides a gain range of 0 to **-20** dB as adjusted by the front panel pushbutton switches. Remote operation allows selection of frequency band and gain. Parameter selection and frequency band and gain settings appear on the LCD display. Connectors are SMA for the L-band input, BNC female 10MHz reference input and output, and SMA female for the RF output (other connector configurations available). The 3115-51 is powered by a 100-240 ±10% VAC power supply; and housed in a 1.75" X 19 " X 16" rack mount chassis.



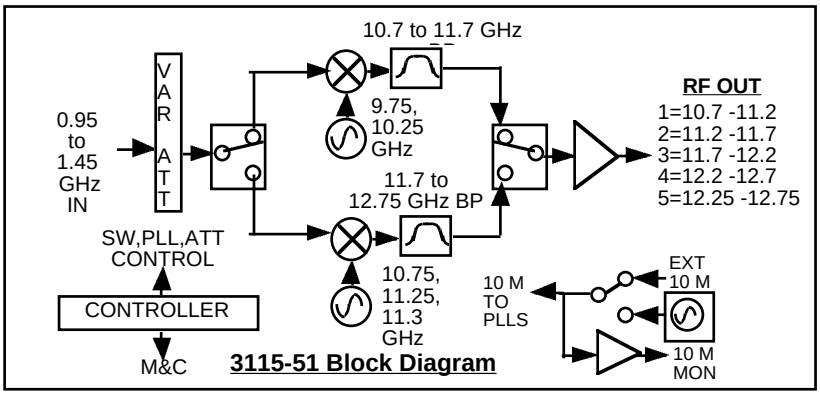
EQUIPMENT SPECIFICATIONS*

Input Characteristics

Impedance/Return Loss	50Ω/14 dB
Frequency	0.95 to 1.45 GHz
Noise Figure, Max.	**25 dB at max gain**
Input Level range	**-20 to 0 dBm**
Input 1 dB compression	**+10 dBm**

Output Characteristics

Impedance/Return Loss	50 Ω /14 dB
Frequency (GHz)	BAND1-10.7 to 11.2
	BAND2-11.2 to 11.7
	BAND3-11.7 to 12.2
	BAND4-12.2 to 12.7
	BAND5-12.25 to 12.75
Output Level Range	**-20** to 0 dBm
Output 1 dB compression	+10 dBm



3115-51 Block Diagram

Channel Characteristics

Gain	**0 ±2 dB, maximim** (**0 to -20 dB** variable in 1 dB steps)
Image Rejection	> 60 dB, min
Spurious, Inband	SIGNAL RELATED<-60 dBC in band, -15 to 0 dBm out; SIGNAL INDEPENDENT,<-60 dBm
Spurious, Out of band	<-50 dBm
Intermodulation	<-50 dBC for two carriers each at -5 dBm out
Frequency Response	±1.5 dB, over 500 MHz RF band; ± 0.5 dB, 40 MHz BW
Frequency Sense	Non-inverting

LO Characteristics

LO Frequency	Band Specific, 9.75, 10.25, 10.75, 11.25, 11.3 GHz
Frequency Accuracy	± 0.01 ppm max over temp internal; ext. ref. input

Phase Noise @ F (Hz) >	*100*	*1K*	*10K*	*100K*	*1M*
dBC/Hz	*-70*	*-80*	*-85*	*-100*	*-110*

10 MHz In/Out Level	3 dBm ± 3 dB

Controls, Indicators

Band/Gain Selection	direct readout LCD; pushbutton switches or remote
Pwr; Alarm; Rem; Mute	Green LED; Red LED; Yellow LED; Yellow LED
Remote	RS232C, 9600 baud (RS485, Ethernet Options)

Other

RF Out Connector	SMA (female), 50Ω
L-Band Connector	SMA (female), 50Ω
10 MHz Connectors	BNC (female), 50Ω/75Ω
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 ±10% VAC, 47-63 Hz, 45 watts max

Available Options

Q - RS485 Remote Interface
W8 - Ethernet Remote Interface
W8S - Ethernet W/SNMP Remote Interface

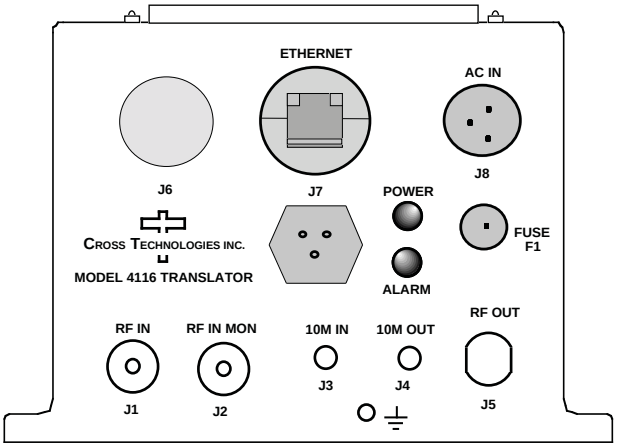
Connector/Impedance

S7 - 50Ω SMA (RF), 75Ω BNC (L-BAND)
SF- 50Ω SMA (RF), 75Ω F-type (L-BAND)
SN - 50Ω SMA (RF), 50Ω N-type (L-BAND)

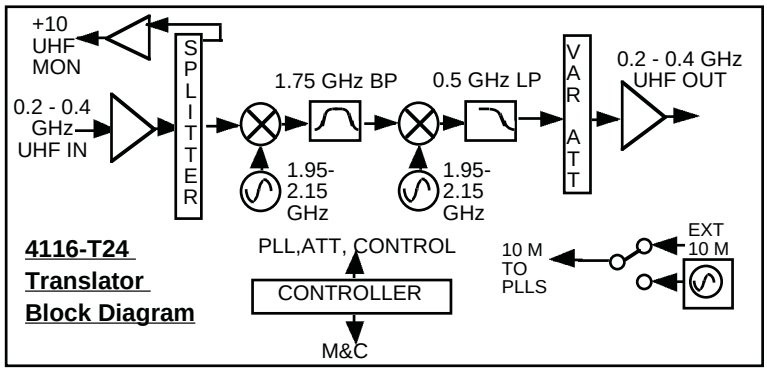
*+0 to +50 degrees C; Specifications subject to change without notice

4116-T24 Translator, UHF to UHF Outdoor

The 4116-T24 Translator converts a 20 MHz UHF input band to a 20 MHz UHF output band in 0.1 MHz steps, input and output selection. Front panel LEDs provide indication of DC Power, and PLL Alarm. The UHF to UHF gain is +20 dB, maximum. Connectors are Type N female for the UHF out, UHF in and UHF in Monitor and SMA female for the external 10 MHz reference input. The 10 MHz reference switches to internal when the external falls below +1 dBm. Gain, band select, and internal 10 MHz frequency are controlled by the Ethernet M&C. The 4116 is powered by a 100-240 ± 10% VAC power supply, and mounted in a 8"W X 6 "H X 16"D weather resistant enclosure.



EQUIPMENT SPECIFICATIONS*



Input Characteristics

Impedance/Return Loss	50Ω/14 dB
Frequency (GHz)	0.2 to 0.4
Noise Figure, Max.	20 dB at max gain
Input Level range	-30 to -10 dBm
Input 1 dB compression	0 dBm

Output Characteristics

Impedance/Return Loss	50 Ω /14 dB
Frequency (GHz)	0.2 to 0.4
Output Level Range	-60 to 0 dBm
Output 1 dB compression	+10 dBm

Channel Characteristics

Gain	+20 ±5 dB max., (+20 to -40 dB variable in 1 dB steps)
Input to Output Isolation	> 60 dB, min
Spurious, Inband	<-50 dBC in band, -15 to 0 dBm out
Spurious, LO	<-60 dBm LO
Intermodulation	<-50 dBC for two carriers each at -5 dBm out
Frequency Response	±2 dB, over UHF band; ± 0.5 dB, 20 MHz BW
Frequency Sense	Non-inverting

LO Characteristics

LO step size	0.1 MHz, input and output selection
Frequency Accuracy	± 0.05 ppm max over temp internal reference; ext. ref. input

Phase Noise @ F (Hz) >	*100*	*1K*	*10K*	*100K*	*1M*
dBC/Hz	*-70*	*-80*	*-85*	*-100*	*-110*

10 MHz level In/Mon	+2 to +8 dBm in; Monitor Output = input level ± 0.5 dB, 50 ohms

Controls, Indicators

Gain, Band, 10M Freq.	Gain, band select, and internal 10 MHz frequency via Ethernet M&C or Status/Control connector.
PLL Alarm	Red LED, External contact closure
Power	Green LED

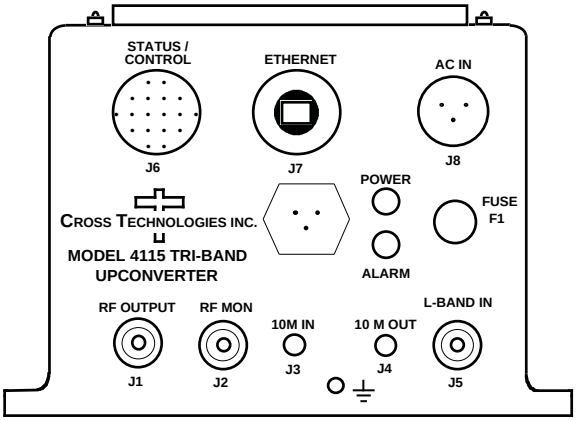
Other

UHF In, Mon. Connector	Type N (female), 50Ω
UHF Out Connector	Type N (female), 50Ω
10 MHz connectors	SMA (female), 50Ω
Size	8"W X 6 "H X 16"D weather resistant enclosure
Power	100-240 ±10% VAC, 47 - 63 Hz, 20 watts max./ FCI Clipper Series CL1M1102 connector

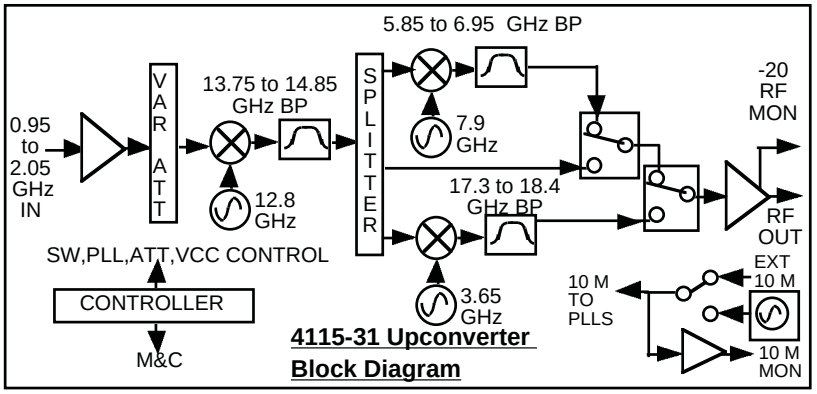
*+0 to +50 degrees C; Specifications subject to change without notice

4115-31 Tri-Band Block Upconverter, Outdoor

The 4115-31 Block Upconverter converts 0.95 - 2.05 GHz to one of three RF bands. Front panel LEDs provide indication of DC Power, and PLL Alarm. The L-band to RF gain is +30 dB. Connectors are Type N female for the L-band, RF and RF Monitor and SMA female for the external reference input and reference output. The 10 MHz reference switches to internal when the external falls below +1 dBm. Gain, band select, and internal 10 MHz frequency are controlled by the Ethernet M&C or via the Status/Control connector. The 4115 is powered by a 100-240 ± 10% VAC power supply, and mounted in a 8"W X 6 "H X 16"D weather resistant enclosure.



EQUIPMENT SPECIFICATIONS*



Input Characteristics

Impedance/Return Loss	50Ω/14 dB
Frequency	0.95 to 2.05 GHz
Noise Figure, Max.	20 dB max gain
Input Level range	-40 to -15 dBm
Input 1 dB compression	-5 dBm

Output Characteristics

Impedance/Return Loss	50 Ω /14 dB
Frequency (GHz)	BAND1-5.85 to 6.95 BAND2-13.75 to 14.85 BAND3-17.3 to 18.4
Output Level Range	-15 to 0 dBm
Output 1 dB compression	+10 dBm

Channel Characteristics

Gain	+30 ±3 dB, (+30 to 0 dB variable in 0.5dB steps)
Image Rejection	> 60 dB, min
Spurious, Inband	SIGNAL RELATED<-60 dBC in band, -15 to 0 dBm out; SIGNAL INDEPENDENT,<-60 dBm
Spurious, Out of band	<-55 dBm
Intermodulation	<-50 dBC for two carriers each at -5 dBm out
Frequency Response	±2 dB, over RF band; ± 0.5 dB, 40 MHz BW
Frequency Sense	Non-inverting

LO Characteristics

LO Frequency	Band Specific
Frequency Accuracy	± 0.05 ppm max over temp internal reference; ext. ref. input

Phase Noise @ F (Hz) >	*100*	*1K*	*10K*	*100K*	*1M*
dBC/Hz	*-70*	*-80*	*-85*	*-100*	*-110*

10 MHz level In/Mon	+2 to +8 dBm in; Monitor Output = input level ± 0.5 dB, 50 ohms

Controls, Indicators

Gain, Band, 10M Freq.	Gain, band select, and internal 10 MHz frequency via Ethernet M&C or Status/Control connector.
PLL Alarm	Red LED, External contact closure
Power	Green LED

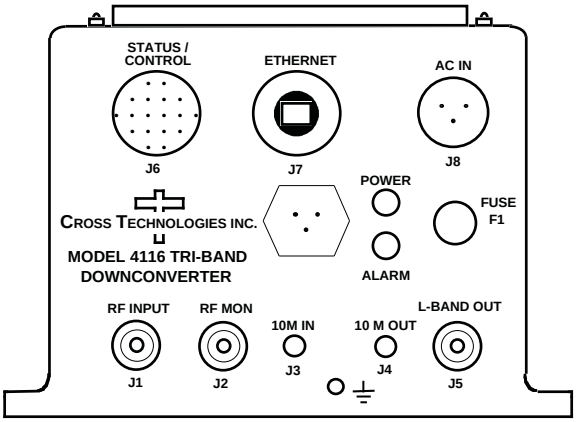
Other

RF Out, Mon. Connector	Type N (female), 50Ω
L-Band Connector	Type N (female), 50Ω
10 MHz connectors	SMA (female), 50Ω
Status/Control Connector	MA3116F14-18P; Weatherized Ethernet connector
Size	8"W X 6 "H X 16"D weather resistant enclosure
Power	100-240 ±10% VAC, 47 - 63 Hz, 20 watts max./ FCI Clipper Series CL1M1102 connector

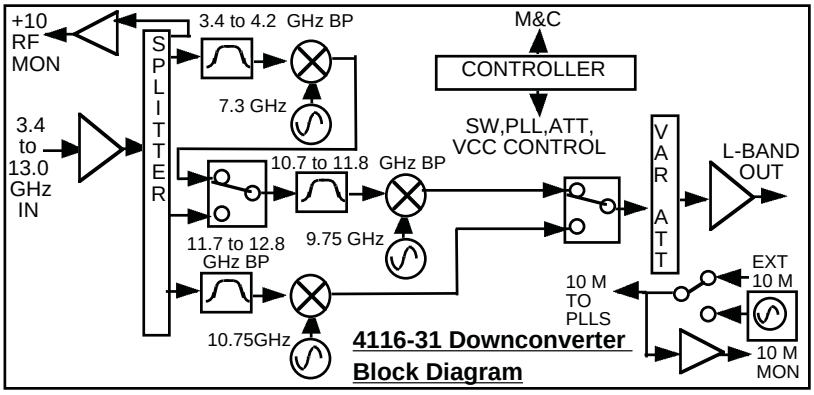
*+0 to +50 degrees C; Specifications subject to change without notice

4116-31 Tri-Band Block Downconverter, Outdoor

The 4116-31 Block Downconverter converts one of three RF bands to 0.95 - 2.05 GHz. Front panel LEDs provide indication of DC Power, and PLL Alarm. The RF to L-band gain is +30 dB. Connectors are Type N female for the L-band, RF and RF Monitor and SMA female for the external reference input and reference output. The 10 MHz reference switches to internal when the external falls below +1 dBm. Gain, band select, and internal 10 MHz frequency are controlled by the Ethernet M&C or via the Status/Control connector. The 4116 is powered by a 100-240 ± 10% VAC power supply, and mounted in a 8"W X 6 "H X 16"D weather resistant enclosure.



EQUIPMENT SPECIFICATIONS*



4116-31 Downconverter Block Diagram

Input Characteristics

Impedance/Return Loss	50Ω/14 dB
Frequency (GHz)	BAND 1 - 3.4 to 4.2 BAND 2 - 10.7 to 11.8 BAND 3 - 11.7 to 12.8
Noise Figure, Max.	15 dB max gain
Input Level range	-50 to -30 dBm
Input 1 dB compression	-20 dBm

Output Characteristics

Impedance/Return Loss	50 Ω /14 dB
Frequency (GHz)	BAND 1 - 0.95 to 1.75 BAND 2 - 0.95 to 2.05 BAND 3 - 0.95 to 2.05
Output Level Range	-20 to 0 dBm
Output 1 dB compression	+10 dBm

Channel Characteristics

Gain	+30 ±3 dB, (+30 to 0 dB variable in 0.5 dB steps)
Image Rejection	> 60 dB, min
Spurious, Inband	SIGNAL RELATED<-60 dBC in band, -15 to 0 dBm out; SIGNAL INDEPENDENT,<-60 dBm
Spurious, Out of band, LO	<-55 dBm spurious; <-70 dBm LO
Intermodulation	<-50 dBC for two carriers each at -5 dBm out
Frequency Response	±2 dB, over RF band; ± 0.5 dB, 40 MHz BW
Frequency Sense	Non-inverting

LO Characteristics

LO Frequency	Band Specific
Frequency Accuracy	± 0.05 ppm max over temp internal reference; ext. ref. input

Phase Noise @ F (Hz) >	*100*	*1K*	*10K*	*100K*	*1M*
dBC/Hz	*-70*	*-80*	*-85*	*-100*	*-110*

10 MHz level In/Mon	+2 to +8 dBm in; Monitor Output = input level ± 0.5 dB, 50 ohms

Controls, Indicators

Gain, Band, 10M Freq.	Gain, band select, and internal 10 MHz frequency via Ethernet M&C or Status/Control connector.
PLL Alarm	Red LED, External contact closure
Power	Green LED

Other

RF In, Mon. Connector	Type N (female), 50Ω
L-Band Connector	Type N (female), 50Ω
10 MHz connectors	SMA (female), 50Ω
Status/Control Connector	MA3116F14-18P; Weatherized Ethernet connector
Size	8"W X 6 "H X 16"D weather resistant enclosure
Power	100-240 ±10% VAC, 47 - 63 Hz, 20 watts max./ FCI Clipper Series CL1M1102 connector

*+0 to +50 degrees C; Specifications subject to change without notice

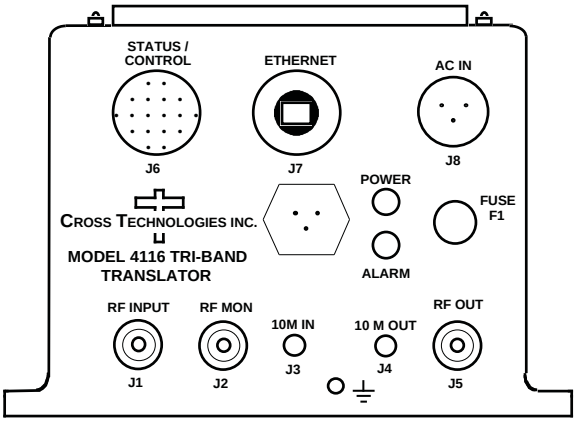
CROSS TECHNOLOGIES, INC.

DATA SHEET

10/07/08

4116-T51 Multi-Band, Block Translator, Outdoor

The 4116-T51 Translator converts one of three input RF bands to one of three output RF bands. Front panel LEDs provide indication of DC Power, and PLL Alarm. The RF to RF gain is +20 dB, maximum. Connectors are Type N female for the RF out, RF in and RF in Monitor and SMA female for the external reference input and reference output. The 10 MHz reference switches to internal when the external falls below +1 dBm. Gain, band select, and internal 10 MHz frequency are controlled by the Ethernet M&C or via the Status/Control connector. The 4116 is powered by a 100-240 ± 10% VAC power supply, and mounted in a 8"W X 6 "H X 16"D weather resistant enclosure.



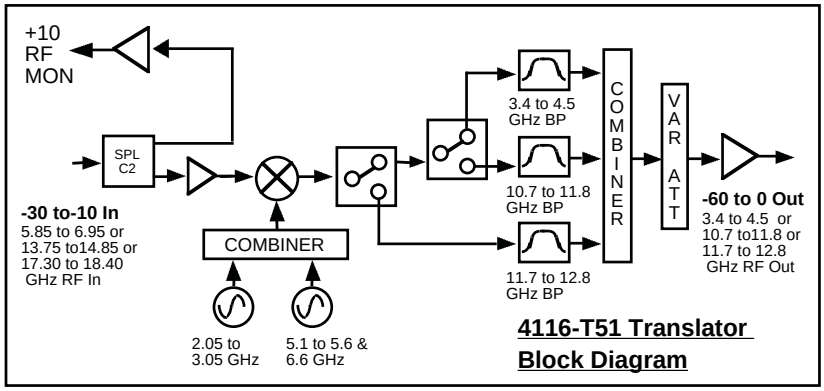
EQUIPMENT SPECIFICATIONS*

Input Characteristics

Impedance/Return Loss	50Ω/14 dB
Frequency (GHz) BAND1	5.85 to 6.95
BAND2&3	13.75 to 14.85
BAND4&5	17.3 to 18.4
Noise Figure, Max.	20 dB at max gain
Input Level range	-30 to -10 dBm
Input 1 dB compression	0 dBm

Output Characteristics

Impedance/Return Loss	50 Ω /14 dB
Frequency (GHz) BAND1	3.4 to 4.5
BAND2&4	10.7 to 11.8
BAND3&5	11.7 to 12.8
Output Level Range	-60 to 0 dBm
Output 1 dB compression	+10 dBm



4116-T51 Translator Block Diagram

Channel Characteristics

Gain	+20 ±3 dB max., (+20 to -40 dB variable in 1 dB steps)
Input to Output Isolation	> 60 dB, min
Spurious, Inband	<-50 dBC in band, -15 to 0 dBm out
Spurious, LO	<-60 dBm LO
Intermodulation	<-50 dBC for two carriers each at -5 dBm out
Frequency Response	±2 dB, over RF band; ± 0.5 dB, 40 MHz BW
Frequency Sense	Non-inverting

LO Characteristics

LO Frequency	Band Specific
Frequency Accuracy	± 0.05 ppm max over temp internal reference; ext. ref. input

Phase Noise @ F (Hz) >	*100*	*1K*	*10K*	*100K*	*1M*
dBC/Hz	*-70*	*-80*	*-85*	*-100*	*-110*

10 MHz level In/Mon	+2 to +8dBm in; Monitor Output = input level ± 0.5dB, 50 ohms

Controls, Indicators

Gain, Band, 10M Freq.	Gain, band select, and internal 10 MHz frequency via Ethernet M&C or Status/Control connector.
PLL Alarm	Red LED, External contact closure
Power	Green LED

Other

RF In, Mon. Connector	Type N (female), 50Ω
RF Out Connector	Type N (female), 50Ω
10 MHz connectors	SMA (female), 50Ω
Status/Control Connector	MA3116F14-18P; Weatherized Ethernet connector
Size	8"W X 6 "H X 16"D weather resistant enclosure
Power	100-240 ±10% VAC, 47 - 63 Hz, 20 watts max./ FCI Clipper Series CL1M1102 connector

*+0 to +50 degrees C; Specifications subject to change without notice

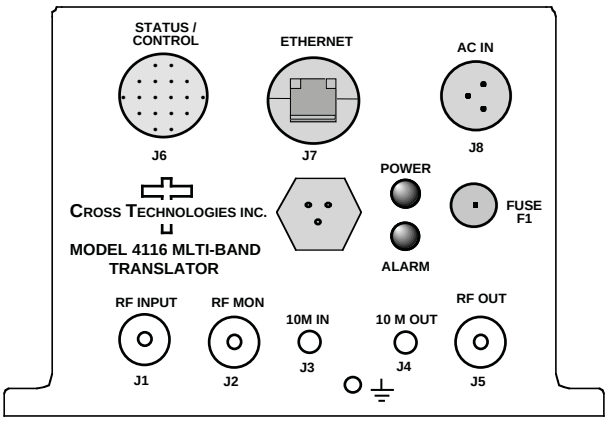
CROSS TECHNOLOGIES, INC.

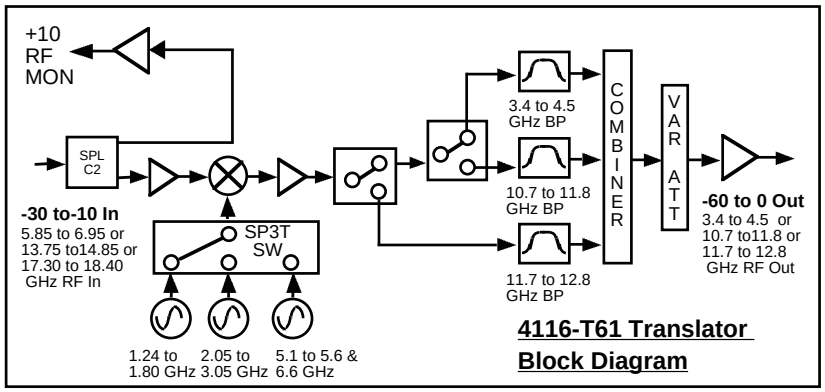
DATA SHEET

REV. C 8/11/09

4116-T61 Multi-Band, Block Translator, Outdoor

The 4116-T61 Translator converts one of three input RF bands to one of three output RF bands. Front panel LEDs provide indication of DC Power, and PLL Alarm. The RF to RF gain is +20 dB, maximum. Connectors are Type N female for the RF out, RF in and RF in Monitor and SMA female for the external reference input and reference output. The 10 MHz reference switches to internal when the external falls below +1 dBm. Gain, band select, and internal 10 MHz frequency are controlled by the Ethernet M&C or via the Status/Control connector. The 4116 is powered by a 100-240 ± 10% VAC power supply, and mounted in a 8"W X 6 "H X 16"D weather resistant enclosure.





4116-T61 Translator Block Diagram

EQUIPMENT SPECIFICATIONS*

Input Characteristics

Impedance/Return Loss	50Ω/14 dB
Frequency (GHz)	SEE BAND CHART
Noise Figure, Max.	20 dB at max gain
Input Level range	-30 to -10 dBm
Input 1 dB compression	0 dBm

Output Characteristics

Impedance/Return Loss	50 Ω /14 dB
Frequency (GHz)	SEE BAND CHART
Output Level Range	-60 to 0 dBm
Output 1 dB compression	+10 dBm

Channel Characteristics

Gain	+20 ±3 dB max., (+20 to -40 dB variable in 1 dB steps)
Input to Output Isolation	> 60 dB, min
Spurious, Inband	**<-40 dBC in band, except -30dBC at -10 dBm in where harmonics of LO falls in-band (See Chart)**
Spurious, LO	<-60 dBm LO
2 Tone Intermodulation	**<-50 dBC for two carriers each at -20 dBm In**
Frequency Response	±2 dB, over RF band; ± 0.5 dB, 40 MHz BW
Frequency Sense	Non-inverting

LO Characteristics

LO Frequency	Band Specific
Frequency Accuracy	± 0.05 ppm max over temp internal reference; ext. ref. input

Phase Noise @ F (Hz) >	*100*	*1K*	*10K**	*100K*	*1M*
dBC/Hz	*-70*	*-80*	*SEE BAND CHART*	*-100*	*-110*

10 MHz level In/Mon	+2 to +8dBm in; Monitor Output = input level ± 0.5dB, 50 ohms

Controls, Indicators

Gain, Band, 10M Freq.	Gain, band select, and internal 10 MHz frequency via Ethernet M&C or Status/Control connector.
PLL Alarm	Red LED, External contact closure
Power	Green LED

Other

RF In, Mon. Connector	Type N (female), 50Ω
RF Out Connector	Type N (female), 50Ω
10 MHz connectors	SMA (female), 50Ω
Status/Control Connector	MA3116F14-18P; Weatherized Ethernet connector
Size	8"W X 6 "H X 16"D Weather resistant enclosure
Power	100-240 ±10% VAC, 47 - 63 Hz, 20 watts max./ FCI Clipper Series CL1M1102 connector

BAND CHART-Frequencies, Translations, 10 kHz Phase Noise

BAND NO.	IN RANGE (GHz)	OUT RANGE (GHz)	TRANSLATE DEFAULT (GHz)	TRANSLATE RANGE (GHz)	TRANSLATE STEP (MHz)	PH NOISE @ 10 kHz
1	5.85-6.95	3.4-4.5	2.45	2.05-3.05	1	-90
2	13.75-14.85	10.7-11.8	3.05	2.05-3.05	1	-90
3	13.75-14.85	11.7-12.8	2.05	2.05-3.05	1	-90
4	13.75-14.85	11.7-12.8	1.5	1.24-1.80	1	-90
5	17.3-18.4	10.7-11.8	6.6	6.6	FIXED	-85
6	17.3-18.4	11.7-12.8	5.6	5.1-5.6	5	-85

LO Harmonically-related In-Band fixed spur frequencies

BAND NO.	OUT RANGE (GHz)	TRANSLATE RANGE (GHz)	In-Band Fixed Spurs (-30 dBC at -10 in) (-10 dBC at -30 in)
1	3.4-4.5	2.05-3.05	2.05 to 2.25, Carrier related -20dBC
2	10.7-11.8	2.05-3.05	2.14 to 2.36; 2.675 to 2.95
3	11.7-12.8	2.05-3.05	2.05 to 2.1;2.34 to 2.565;2.925 to 3.05
4	11.7-12.8	1.24-1.80	1.24 to 1.40 ;1.5 to 1.6 ; 1.75 to 1.8
5	10.7-11.8	6.6	None
6	11.7-12.8	5.1-5.6	None

*+0 to +50 degrees C; **-30 to +60 degrees C Non-operating;** Specifications subject to change without notice

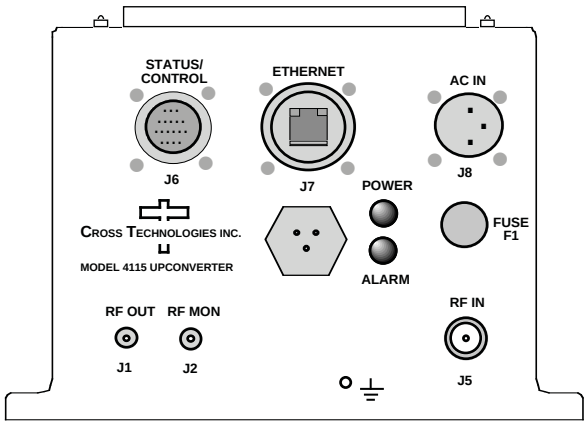
CROSS TECHNOLOGIES, INC.

DATA SHEET

REV. B 8/24/09

4115-267 Ka-band Block Upconverter, Outdoor

The 4115-267 Ka-band Block Upconverter converts 0.52 - 0.92 GHz up to 26.5 - 26.9 GHz. Front panel LEDs provide indication of DC Power, and PLL Alarms. The L-band to RF gain is **-15 to +15 dB** adjustable in 0.5 dB steps. Connectors are Type N female for the L-band, Super SMA female for the RF output. Gain, and input range select, are controlled by the Ethernet M&C. The 4115 is powered by a 100-240 ± 10% VAC power supply, and mounted in a 8"W X 6"H X 16"D weather resistant enclosure.

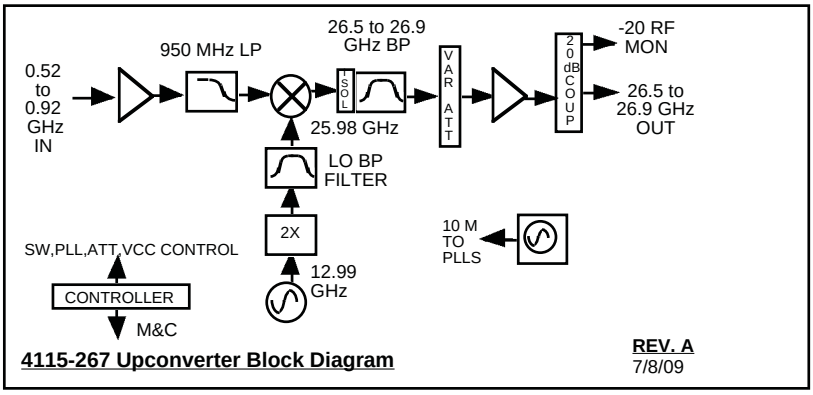


EQUIPMENT SPECIFICATIONS*

Input Characteristics	
Impedance/Return Loss	50Ω/14 dB
Frequency	0.52 to 0.92 GHz
Noise Figure, Max.	20 dB max gain
Input Level range	**-20 to -5 dBm**
Output Characteristics	
Impedance/Return Loss	50 Ω /14 dB
Frequency (GHz)	26.5 to 26.9
Output Level Range	**-35 to +5 dBm**
Output 1 dB compression	+10 dBm
Channel Characteristics	
Gain	+15 ±1 dB **(±2 dB, -30 to +60 deg C)** (**+15 to -15 dB** variable in 0.5 dB steps)
Image Rejection	> 60 dB, min
Spurious, Inband	SIGNAL RELATED **<-50 dBC in band, -30 to +5 dBm** out; SIGNAL INDEPENDENT,<-70dBm
Spurious, Out of band	<-50 dBm
Intermodulation	<-50 dBC for two carriers each at -10 dBm below maximum **input and** output level out
Frequency Response	±2 dB, over RF band; ± 0.8 dB, 40 MHz BW
Group Delay	**3 ns** p-p over any 40 MHz BW in the 400 MHz output band
Frequency Sense	Non-inverting
LO Characteristics	
LO Frequency	**25.98 GHz**
Frequency Accuracy	± 0.05 ppm max over temp internal reference

Phase Noise @ F (Hz) >	*100*	*1K*	*10K*	*100K*	*1M*	*10M*
dBC/Hz	*-60*	*-70*	*-80*	*-95*	*-108*	*-125*

Controls, Indicators	
Gain, Band, 10M Freq.	Gain, band select, and internal 10 MHz frequency via Ethernet M&C or Status/Control connector.
PLL Alarm	Red LED, External contact closure
Power	Green LED
Other	
RF Out, Mon Connector	Super SMA (female), 50Ω
RF In Connector	Type N (female), 50Ω
Size	8"W X 6"H X 16"D weather resistant enclosure
Power	100-240 ±10% VAC, 47 - 63 Hz, 20 watts max./ FCI Clipper Series CL1M1102 connector

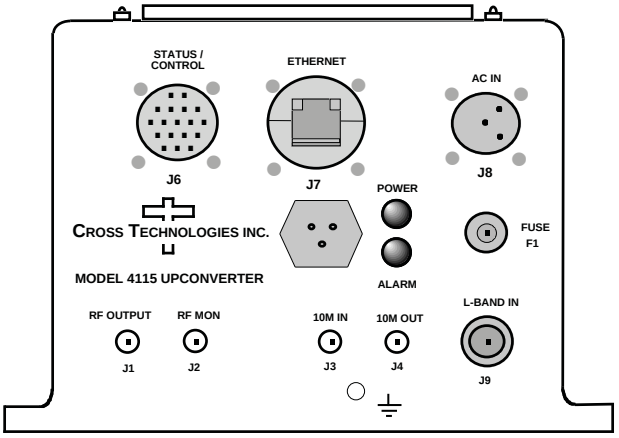


4115-267 Upconverter Block Diagram **REV. A** 7/8/09

*+0 to +50 degrees C; Specifications subject to change without notice

4115-300 Ka-band Block Upconverter, Outdoor

The 4115-300 Ka-band Block Upconverter converts 0.95 - 1.95 GHz up to 27.5 - 31.0 GHz in four selectable fixed bands. Front panel LEDs provide indication of DC Power, and PLL Alarms. The L-band to RF gain is +30 dB. Connectors are Type N female for the L-band, Type K female for the RF and RF Monitor and SMA female for the external reference input and reference output. The 10 MHz reference switches to internal when the external falls below +1 dBm. Gain, band select, and internal 10 MHz frequency are controlled by the Ethernet M&C. The 4115 is powered by a 100-240 ± 10% VAC power supply, and mounted in a 8"W X 6"H X 16"D weather resistant enclosure.



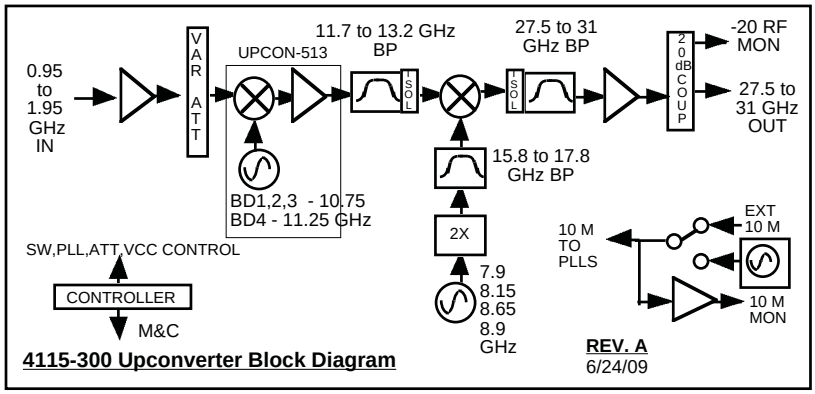
EQUIPMENT SPECIFICATIONS*

Input Characteristics

Impedance/Return Loss	50Ω/14 dB
Frequency	0.95 to 1.95 GHz
Noise Figure, Max.	20 dB max gain
Input Level range	-40 to -15 dBm
Input 1 dB compression	-5 dBm

Output Characteristics

Impedance/Return Loss	50 Ω /14 dB
Frequency (GHz)	BAND1 27.5 to 28.5 BAND2 28.0 to 29.0 BAND3 29.0 to 30.0 BAND4 30.0 to 31.0
Output Level Range	-15 to 0 dBm
Output 1 dB compression	+10 dBm



Channel Characteristics

Gain	+30 ±3 dB, (+30 to 0 dB variable in 0.5 dB steps)
Image Rejection	> 60 dB, min
Spurious, Inband	SIGNAL RELATED<-60 dBC in band, -15 to 0 dBm out; SIGNAL INDEPENDENT,<-60 dBm
Spurious, Out of band	<-55 dBm
Intermodulation	<-50 dBC for two carriers each at -5 dBm out
Frequency Response	±2 dB, over RF band; ± 0.5 dB, 40 MHz BW, Frequency Sense - Non-inverting

LO Characteristics

LO Frequency	Band Specific
Frequency Accuracy	± 0.05 ppm max over temp internal reference; ext. ref. input

Phase Noise @ F (Hz) >	*100*	*1K*	*10K*	*100K*	*1M*
dBC/Hz	*-65*	*-75*	*-80*	*-95*	*-105*

10 MHz level In/Mon	+2 to +8 dBm in; Monitor Output = input level ± 0.5 dB, 50 ohms

Controls, Indicators

Gain, Band, 10M Freq.	Gain, band select, and internal 10 MHz frequency via Ethernet M&C or Status/Control connector.
PLL Alarm	Red LED, External contact closure
Power	Green LED

Other

RF Out, Mon. Connector	Type K (female), 50Ω
L-Band Connector	Type N (female), 50Ω
10 MHz connectors	SMA (female), 50Ω
Size	8"W X 6 "H X 16"D weather resistant enclosure
Power	100-240 ±10% VAC, 47 - 63 Hz, 20 watts max./ FCI Clipper Series CL1M1102 connector

*+0 to +50 degrees C; Specifications subject to change without notice

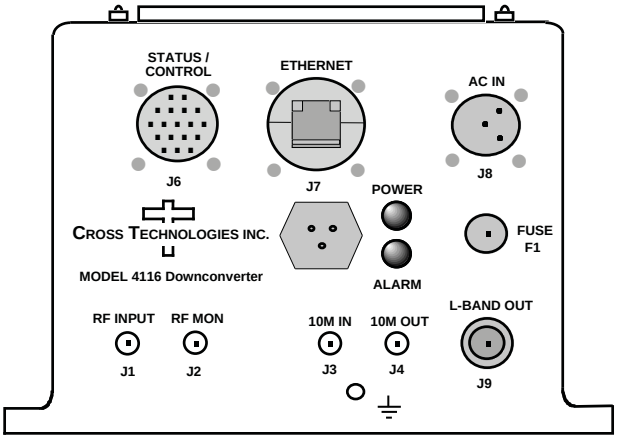
CROSS TECHNOLOGIES, INC.

DATA SHEET

REV. B 11/23/09

4116-200 Ka-band Block Downconverter, Outdoor

The 4116-200 Ka-band Block Downconverter converts 17.7 - 21.2 GHz to 0.95 - 1.95 GHz in four selectable fixed bands. Front panel LEDs provide indication of DC Power, and PLL Alarms. The L-band to RF gain is +30 dB. Connectors are Type N female for the L-band, Type K female for the RF and RF Monitor and SMA female for the external reference input and reference output. The 10 MHz reference switches to internal when the external falls below +1 dBm. Gain, band select, and internal 10 MHz frequency are controlled by the Ethernet M&C. The 4115 is powered by a 100-240 ± 10% VAC power supply, and mounted in a 8"W X 6"H X 16"D weather resistant enclosure.



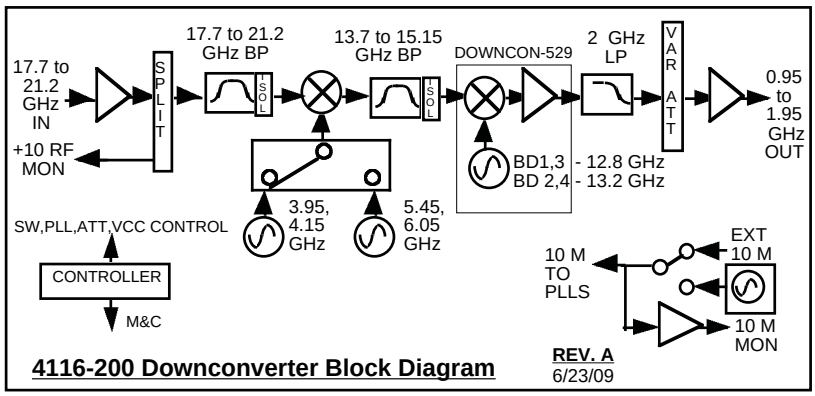
EQUIPMENT SPECIFICATIONS*

Input Characteristics

Impedance/Return Loss	50Ω/14 dB
Frequency (GHz)	BAND1 17.7 to 18.7
	BAND2 18.3 to 19.3
	BAND3 19.2 to 20.2
	BAND4 20.2 to 21.2
Noise Figure, Max.	20 dB max gain
Input Level range	-50 to -30 dBm
Input 1 dB compression	-20 dBm

Output Characteristics

Impedance/Return Loss	50Ω/14 dB
Frequency	0.95 to 1.95 GHz
Output Level Range	-20 to 0 dBm
Output 1 dB compression	+10 dBm



4116-200 Downconverter Block Diagram

Channel Characteristics

Gain	+30 ±3 dB, (+30 to 0 dB variable in 0.5 dB steps)
Image Rejection	> 60 dB, min
Spurious, Inband	SIGNAL RELATED <-60 dBC in band, -15 to 0 dBm out; SIGNAL INDEPENDENT,<-60 dBm
Spurious, Out of band	<-55 dBm
Intermodulation	<-50 dBC for two carriers each at -5 dBm out
Frequency Response	±2 dB, over RF band; ± 0.5 dB, 40 MHz BW
Frequency Sense	Non-inverting

LO Characteristics

LO Frequency	Band Specific
Frequency Accuracy	± 0.05 ppm max over temp internal reference; ext. ref. input

Phase Noise @ F (Hz) >	*100*	*1K*	*10K*	*100K*	*1M*
dBC/Hz	*-65*	*-75*	*-80*	*-95*	*-105*

10 MHz level In/Mon	+2 to +8 dBm in; Monitor Output = input level ± 0.5 dB, 50 ohms

Controls, Indicators

Gain, Band, 10M Freq.	Gain, band select, and internal 10 MHz frequency via Ethernet M&C or Status/Control connector.
PLL Alarm	Red LED, External contact closure
Power	Green LED

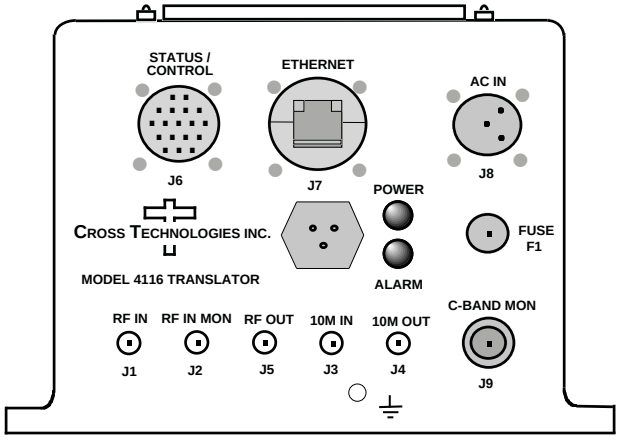
Other

RF In, Mon. Connector	**Super SMA (27 GHz)** (female), 50Ω
L-Band Connector	Type N (female), 50Ω
10 MHz connectors	SMA (female), 50Ω
Size	8"W X 6"H X 16"D weather resistant enclosure
Power	100-240 ±10% VAC, 47 - 63 Hz, 20 watts max./ FCI Clipper Series CL1M1102 Connector

*+0 to +50 degrees C; Specifications subject to change without notice

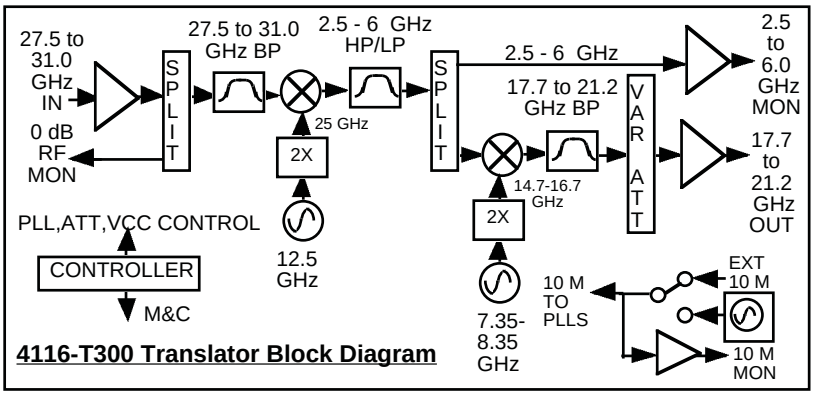
4116-T300 Ka-band Translator, Outdoor

The 4116-T300 Ka-band Translator converts 27.5 - 31.0 GHz to 17.7 - 21.2 GHz in four selectable fixed bands and to 2.5 - 6.0 GHz for monitoring purposes. LEDs provide indication of DC Power, and PLL Alarms. The maximum gain is **+20 dB**. Connectors are Type N female for the C-band monitor, Type K female for the RF In, RF Out, and RF Monitor and SMA female for the external reference input and output. The 10 MHz reference switches to internal when the external falls below +1 dBm. Gain, band select, and internal 10 MHz frequency are controlled by the Ethernet M&C. 100-240 ± 10% VAC power supply. Mounted in a 8"W X 6"H X 16"D weather resistant enclosure.



BAND CHART-Frequency Band

Band	**Input** (GHz)	**Output** (GHz)	**Translation** (GHz)
1	27.5 - 28.5	17.7 - 18.7	9.800 (8.8-10.3)
2	28.0 - 29.0	18.3 - 19.3	9.700 (8.7-10.3)
3	29.0 - 30.0	19.2 - 20.2	9.800 (8.8-10.3)
4	30.0 - 31.0	20.2 - 21.2	9.800 (8.8-10.3)
5	27.5 - 28.5	18.3 - 19.3	9.200 (8.3-10.2)
6	27.5 - 28.5	19.2 - 20.2	8.300 (8.3-9.3)
7	28.0 - 29.0	17.7 - 18.7	10.300 (9.3-10.3)
8	28.0 - 29.0	19.2 - 20.2	8.800 (8.3-9.8)
9	29.0 - 30.0	17.7 - 18.7	**10.300**
10	29.0 - 30.0	18.3 - 19.3	10.000 (9.7-10.3)
11	30.0 - 31.0	19.2 - 20.2	10.000 (9.8-10.3)



4116-T300 Translator Block Diagram

EQUIPMENT SPECIFICATIONS*

Input Characteristics

Impedance/Return Loss	50Ω/14 dB
Frequency	SEE BAND CHART
Noise Figure, Max.	20 dB max gain
Input Level range	-40 to -15 dBm
Input 1 dB compression	-5 dBm

Output Characteristics

Impedance/Return Loss	50 Ω /14 dB
Frequency (GHz)	SEE BAND CHART
Output Level Range	-15 to 0 dBm
Output 1 dB compression	+10 dBm

Channel Characteristics

Gain	**+20** ±3 dB, **(+20 to -10 dB variable in 1 dB steps)**
Input to output isolation	> 60 dB, min
Spurious, Inband	SIGNAL RELATED<**-50** dBC in band, -15 to 0 dBm out
Spurious, Out of band, LO	**<-50 dBm**
Intermodulation	<-50 dBC for two carriers each at -5 dBm out
Frequency Response	±2 dB, over RF band; ± 0.5 dB, 40 MHz BW
Frequency Sense	Non-inverting

LO Characteristics

LO Frequency	Band Specific, **8.3 to 10.3 GHz translation range, 5 MHz steps**
Frequency Accuracy	± 0.05 ppm max over temp internal reference; ext. ref. input

Phase Noise @ F (Hz) >	*100*	*1K*	*10K*	*100K*	*1M*
dBC/Hz	*-65*	*-75*	*-80*	*-95*	*-105*

10 MHz level In/Mon +2 to +8 dBm in; Monitor Output = input level ± 0.5 dB, 50 ohms

Controls, Indicators

Gain, Band, 10M Freq.	Gain, band select, and internal 10 MHz frequency via Ethernet M&C or Status/Control connector.
PLL Alarm	Red LED, External contact closure
Power	Green LED

Other

RF In, - Out, F Mon. Con.	**Super SMA (27 GHz)** (female), 50Ω
C-Band Connector	Type N (female), 50Ω
10 MHz connectors	SMA (female), 50Ω
Size	8"W X 6 "H X 16"D weather resistant enclosure
Power	100-240 ±10% VAC, 47 - 63 Hz, 20 watts max./ FCI Clipper Series CL1M1102 Connector

*+0 to +50 degrees C; Specifications subject to change without notice

X. PRECISION FREQUENCY SOURCES

MODEL	DESCRIPTION	PAGE
2099-10	Frequency Source, Dual 10 MHz Reference	85
2099-10XX	Frequency Source, Multi-Port 10 MHz Reference	86
2099-17	Source/Inserter	87
2099-1748	Source/Inserter	88
2099-25XX	Frequency Source, Multi-Port 25 MHz Reference	89
2099-100XX	Frequency Source, Multi-Port 100 MHz Reference	90

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CROSS TECHNOLOGIES, INC.

DATA SHEET
Rev B
10/01/2008

2099-10 10MHz Reference

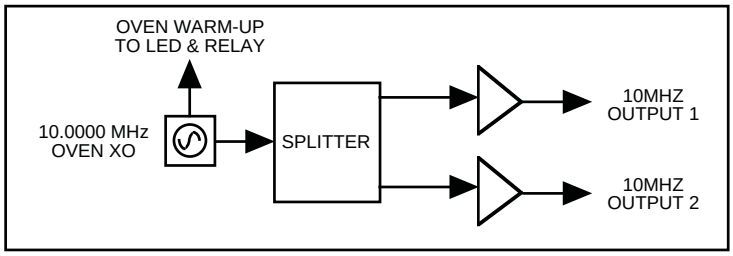
The 2099-10 10 MHz Reference provides two 10 MHz outputs from a ±0.01 ppm high stability oven controlled crystal oscillator. Front panel LEDs provide indication of DC power and oven warm-up. The level is +9 dBm and the 2099-10 works into either a 75 or 50 ohm load. Connectors are BNC female. A relay contact closure or open indicates when the oscillator oven is stabilized. The unit is powered by a 100-240 ± 10% VAC power supply; and housed in a 1 3/4" X 19" X 14" rack mount chassis.

Front Panel

EQUIPMENT SPECIFICATIONS*

Output Characteristics

Number of outputs	2
Impedance	50Ω or 75Ω
Return Loss	>18 dB
Frequency	10.0000 MHz
Output Level	+9 ± 1 dBm
Harmonics	< -30 dBC, < -40 typ.
Spurious	< -75 dBC



Block Diagram

Oscillator Stability

Over temperature	± 0.01 ppm max 0˚C to +50˚C
Aging, per day	± 0.001 ppm
Aging, per year	± 0.1 ppm
Warm up, in 4 minutes	± 0.1 ppm
Warm up, in 1 hour	± 0.01 ppm
Mechanical adjustment	± 1 ppm

Oscillator Phase Noise

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

Controls, Indicators

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

Other

10 MHz Connectors	BNC (female) 50Ω or 75Ω - Customer to specify at time of order.
Connector, Alarm	DB9 - NO or NC contact closure on Alarm
Size	19 inch standard chassis 1.75" high X 14.0" deep
Power	100-240 ± 10% VAC, 47 - 63 Hz, 20 watts max.

*10˚C to 40˚C; Specifications subject to change without notice

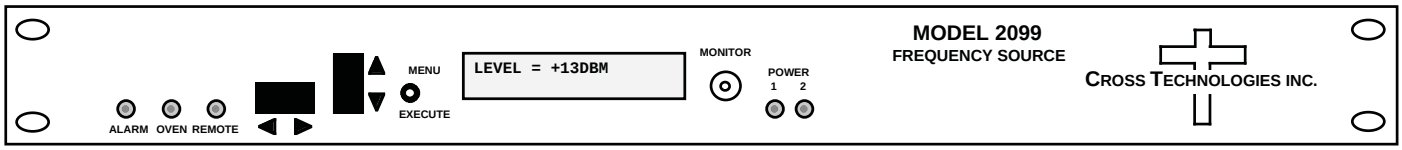
CROSS TECHNOLOGIES, INC.

DATA SHEET

12/23/08

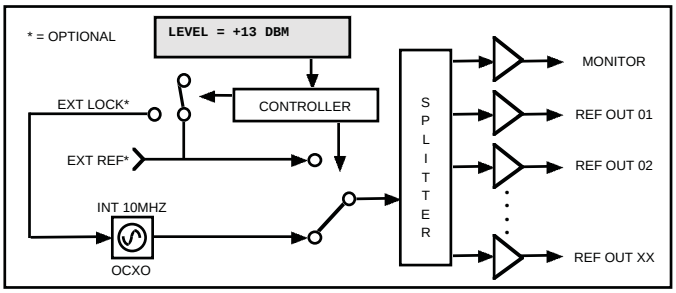
2099-10XX Frequency Source

The Model 2099-10XX Frequency Source provides four (xx=04), eight (xx=08) or twelve (xx=12) 10MHz reference outputs from a 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 75Ω or 50Ω 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 (or pass-through gain, 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 90-260 VAC AC input connectors. An RS232/422/485 (selectable) M&C interface provides remote control of the unit.



2099-10XX

EQUIPMENT SPECIFICATIONS*



2099-10XX BLOCK DIAGRAM

Output Characteristics		
	Number of outputs	5, 9, or 13 (including monitor)
	Impedance	50Ω/75Ω
	Return Loss	>18dB
	Frequency	10.0000 MHz
	Level, adjustable (int ref)	-7 dBm to +13 dBm
	Harmonics	< -30 dBC, < -40 typ.
	Spurious	< -75 dBC
External Reference Input Characteristics		
	Impedance	50Ω/75Ω
	Return Loss	>18dB
	Level	+3 dBm ± 3 dB
Oscillator Characteristics		
	Over temperature	± 0.01 ppm max 0˚C to +50˚C
	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 (dBC/Hz)	≤ -110 @ 10Hz; ≤ -140 @ 100Hz; ≤ -155 @ 1kHz; ≤ -160 @ 10kHz
Controls, Indicators		
	Output Level Adjust	direct readout LCD; push-button swithces or remote selection
	Power	Green LEDs
	Remote	Yellow LED, RS232C/422/485
	Oven Warm-Up	Yellow LED
	Alarm	Red LED, External contact closure
Other		
	10 MHz Connectors	BNC (female), 50Ω/75Ω impedance
	Alarm/Remote Connector	DB9 (female) - NO or NC contact closure on Alarm
	Size	19 inch standard chassis 1.75” high X 12.0” deep
	Power	Redundant 90 - 260 VAC, 47 - 63 Hz, 20 W max. power supplies
Options		
	E	External Reference Input (includes INTERNAL, EXT LOCK, and EXT LOCK AUTO modes)

*10˚C to 40˚C; Specifications subject to change without notice

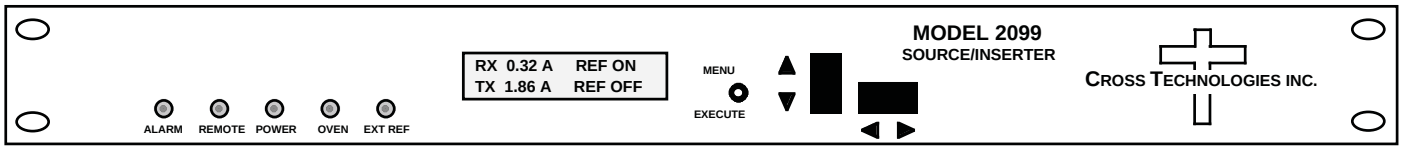
CROSS TECHNOLOGIES, INC.

DATA SHEET

10/26/06

2099-17 10MHz Source/Inserter

The 2099-17 10 MHz Source/Inserter is a 10 MHz, ± 0.01 ppm oven controlled crystal oscillator (OCXO) with circuitry to insert the 10MHz 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 ± 10% VAC, 47-63 Hz. The chassis is 1 RU, 16" deep.



Front Panel

EQUIPMENT SPECIFICATIONS*

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

Output Characteristics (on L-band RF)

Level	+2 dBm ± 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	50Ω/75Ω, 18 dB
Level	+3 dBm ± 3 dB
Harmonics (Output)	< -30 dBC, < -40 dBC typ.

Oscillator

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 Adjust	± 0.5 ppm

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

---------Chassis / Other--------

Controls, Indicators

INT/EXT 10 MHz Select	direct readout LCD; manual or remote selection
10 MHz Insert Select	direct readout LCD; manual or remote selection
LNB, SSPB Current	direct readout, remote monitor
Power, Alarm, Remote	Green LED; Red LED; Yellow LED;
Oven Warm-up, Ext Ref	Yellow LED; Yellow LED
Remote	RS232C, 9600 baud (RS485, **option Q**)

Other

RF Connectors	BNC, 50Ω (female)
10 MHz Connectors	BNC, 75 / 50 (female)
Alarm/Remote Connector	DB9 (female) - NO or NC closure on Alarm
Size	19 inch, 1RU chassis 1.75"H X 16.0"D
Power	100-240 ± 10% VAC, 47-63 Hz, 90 watts max

Available Options

Q - RS485/RS422 Remote Interface

Connectors/Impedance

B – 75Ω BNC (RF)

F – 75Ω Type F (RF)

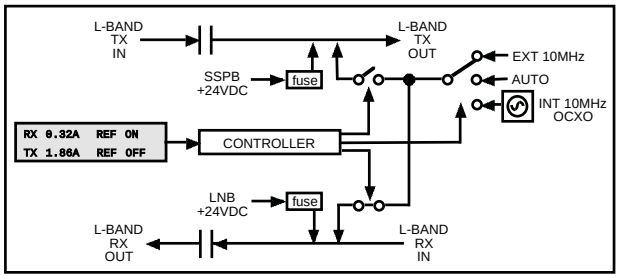
---------RX and TX L-band Insertion---------

RF Input/Output Characteristics

Frequency	950 - 2150 MHz
Impedance	50Ω
Return Loss	>12 dB, 0.95-1.5 GHz >10 dB, 1.5-2.15 GHz
Insertion Loss	< 1 dB, 0.95-1.5 GHz < 2 dB, 1.5-2.15 GHz
Frequency Response	±1.0 dB, 950 - 2150 MHz; ± 0.5 dB, 36 MHz BW

LNB, SSPB DC Power Characteristics

Voltage/Current	LNB +24 VDC, 0.5 A, max. SSPB +24 VDC, 2.5 A, max. Call for other voltages
Load Regulation	±5 %



Block Diagram

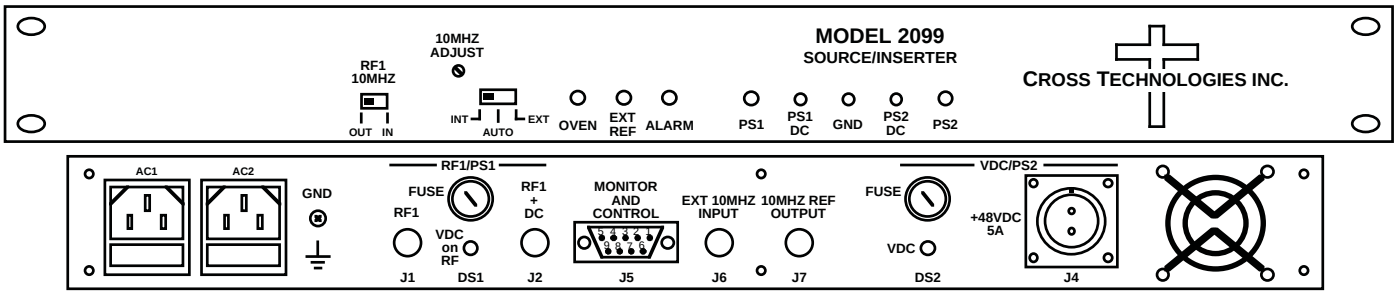
CROSS TECHNOLOGIES, INC.

DATA SHEET

4/3/07

2099-1748 Source/Inserter

The 2099-1748 10MHz Source/Inserter is a 10MHz, ±0.01 ppm oven controlled crystal oscillator (OCXO) with circuitry to insert the 10MHz signal and DC voltage (PS1) on the L-band, RF1 line. A DC connector also provides a +48VDC, 5A output (PS2). Two front panel switches switch the 10MHz reference in or out on RF1 and select internal, external or auto10MHz. Front panel LEDs indicate DC power (green), alarm (red), external 10MHz (yellow), and OCXO oven warm-up (yellow). Rear panel LEDs indicate the presence of voltage on either RF1 or the DC connector. A summary alarm contact closure or open on alarm is available on a DB9 connector. Connectors are BNC female for RF and 10MHz output and external input signals, and an Amphenol MS connector provides the +48VDC, 5A DC output from PS2. +24VDC can be inserted on the RF1 line, and +48VDC is available on the DC connector by installing separate fuses for each. The unit is powered by a 100-240 ±10% VAC, 47-63 Hz supply, and housed in a 1RU x 15"D chassis.



Front and Rear Panels

EQUIPMENT 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

Phase Noise

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

10 MHz Output Characteristics (on L-band RF)

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

Ext 10 MHz Input Characteristics

Impedance/Return Loss	75Ω / 50Ω, 18 dB
Level	+3 dBm ± 3 dB

10 MHz Reference Output Characteristics

Impedance, Return Loss	75Ω / 50Ω, 18 dB
Level	+3 dBm ± 3 dB
Harmonics	<-30 dBC, < -40 typical

Available Options

B - 75Ω BNC (RF) Connectors/Impedance for L-band
F - 75Ω Type F (RF) Connectors/Impedance for L-band

--------- L-band Insertion---------

RF Input/Output Characteristics

Impedance/Return Loss	50Ω /12 dB
Frequency	950 - 2150 MHz
Insertion Loss	1 ± 0.5 dB
Frequency Response	±1.0 dB, 950 - 2150 MHz; ± 0.5 dB, 36 MHz BW

DC Power Characteristics

Voltage/Current, PS1/RF1	+24 VDC, 2.5 A, max.
Voltage/Current, PS2/MS	+48 VDC, 5 A, max.
Call for other voltages	
Load Regulation	± 5 %

---------Chassis/Other--------

Controls, Indicators

INT/EXT/AUTO 10 MHz	front panel SP3T switch
RF1 10MHz Insert	front panel SPDT switch
PS1, PS2 Voltage	front panel test point monitor
Power, Alarm	Green LEDs; Red LED
Oven Warm-Up, Ext Ref	Yellow LED; Yellow LED
VDC on RF1/MS	Yellow LEDs

Other

RF Connectors	BNC, 50Ω (female)
10 MHz Connectors	BNC, 75Ω / 50Ω (female)
Alarm/Remote Connector	DB9 (female)
Size	19 inch, 1RU, 1.75"H X 15.0"D
Power, PS1	90-260 VAC, 47-63 Hz, 150W
Power, PS2	90-260 VAC, 47-63 Hz, 350W

*10˚C to 40˚C; Specifications subject to change without notice

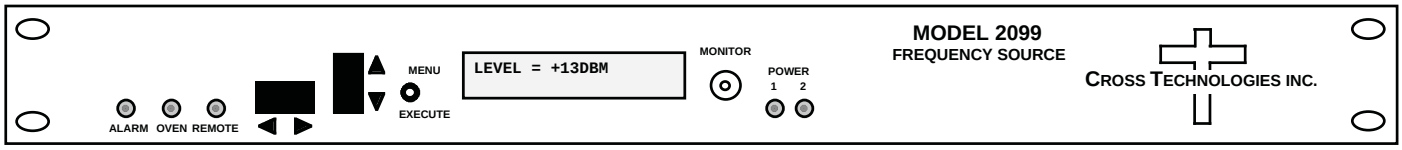
CROSS TECHNOLOGIES, INC.

DATA SHEET

12/12/05

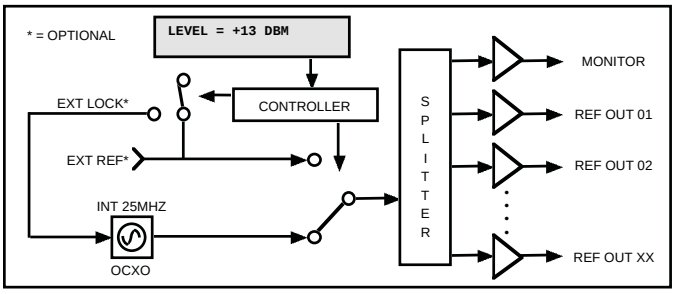
2099-25XX Frequency Source

The Model 2099-25XX Frequency Source provides four (xx=04), eight (xx=08) or twelve (xx=12) 25 MHz reference outputs from a 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 75Ω or 50Ω 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 (or pass-through gain, 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 housed in a 1RU rack mountable chassis, and is powered by redundant power supplies fed by separate fused 100-240 ±10% VAC AC input connectors. An RS232/422/485 (selectable) M&C interface provides remote control of the unit.



2099-25XX

EQUIPMENT SPECIFICATIONS*



2099-25XX BLOCK DIAGRAM

Output Characteristics		
	Number of outputs	4, 8 or 12 (including monitor)
	Impedance	50Ω/75Ω
	Return Loss	>18dB
	Frequency	25.0000 MHz
	Level, adjustable (int ref)	-7 dBm to +13 dBm
	Harmonics	< -30 dBC, < -40 typ.
	Spurious	< -75 dBC
External Reference Input Characteristics		
	Impedance	50Ω/75Ω
	Return Loss	>18dB
	Level	+3 dBm ± 3 dB
Oscillator Characteristics		
	Over temperature	± 0.03 ppm max 0˚C to +50˚C
	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 (dBC/Hz)	≤ -110 @ 10Hz; ≤ -140 @ 100Hz; ≤ -155 @ 1kHz; ≤ -160 @ 10kHz
Controls, Indicators		
	Output Level Adjust	direct readout LCD; push-button swithces or remote selection
	Power	Green LEDs
	Remote	Yellow LED, RS232C/422/485
	Oven Warm-Up	Yellow LED
	Alarm	Red LED, External contact closure
Other		
	10 MHz Connectors	BNC (female), 50Ω/75Ω impedance
	Alarm/Remote 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 ±10% VAC, 47 - 63 Hz, 45 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

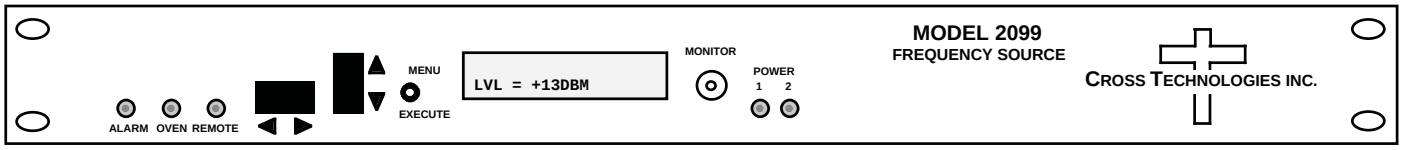
CROSS TECHNOLOGIES, INC.

DATA SHEET

2/13/07

2099-100XX Frequency Source

The Model 2099-100XX Frequency Source provides four (xx=04), eight (xx=08) or twelve (xx=12) 100 MHz reference outputs from a 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 75Ω or 50Ω 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. 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 ± 10% VAC AC input connectors and provides RS232/422/485 M&C Interface.



2099-100XX

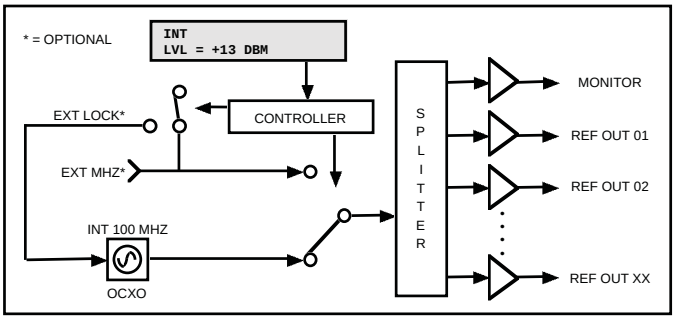
EQUIPMENT SPECIFICATIONS*

Output Characteristics

Number of outputs	4, 8 or 12 (including monitor)
Impedance; Return Loss	50Ω/75Ω; >18dB
Frequency	100 MHz
Level, adjustable (int ref)	-7 dBm to +7 dBm
Gain, adjustable (ext ref)	-10 dB to +3 dB (option -E only)
Harmonics	< -30 dBC, < -40 typ.
Spurious	< -75 dBC

External Reference Input Characteristics

Impedance; Return Loss	50Ω/75Ω; >18dB
Level	+3 dBm ± 3 dB



2099-100XX BLOCK DIAGRAM

Oscillator Characteristics

Over temperature	± 0.03 ppm max 0˚C to +50˚C
Aging	± 0.01 ppm per day; ±0.5 ppm per year
Warm up	± 1.0 ppm in 4 minutes; ±0.1 ppm in 1 hour
Tuning Adjustment	±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
Remote	Yellow LED, RS232C/422/485
Oven Warm-Up	Yellow LED
Alarm	Red LED, External contact closure

Other

10 MHz Connectors	BNC (female), 50Ω/75Ω impedance
Alarm/Remote 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 ±10% VAC, 410 - 63 Hz, 45 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

XI. RF PROTECTION SWITCHES

1:1 PROTECTION SWITCHES

MODEL	PAGE/WEB	SW1 Freq	SW 2 Freq	DC PWR.
1582-22L	93	2.15 GHz	2.15 GHz	24V/2.4A or
1582-22L2	WEB	2.15 GHz(x2	2.15 GHz (x2	48V/1.8A
1582-25L	94	2.5 GHz	2.5 GHz	30V/0.5A
1582-25L2	94	2.5 GHz(x2)	2.5 GHz (x2)	30V/0.5A
1582-70L	95	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	96	2.5 GHz	15 GHz	NA
1582-650	97	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

1:2 PROTECTION SWITCHES

MODEL	PAGE/WEB	SW1 Freq	SW 2 Freq	Converter Type [a]
1582-10xx	98	10.0 GHz	10.0 GHz	Switch/Distb.
2582-122	99	2.2 GHz	2.2 GHz	Agile
2582-123	100	2.2 GHz	15.0 GHz	Block
2582-124	WEB	2.2 GHz	15.0 GHz	Agile
2582-126	101	15.0 GHz	15.0 GHz	Block
2582-324	WEB	2.2 GHz	15.0 GHz	Agile

1:4 PROTECTION SWITCHES

MODEL	PAGE/WEB	SW1 Freq	SW 2 Freq	Converter Type [a]
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	102	2.2 GHz	15.0 GHz	Agile

1:8 PROTECTION SWITCHES

MODEL	PAGE/WEB	SW1 Freq	SW 2 Freq	Converter Type [a]
2582-282	WEB	2.2 GHz	2.2 GHz	Agile
2582-284	103	2.2 GHz	15.0 GHz	Agile

(a) Switches for Agile Converters provide backup controller to store configurations of converters for downloading and restoring before switching. Switches for Block Converters do not require backup controller functionality.

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DATA SHEET

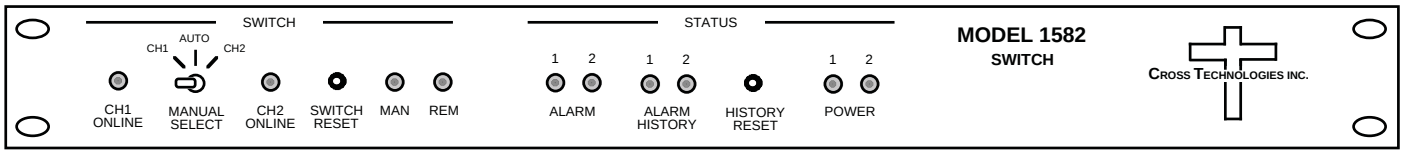
1/24/06

1582-22L RF Protection 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, X and Y. Switching logic can be selected as follows:

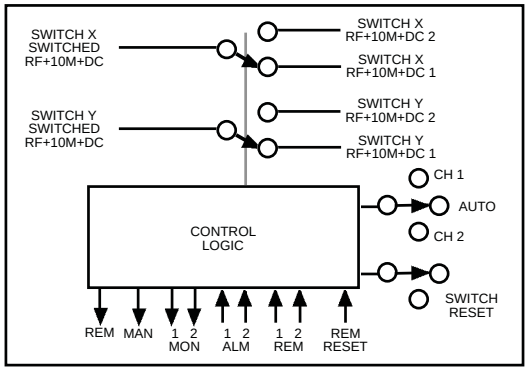
1. CH1 Prime Mode - Switches from CH1 to the CH2 only if CH1 alarms and CH2 is good. Switches back when CH1 no longer in alarm or both CH1 and CH2 are bad.
2. Latch to CH2 Mode - Switches to CH2 if CH1 alarms and CH2 is good. Latches to CH2. Push Manual Reset or ground Remote Reset pin to return to CH1 if it has no alarm.
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.



1582-22L

EQUIPMENT SPECIFICATIONS*



1582-22L BLOCK DIAGRAM

Switch Characteristics

Impedance	75Ω
Type/Configuration	Latching Relay, DPDT
Insertion Loss	≤2 dB, at 10 MHz to 25 MHz
	Not Specified, 26 MHz to 0.8 GHz
	1.5 dB max., ≤1.0 dB, typ, 0.95 to 1.5 GHz
	2.5 dB max., ≤2.0 dB, typ, 1.5 to 2.15 GHz
Frequency Response	≤±0.5 dB, any 40 MHz BW, 0.95 to 2.15 GHz
Return Loss	≥12 dB max., ≥14 dB, typ, 0.95 to 1.5 GHz
	≥10 dB max., ≥12 dB, typ, 1.5 to 2.15 GHz
Isolation	≤-50 dB, at 10 MHz to 25 MHz
	-50 dB max., ≤-55 dB, typ, .95 to 2.15 GHz
Switch time	≤20 milliseconds
DC Switching	24VDC @ 2.4 Amps; 48VDC @ 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 (*=Closures)	CH1*, CH2* ON-LINE, ALARM, ALARM HISTORY, POWER; MANUAL*; REMOTE*

Other

Alarm/Remote Connector	Terminal Strip
RF Connectors	75Ω BNC (female); 50 Ω BNC, N Connectors, Optional
Mechanical	19 inch standard chassis 1.75"high X 12" deep
Power	Redundant power supplies; 90 - 260 VAC, 47 -63 Hz, 30 watts

*10˚C to 40˚C; 2000m max elevation; 80% max humidity; Specifications subject to change without notice

CROSS TECHNOLOGIES, INC.

DATA SHEET

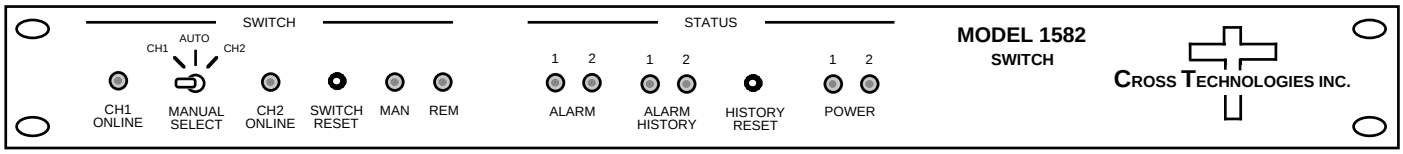
1/07/09

1582-25L RF Protection Switch

The 1582-25L RF Protection Switch provides Auto, Manual or Remote latched relay switching between CH1 and CH2 RF signals from DC to 2.5 GHz including up to 0.5A DC power for attached LNBs. Alarm conditions on CH1 and CH2 are either a contact closure to ground or an open (selectable). The logic controls two separate RF switches, A and B. Switching logic can be selected as follows:

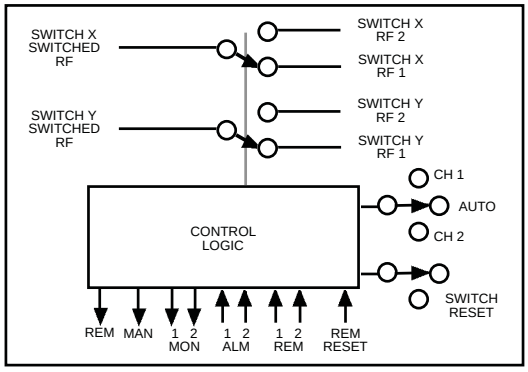
1. CH1 Prime Mode - Switches from CH1 to the CH2 only if CH1 alarms and CH2 is good. Switches back when CH1 no longer in alarm or both CH1 and CH2 are bad.
2. Latch to CH2 Mode - Switches to CH2 if CH1 alarms and CH2 is good. Latches to CH2. Push Manual Reset or ground Remote Reset pin to return to CH1 if it has no alarm.
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.



1582-25L

EQUIPMENT SPECIFICATIONS*



1582-25L BLOCK DIAGRAM

Switch Characteristics

Impedance	75Ω
Type/Configuration	Latching Relay, DPDT
Insertion Loss	1.5 dB max., ≤1.0 dB, typ, DC to 1.5 GHz
	2.5 dB max., ≤2.0 dB, typ, 1.5 to 2.5 GHz
Frequency Response	≤±0.5 dB, any 40 MHz BW, DC to 2.5 GHz
Return Loss	≥12 dB max., ≥14 dB, typ, DC to 1.5 GHz
	≥10 dB max., ≥12 dB, typ, 1.5 to 2.5 GHz
Isolation	-55 dB max., ≤-60 dB, typ, DC to 1.5 GHz
	-45 dB max., ≤-50 dB, typ, 1.5 to 2.5 GHz
Switch time	≤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 (*=Closures)	CH1*, CH2* ON-LINE, ALARM, ALARM HISTORY, POWER; MANUAL*; REMOTE*

Other

Alarm/Remote Connector	Terminal Strip
RF Connectors	75Ω BNC (female); 50 Ω BNC, N Connectors, Optional
Mechanical	19 inch standard chassis 1.75"high X 12" deep
Power	Redundant power supplies; **100-240 ±10% VAC**, 47 -63 Hz, 30 watts

*10˚C to 40˚C; 2000m max elevation; 80% max humidity; Specifications subject to change without notice

CROSS TECHNOLOGIES, INC.

DATA SHEET

5/31/02

1582-70L RF SWITCH

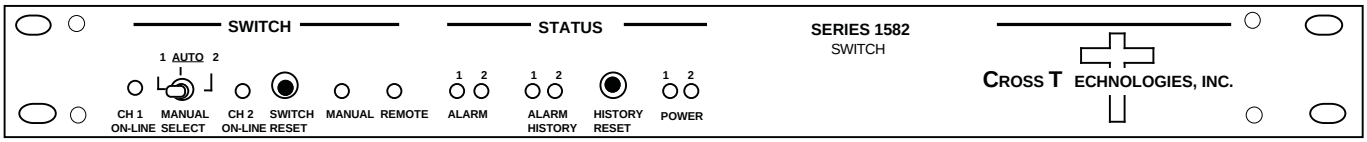
Provides Auto, Manual or Remote latched relay switching between CH1 and CH2 RF signals. Alarm conditions on CH1 and CH2 are either a contact closure to ground or an open (selectable). The logic controls two separate RF switches, X and Y. Switching logic can be selected as follows:

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 - Switches to CH2 if CH1 alarms and CH2 is good. Latches to CH2. Push Manual Reset or ground Remote Reset pin to return to CH1 if it has no alarm.

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 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.

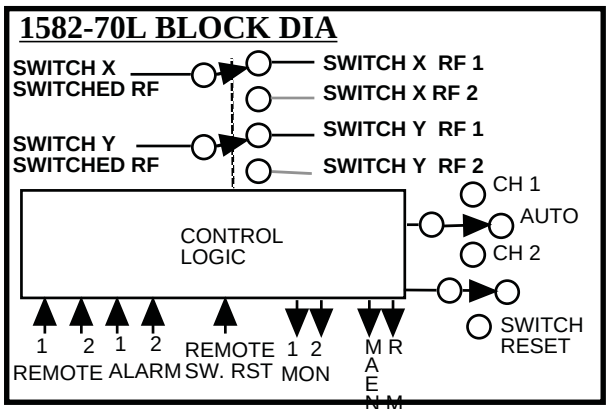


1582-70L RF SWITCH

Technical Specifications*

Switch Characteristics

Impedance	75 ohms
Type	Latching Relay
Isolation	>65 dB DC to 10 MHz
	>50 dB to 1.0 GHz;
	>40 dB to 1.5 GHz
Switch time	≤10 milliseconds
Insertion Loss	≤1 dB to 1.0 GHz;
	≤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 (*=Closures)	CH1*, CH2* ON-LINE, ALARM, ALARM HISTORY, POWER; MANUAL*; REMOTE*

Other

Connectors	Terminal Strip (alarms and controls), 75 ohm BNC, female (RF)
Mechanical	19 inch standard chassis 1.75"high X 12" deep
Power	Redundant power supplies; 100-240 ± 10% VAC, 47 -63 Hz, 30 watts

*+10 to +40 degrees C; 2000 meters max elevation; 80% max humidity; Specifications subject to change without notice

CROSS TECHNOLOGIES, INC.

DATA SHEET

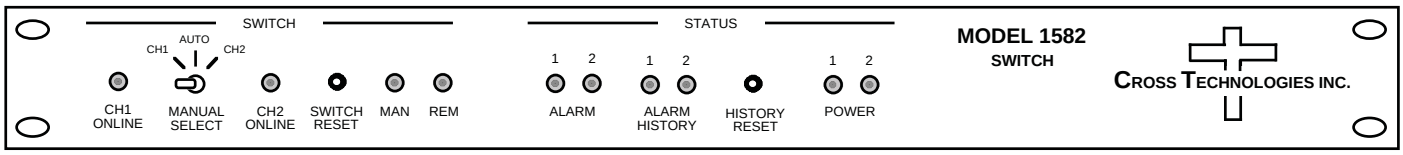
12/6/06

1582-152 IF/RF Protection Switch

The 1582-152 IF/RF Protection Switch 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 is no longer in alarm or both CH1 and CH2 are bad.
2. Latch to CH2 Mode - Switches to CH2 if CH1 alarms and CH2 is good. Latches to CH2. Push Manual Reset or ground Remote Reset pin to return to CH1 if it has no alarm.
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 1582-152 is housed in a 1RU x 12" deep chassis, and is powered by two redundant power supplies.

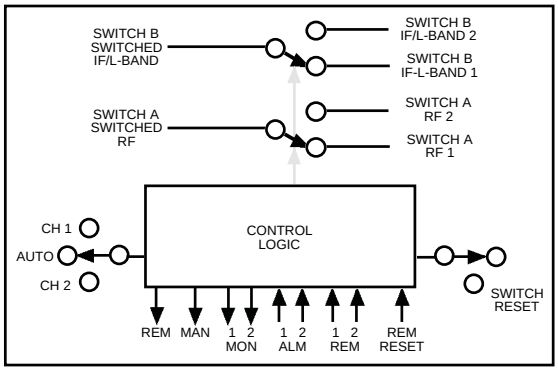


Front Panel

EQUIPMENT SPECIFICATIONS*

IF/L-Band Switch Characteristics

Impedance / Connectors	75Ω / BNC
Return Loss	≥ 12 dB DC to 1.5 GHz
	≥ 10 dB to 2.5 GHz
Frequency Response	≤ ±0.5 dB, any 40 MHz BW, DC to 2.5 GHz
Isolation	55 dB min, ≥ 60 dB typ. DC to 1.5 GHz
	45 dB min, ≥ 50 dB typ. to 2.5 GHz
Switch time	≤ 10 milliseconds
Insertion Loss	1.5 dB max., ≤ 1.0 dB typ. DC to 1.5 GHz
	2.5 dB max., ≤ 2.0 dB typ. to 2.5 GHz
Type	Relay
Configuration	SPDT



Block Diagram

RF Switch Characteristics

Impedance / Connectors	50Ω / SMA
Return Loss	> 18 dB DC to 4 GHz
	> 15 dB to 8 GHz
	> 12 dB to 15 GHz
Type	Relay
Isolation	> 70 dB DC to 4 GHz
	> 60 dB to 8 GHz
Switch time	≤ 10 milliseconds
Insertion Loss	≤ 1 dB DC to 4 GHz
	≤ 1.5 dB to 8 GHz
	≤ 2.0 dB to 15 GHz
Type	Relay
Configuration	SPDT, no termination

Other

Alarm/Remote Connector	Terminal Strip
Power	Redundant power supplies; 100-240 ±10% VAC, 47 -63 Hz, 30 watts

*10˚C to 40˚C; 2000m max elevation; 80% max humidity; Specifications subject to change without notice

CROSS TECHNOLOGIES, INC.

DATA SHEET

2/17/05

1582-650 RF SWITCH

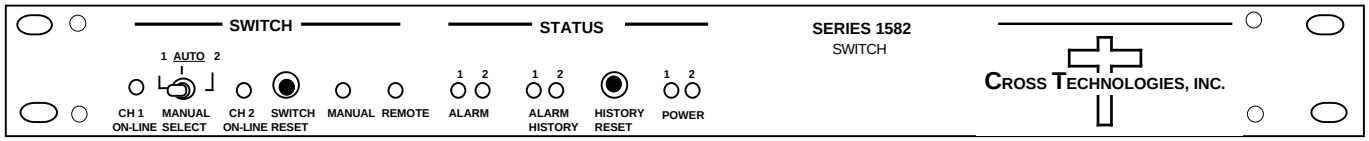
Provides Auto, Manual or Remote relay switching between CH1 and CH2 RF signals. Alarm conditions on CH1 and CH2 are either a contact closure to ground or an open (selectable). The logic controls one single pole, double throw RF switch. Switching logic can be selected as follows:

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 - Switches to CH2 if CH1 alarms and CH2 is good. Latches to CH2. Push Manual Reset or ground Remote Reset pin to return to CH1 if it has no alarm.

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 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.

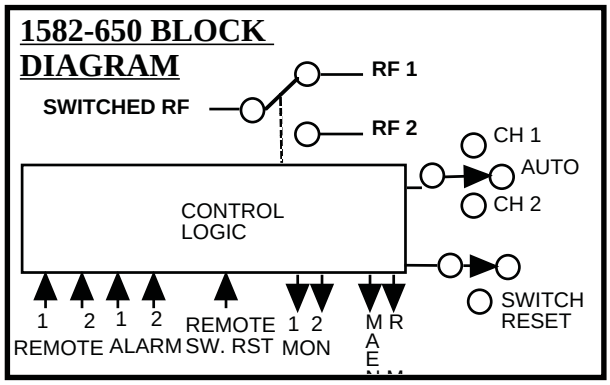


1582-650 RF SWITCH

1582-650 Technical Specifications

Switch Characteristics

Impedance	50 ohms, Type N
Return Loss	>18 dB DC to 4 GHz
	>15 dB to 6.5 GHz;
Type	Relay
Isolation	>70 dB DC to 4 GHz
	>60 dB to 6.5 GHz;
Switch time	≤10 milliseconds
Insertion Loss	≤1 dB to 4.0 GHz;
	≤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)	CH1*, CH2* ON-LINE, ALARM, ALARM HISTORY, POWER; MANUAL*; REMOTE*

Other

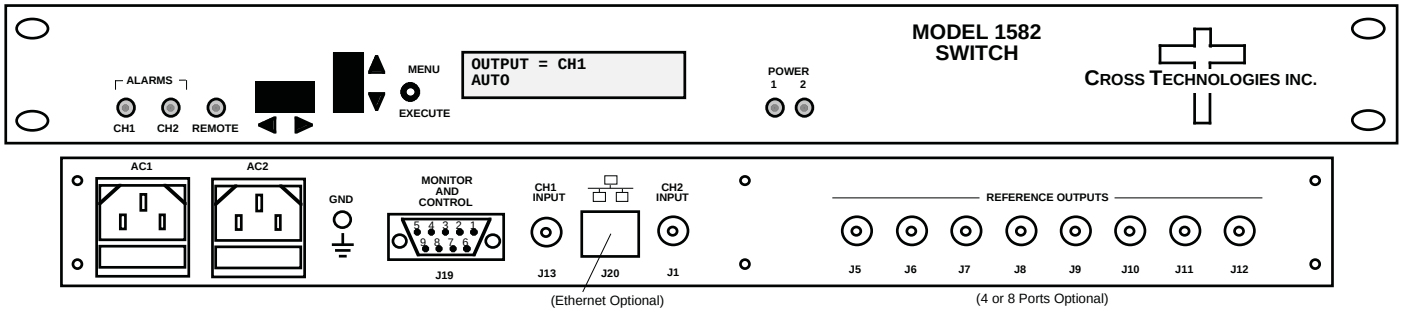
Connectors	Terminal Strip (alarms and controls)
Connectors	RF, 50 ohm N, female
Mechanical	19 inch standard chassis 1.75” high X 12” deep
Power	Redundant power supplies; 100-240 ± 10% VAC, 47 -63 Hz, 30 watts

*+10 to +40 degrees C; 2000 meters max elevation; 80% max humidity; Specifications subject to change without notice

1582-10xx 1:1 Switch, 10 MHz

The 1582-10xx 1:1 Switch/Distribution unit supports Dual (monitored), 10 MHz External Reference Inputs with Auto (Standard or Minimum Auto Switching (MAS) modes), Local (Manual) or Remote relay switching between CH1 and CH2. The unit provides, either one (xx=01), four (xx=04) or eight (xx=08) 10 MHz reference outputs. Alarm conditions monitored on CH1 and CH2 are a level drop below -6 dBm of the 10 MHz signal.

When power is lost and when power is applied (as alarms at power up dictate), CH1 is selected. Front panel LEDs indicate CH1 and CH2 alarms, Remote Enabled (yellow), and Redundant Power supplies on (green). Multi-function push button switches select Auto (MAS=ON/OFF), Local (Manual), or Remote operation and the Channel selected. Remote operation via the RS232/RS422/RS485 (Ethernet optional) M&C interface allows selection of CH1 or CH2 and indicates switch position and alarm status. A contact closure to ground indicates if either or both CH1 and CH2 are in alarm. An LCD display shows mode of operation and the currently selected channel. Connectors are BNC, female for the 10 MHz signals and DB9 for M&C and for the alarm contact closure output. (RJ-45 for Ethernet.) The 1582-10xx is a 1RU chassis with redundant power supplies fed by separate fused 100-240 ±10% VAC AC input connectors.



1582-10xx FRONT AND REAR PANEL

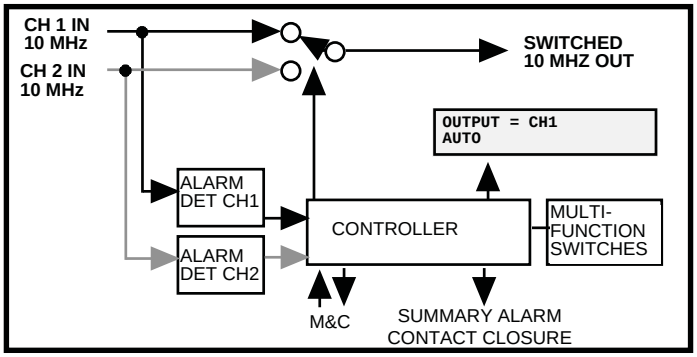
1582-10M Technical Specifications

Switch Characteristics

Impedance	75 ohms
Type	Non-latching Relay
Isolation	>50 dB DC to 10 MHz
Switchlevel/time	≤-6±1dB / ≤100 milliseconds
Insertion Loss	≤1 dB
Configuration	SPDT

Alarm and Control, M&C

Alarm output signal	Form C relay: 30VDC, 0.5A max
M & C Interface	RS232C, RS422, or RS485, Selectable, (Ethernet Optional)
M & C Signal	38.4 kB baud rate



1582-10xx BLOCK DIAGRAM

Controls, Indicators

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

Connectors, Other

Ext. Alarm, M&C Conn.	DB9 (female)
10 MHz In/Out	BNC, female, 75 ohm
Size	1 RU, 19 inch standard chassis 1.75" high X 16.0" deep
Power	Redundant 100 - 240 ±10% VAC, 47 - 63 Hz, 20 W max. power supplies

OPTIONAL

- 4	4 - 75Ω outputs
- 8	8 - 75Ω outputs
- W8	Ethernet M&Cz
- D	50Ω BNC

CROSS TECHNOLOGIES, INC.

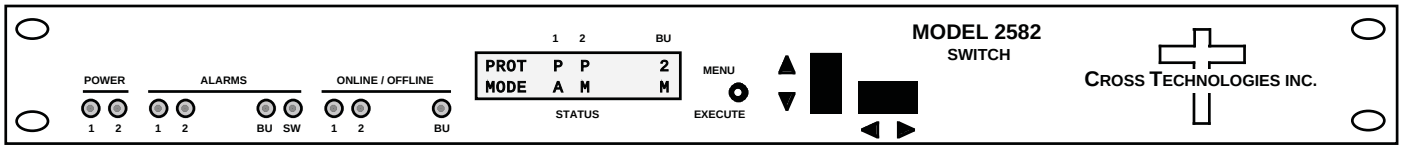
DATA SHEET

REV. B
2/05/08

2582-122 Backup 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 2582-122 works with standard Cross L-band 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 when a failure occurs either automatically or manually. "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

EQUIPMENT SPECIFICATIONS*

IF / RF Switch Characteristics

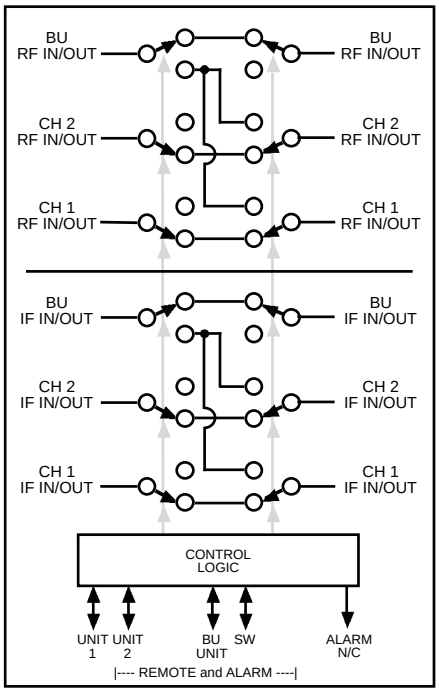
Impedance	75 Ω
Return Loss	≥ 12 dB, 0.5 to 2.2 GHz; ≥ 18dB, 50 to 200 MHz
Type	Relay
Isolation	> 55 dB, DC to 1.5 GHz; > 50 dB, to 2.2 GHz;
Switch time	≤ 100 milliseconds
Insertion Loss	≤ 1.5 dB, to 1.5 GHz; ≤ 2.0 dB, to 2.2 GHz
Configuration	1 for 2, no termination

Controls, Indicators

Manual Selection	Push-button switches
Remote Selection	RS 232C (RS 422/485, **option Q**), 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 VAC ±10%, 47-63 Hz, 45 watts max; Redundant power supplies



Block Diagram

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

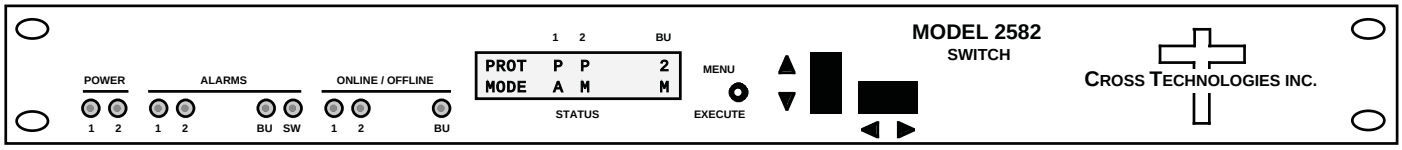
CROSS TECHNOLOGIES, INC.

DATA SHEET

REV A
9/12/06

2582-123 Backup 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 using a combination of IF/L-Band relay switches and RF transfer switches for 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 ±10% VAC power supplies and is housed in a 1 3/4" X 19 " X 16" 1RU rack mount chassis.



Front Panel

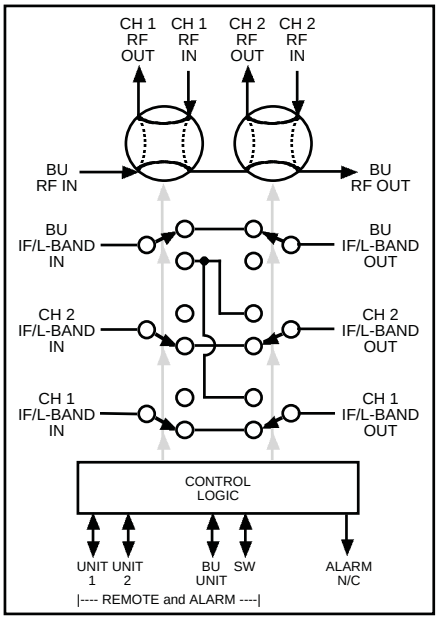
EQUIPMENT SPECIFICATIONS*

IF/L-Band Switch Characteristics

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

RF Switch Characteristics

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



Block Diagram

Controls, Indicators

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

Other

RF Connectors	SMA (female)
L-Band Connectors	BNC (female)
Alarm/Remote Conn's	DB9 (female)
Size	19 inch, 1RU standard chassis 1.75"high X 16.0" deep
Power	100-240 ±10% VAC, 47-63 Hz, 45 watts max; Redundant power supplies

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

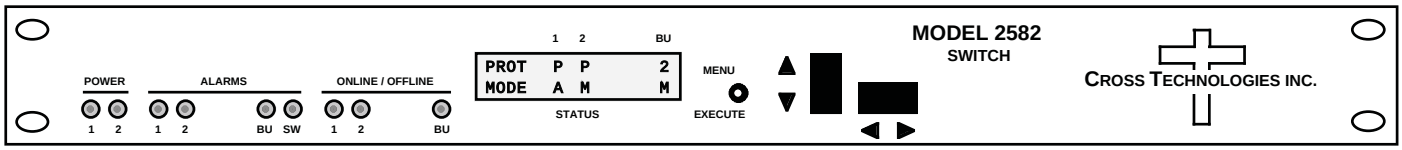
CROSS TECHNOLOGIES, INC.

DATA SHEET

REV C 07/15/08

2582-126 Backup 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 (±10%) VAC power supplies and is housed in a 1 3/4" X 19 " X 16" 1RU rack mount chassis.



Front Panel

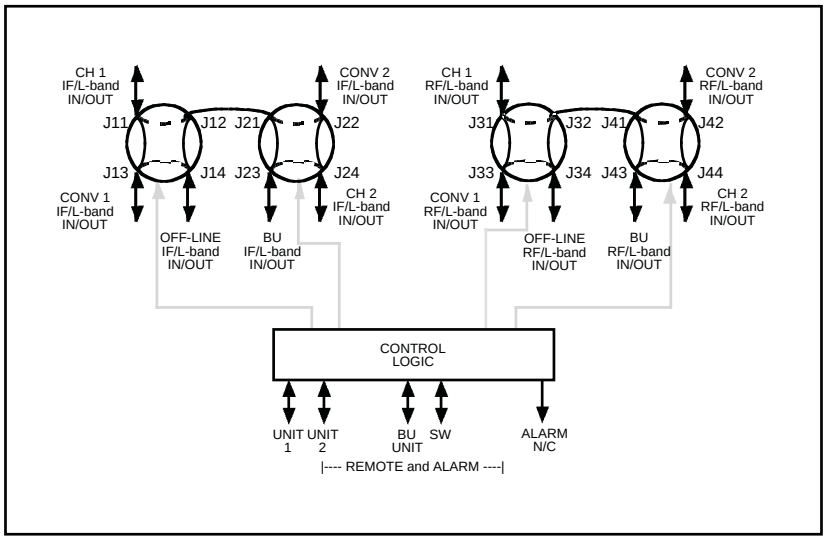
EQUIPMENT SPECIFICATIONS*

IF (L-band) / RF Switch Characteristics

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

Controls, Indicators

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



Block Diagram

Other

RFConnectors	SMA (female)
Alarm/Remote Conn's	DB9 (female)
Size	19 inch, 1RU standard chassis 1.75"high X 16.0" deep
Power	100-240 (±10%) VAC, 47-63 Hz, 45 watts max; Redundant power supplies

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

CROSS TECHNOLOGIES, INC.

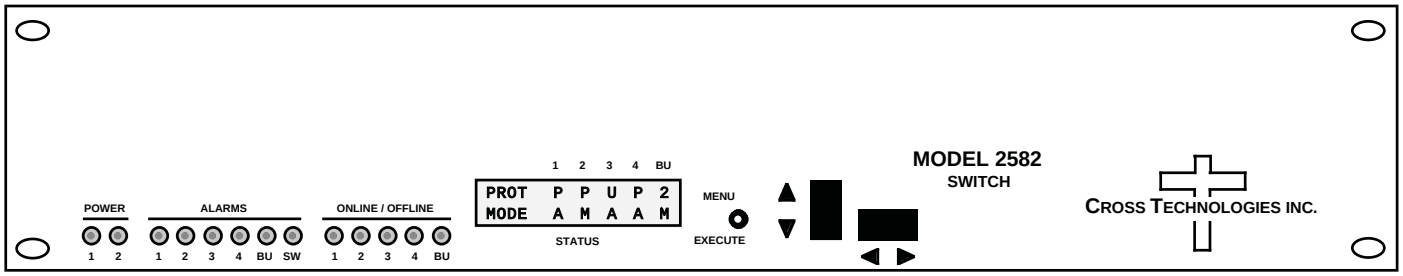
DATA SHEET

7/12/07

2582-344 Backup 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 ±10% VAC redundant power supplies, and housed in a 2RU chassis.



Front Panel

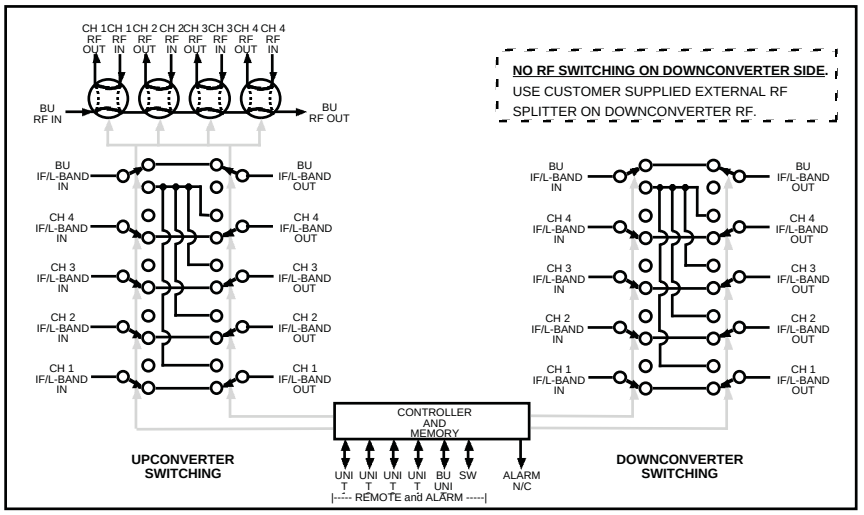
EQUIPMENT SPECIFICATIONS*

IF/L-Band Switch Characteristics

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

RF Switch Characteristics

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



Block Diagram

Controls, Indicators

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

Other

RF Connectors	SMA (female)
IF/L-Band Connectors	BNC (female)
Alarm/Remote Conn's	DB9 (female)
Size	19 inch, 1RU standard chassis X 16.0" D
Power	100-240 VAC, Redundant power supplies

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

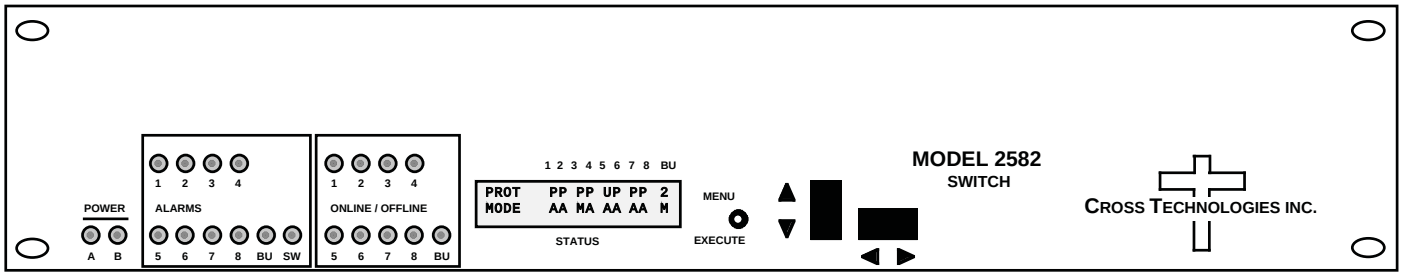
CROSS TECHNOLOGIES, INC.

DATA SHEET
3/30/09
REV. 0

2582-284 Backup Switch, 1 for 8

The 2582-284 1 for 8 Switch with Backup Controller provides Auto or Manual backup protection for up to 8 converters by relay switching two IF and one RF signal from a backup unit to any of 8 on-line units. The controller in the 2582-284 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 2582-284 display. The 2582-284 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 2582-284 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 2582-284 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 ±10% VAC redundant power supplies, and housed in a 2RU chassis.



Front Panel

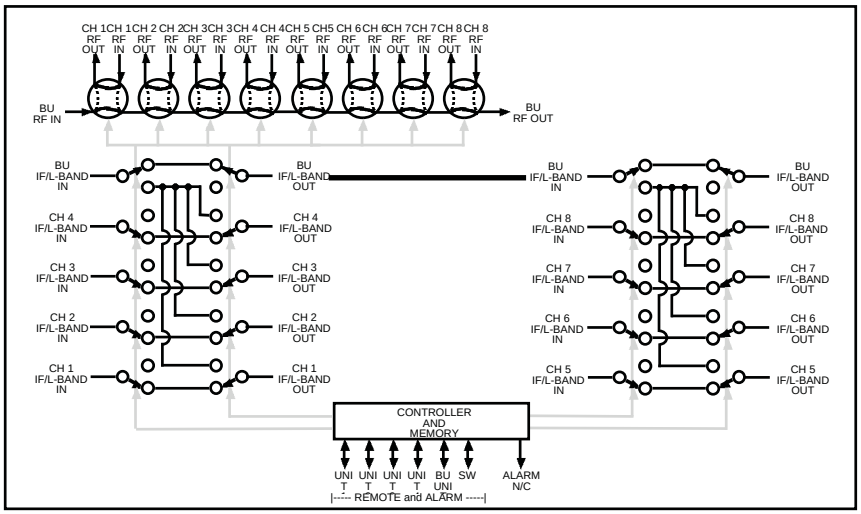
EQUIPMENT SPECIFICATIONS*

IF/L-Band Switch Characteristics

Impedance	50 Ω
Return Loss	> 12 dB
Type	Relay
Isolation	> 55 dB, DC to 1.5 GHz
	> 50 dB, to 2.2 GHz;
Switch time	≤ 100 milliseconds
Insertion Loss	≤ 1.5 dB, to 1.5 GHz;
	≤ 2.0 dB, to 2.2 GHz
Configuration	1 for 8, no termination

RF Switch Characteristics

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



Block Diagram

Controls, Indicators

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

Other

RF Connectors	SMA (female)
IF/L-Band Connectors	BNC (female)
Alarm/Remote Conn's	DB9 (female)
Size	19 inch, 1RU standard chassis X 16.0" D
Power	100-240 VAC, Redundant power supplies

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

XII. DATA, OTHER SWITCHES

MODEL NUMBER	PAGE# OR WEB	LAT-CHED?	DATA RATE	CON-NECTOR	PINS SWITCHED	PINS CON-NECTED
DATA SWITCHES						
1582-03	WEB	No	128 kbps	DB9	2	5*
1582-04	WEB	No	128 kbps	DB9	2	5*
1582-11	WEB	No	512 kbps	DB9	3, 8	1,2,4,5*,6,7, 9
1582-12	WEB	No	512 kbps	DB9	3, 8	1,2,4,5*,6,7, 9
1582-13	WEB	No	512 kbps	DB9	1,2,4,6,7, 9	3, 5*, 8
1582-14	WEB	No	512 kbps	DB9	1,2,4,6,7, 9	3, 5*, 8
1582-42L	WEB	Yes	15 Mbps	DB9	1,2,4,6,7, 9	5*
1582-45L	WEB	Yes	1 Mbps	DB25	All 25	NONE
OTHER SWITCHES						
162	WEB	No	DC	Bar. Strip	16 ChX8 lines	N/A
2082-141	105	Yes	DC	MS	N/A	N/A

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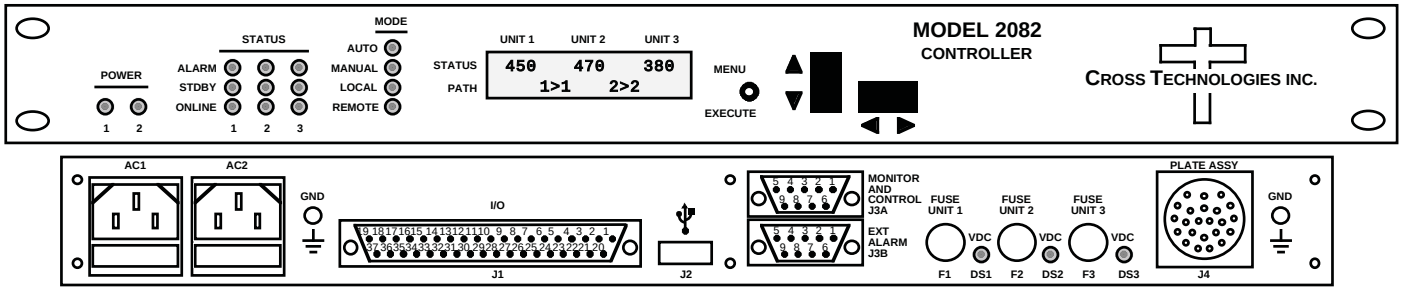
DATA SHEET

8/30/2007

2082-14XX Redundant Unit Controller

The Model 2082-14XX 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 2082-14XX is housed in a 1RU chassis and is powered by redundant power supplies fed by separate, fused 100-240 ±10% VAC AC input connectors.



Front and Rear Panels (-142)

EQUIPMENT SPECIFICATIONS*

Switch Drive Characteristics	
Fault detection time	50 ms max
Total Switchover time	100 ms max, based on switch specifications
Drive Voltage	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 ±10% VAC, 47 - 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

XIII. SPLITTERS/COMBINERS

MODEL	DESCRIPTION	PAGE
1584-XX	L-Band Splitters, LNB Voltage, Redundant Power	109
1584-XXS	L-Band Splitters, No LNB Voltage, Single Pwr Supply	110
1584-XX	L-Band Combiners	111
284-0X	L-Band Splitters, No LNB Voltage	112
284-1X	L-Band Splitters, LNB Voltage	113

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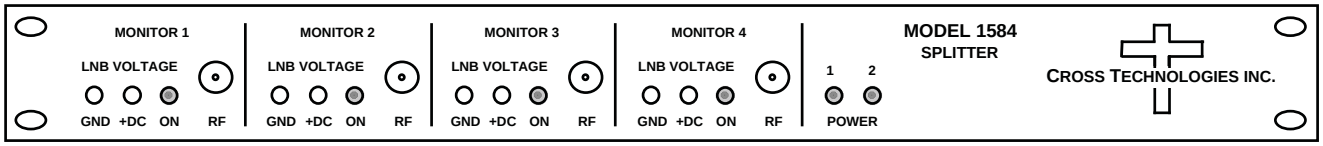
DATA SHEET

Rev. B
1/10/07

1584 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 90 - 260 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

EQUIPMENT SPECIFICATIONS*

Input Characteristics

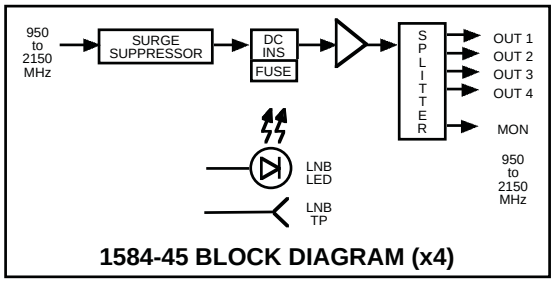
Input Impedance	75Ω
Return Loss	12dB min, 14dB typ
Input Level	-20 dBm total maximum

Output Characteristics

Impedance	75Ω
Return Loss	12dB min, 14dB typ

In-Band Characteristics

Gain	0 dB ± 1.0 dB
Frequency Response	± 1.0 dB, 950-2150 MHz; ± 0.5 dB, any 20 MHz incr.
Port to Port Isolation	> 18dB, 20dB typ
Coupler to Coupler Iso'n	> 35dB, 40dB typ



1584-45 BLOCK DIAGRAM (x4)

Indicators

Power	Green LED indicates DC voltage prior to diode OR
LNB DC Voltage	Green LED indicates LNB power insertion on splitter input (J17)

Other

LNB DC voltage	22 ± 2 VDC
Output LNB current	300 ma, max
Surge Suppressor	SiDACTOR
RF connectors	Type F (female)
AC Power	Redundant switching power supplies, 90 - 260 VAC, 50 - 60 Hz, 30 watts max
Mechanical	19 inch standard chassis 1.75"high X 12" deep

Options

-B	75Ω, BNC RF connectors
-D	50Ω, BNC RF connectors

Models

1584-25	Two 4-way splitters with 1 front panel monitor each
1584-29	Two 8-way splitters with with 1 front panel monitor each
1584-45	Four 4-way splitters with 1 front panel monitor each
1584-116	One 16-way splitter with no front panel monitor

*10˚C to 40˚C; Specifications subject to change without notice

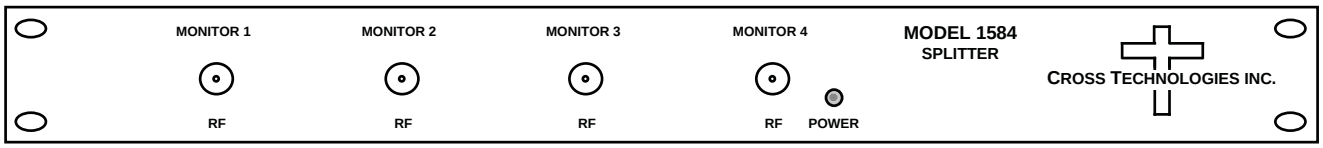
CROSS TECHNOLOGIES, INC.

DATA SHEET

Rev. C
06/02/08

1584 S-Series L-Band Splitters

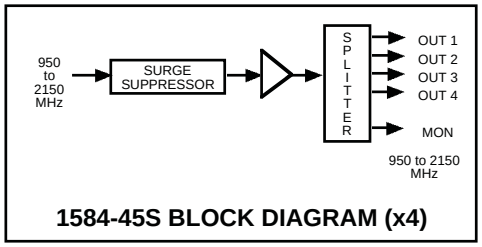
The 1584 S-Series Splitters provide numerous configurations of 950 - 2150 MHz, 0 dB gain splitters in a 1 Rack Unit chassis powered by a single 100-240 ±10% VAC power supply. Each splitter provides surge protection, and excellent RF characteristics. The S-series 1584 splitters do NOT provide fused LNB DC power insertion. 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.



1584-45S FRONT PANEL

EQUIPMENT SPECIFICATIONS*

Input Characteristics		
	Input Impedance	75Ω
	Return Loss	12dB min, 14dB typ
	Input Level	-20 dBm total maximum
Output Characteristics		
	Impedance	75Ω
	Return Loss	12dB min, 14dB typ
In-Band Characteristics		
	Gain	0 dB ± 1.0 dB
	Frequency Response	± 1.0 dB, 950-2150 MHz; ± 0.5 dB, any 20 MHz incr.
	Port to Port Isolation	> 18dB, 20dB typ
	Coupler to Coupler Iso'n	> 35dB, 40dB typ
Indicators		
	Power	Green LED indicates DC voltage
Other		
	Surge Suppressor	SiDACTOR
	RF connectors	Type F (female)
	AC Power	100-240 ±10% VAC, 47 - 63 Hz, 30 watts max
	Mechanical	19 inch standard chassis 1.75"high X 12" deep
Options		
	-B	75Ω, BNC RF connectors
	-D	50Ω, BNC RF connectors
Models		
	1584-25S	Two 4-way splitters with 1 front panel monitor each
	1584-29S	Two 8-way splitters with with 1 front panel monitor each
	1584-45S	Four 4-way splitters with 1 front panel monitor each
	1584-116S	One 16-way splitter with no front panel monitor



1584-45S BLOCK DIAGRAM (x4)

*10˚C to 40˚C; Specifications subject to change without notice

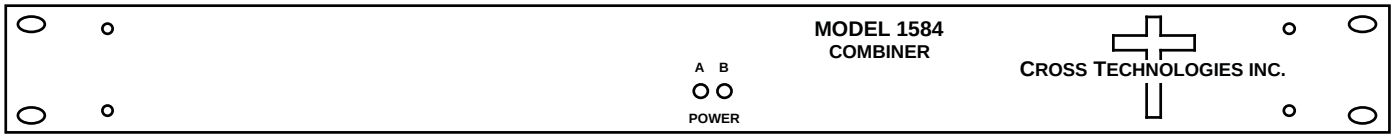
CROSS TECHNOLOGIES, INC.

DATA SHEET

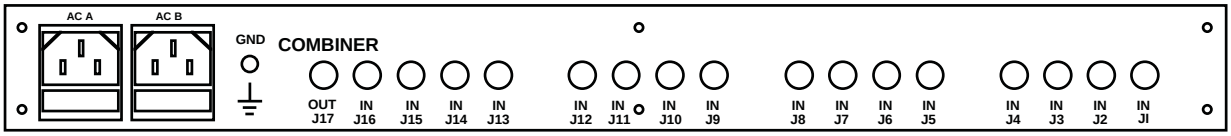
6/3/08 - **REV_C**

1584-161 RF Combiner

The Model 1584-161 is one sixteen-way, 0.95 - 2.05 GHz, 0 dB gain combiner in a 1RU rack mount chassis with redundant 100-240 ±10% VAC power supplies. The combiner provides excellent RF characteristics. It has sixteen inputs and one output on the back panel. Two individual 100-240 ±10% VAC input power supplies provide diode OR'd redundant power to the unit. A surge suppressor on the combiner output protects against high voltage transients. On the front panel, two green LED's indicate the presence of DC voltage from each of the two power supplies.



1584-161 FRONT PANEL



1584-161 REAR PANEL

EQUIPMENT SPECIFICATIONS*

Input Characteristics

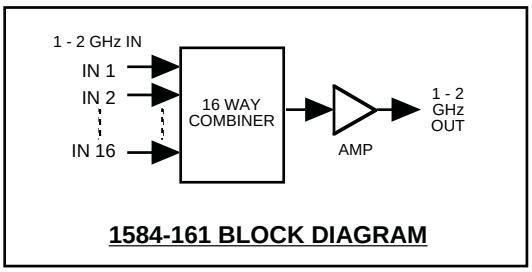
Input Impedance	75Ω STD (50Ω, Option -D)
Return Loss	12dB min, 14 dB typ.
Input Level	-20 dBm total maximum

Output Characteristics

Impedance	75Ω (50Ω, Option -D)
Return Loss	12 dB min, 14 dB typ

In-Band Characteristics

Gain	0 dB ± 1.0 dB
Frequency Response	± 1.0 dB,.95 - 2.05 GHz; ± 0.5 dB, any 20 MHz incr.
Port to Port Isolation	> 18 dB, 20 dB typ



1584-161 BLOCK DIAGRAM

Indicators

Power	Green LED indicates DC voltage prior to diode OR'd and to amplifiers

Other

Surge Suppressor	SiDACTOR
RF connectors	Type F (female)
AC Power	Redundant switching power supplies, 100-240 ± 10% VAC, 47 - 63 Hz, 30 watts max.
Mechanical	19 inch standard chassis 1.75" high X 12" deep

Options

-B	75Ω, BNC RF connectors
-C	RF Out BNC 50Ω, RF In Type F, 75Ω
-D	50Ω, BNC RF connectors
W9	10 MHz Pass Through @ J16, J17

*10˚C to 40˚C; Specifications subject to change without notice

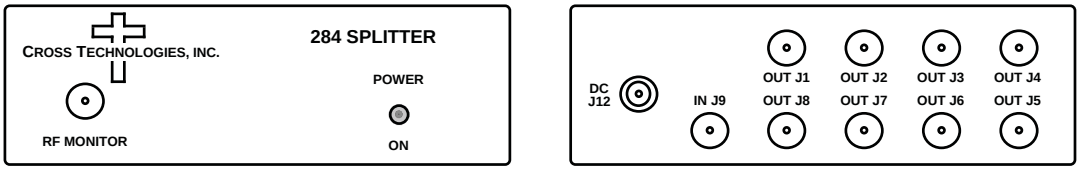
CROSS TECHNOLOGIES, INC.

DATA SHEET

8/08/05

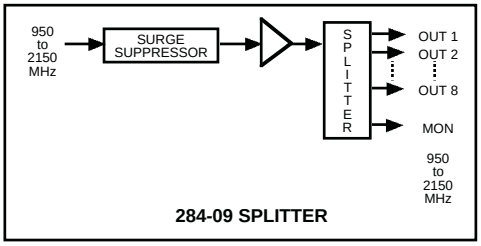
284-0X Series L-Band Splitters

The Model 284-0X RF Splitters are five or nine way, 950 - 2050 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**).



284-09 Front and Rear Panels

EQUIPMENT SPECIFICATIONS*



Input Characteristics		
	Input Impedance	75Ω
	Return Loss	12dB min, 14dB typ
	Input Level	-20 dBm total maximum
Output Characteristics		
	Impedance	75Ω
	Return Loss	12dB min, 14dB typ
In-Band Characteristics		
	Gain	0 dB ± 1.0 dB
	Frequency Response	± 1.0 dB, 950-2150 MHz; ± 0.5 dB, any 20 MHz increment
	Port to Port Isolation	> 18dB, 20dB typ
Indicators		
	Power	Green LED indicates DC voltage prior to diode OR
Other		
	Surge Suppressor	SiDACTOR
	RF connectors	Type F (female)
	Power	115 VAC wall mount power supply
	Size (Bench Top)	4.7" wide x 1.75" high X 6.5" deep
Options		
	-R1,-R2, or -R3	Rack mounting (mounted on a 19-inch standard (1RU) panel, 1.75" high x 7.0" deep)
	-C	No wall mount power supply (use 2000-02 model power supply)
	-P2	90-260 VAC wall mount power supply
	-B	50Ω, BNC RF connectors
Models		
	284-05	One 5-way splitter
	284-09	One 9-way splitter

*10˚C to 40˚C; Specifications subject to change without notice

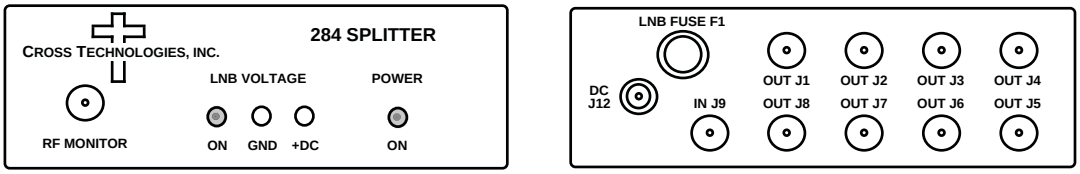
CROSS TECHNOLOGIES, INC.

DATA SHEET

8/08/05

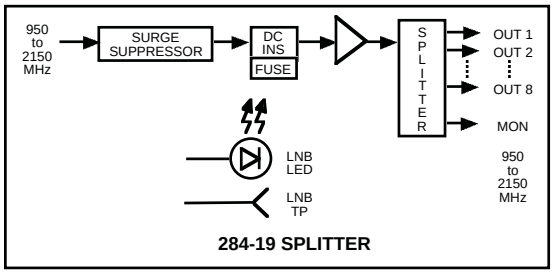
284-1X Series L-Band Splitters

The Model 284-1X RF Splitters are five or nine way, 950 - 2150 MHz, 0 dB gain splitters. The 284-1X splitters provide fused DC power insertion on the RF input connector center pin, surge protection, and 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, green LEDs indicate the presence of DC voltage from the 115 VAC wall mount power supply and +18VDC power to the LNB (on J9 input center pin). Up to three 284s can be mounted on an 1 3/4" X 19" rack mount panel (**option -R1, -R2, or -R3**).



284-19 Front and Rear Panels

EQUIPMENT SPECIFICATIONS*



Input Characteristics		
	Input Impedance	75Ω
	Return Loss	12dB min, 14dB typ
	Input Level	-20 dBm total maximum
Output Characteristics		
	Impedance	75Ω
	Return Loss	12dB min, 14dB typ
In-Band Characteristics		
	Gain	0 dB ± 1.0 dB
	Frequency Response	± 1.0 dB, 950-2150 MHz; ± 0.5 dB, any 20 MHz increment
	Port to Port Isolation	> 18dB, 20dB typ
Indicators		
	Power	Green LED indicates DC voltage prior to diode OR
	LNB DC Voltage	Green LED indicates LNB power insertion on splitter input (J9)
Other		
	LNB DC voltage	18 ± 2 VDC
	Output LNB current	300 ma, max
	Surge Suppressor	SiDACTOR
	RF connectors	Type F (female)
	Power	115 VAC wall mount power supply
	Size (Bench Top)	4.7" wide x 1.75" high X 6.5" deep
Options		
	-R1,-R2, or -R3	Rack mounting (mounted on a 19-inch standard (1RU) panel, 1.75" high x 7.0" deep)
	-C	No wall mount power supply (use 2000-02 model power supply)
	-P2	90-260 VAC wall mount power supply
	-B	50Ω, BNC RF connectors
Models		
	284-15	One 5-way splitter
	284-19	One 9-way splitter

*10˚C to 40˚C; Specifications subject to change without notice

XIV. TEST CONVERTERS

MODEL NUMBER	PAGE# OR WEB	BAND	FREQ. RANGE (GHz)	IF FREQ (MHz)	FREQ INCR (MHz)	FREQ ACCU-RACY	GAIN (dB)
TEST UPCONVERTERS							
2003	WEB	L	0.95-1.45	70/140	1	± 25 kHz	-25,-45,-65
2004	119	L	0.95-2.050	70/140	1	± 25 kHz	-25,-45,-65
2005-02	120	L	0.95-2.050	70/140	1	± 25 kHz	-10, -30
2005-03	120	L	0.95-1.45	70/140	1	± 25 kHz	-10, -30
2005-04	WEB	L	0.95-2.050	70/140	1	± 25 kHz	-5
2005-05	WEB	L	0.95-1.45	70/140	1	± 25 kHz	-5
2006-01	WEB	L	1.13 LO	70/140	FIXED	± 100 kHz	-25
2006-02	WEB	L	1-1.5 LO	70/140	FIXED	± 100 kHz	-25
2006-03	WEB	L	1.13 LO	70/140	FIXED	± 100 kHz	-5
2006-04	WEB	L	1-1.5 LO	70/140	FIXED	± 100 kHz	-5
2006-11	121	L	1.13 LO	70/140	FIXED	± 25 kHz	-5, -25
2006-12	121	L	1-1.5 LO	70/140	FIXED	± 25 kHz	-5, -25
2004-10	122	S	2.0-2.4	70/140	1	± 10 kHz	-25,-45,-65
2005-10	123	S	2.0-2.4	70/140	1	± 10 kHz	-10, -30
TEST DOWNCONVERTERS							
2005-22P	124	L	0.95-2.05	70/140	1	± 25 kHz	-20, 0
2006-103	WEB	L	1.13 LO	70/140	FIXED	± 25 kHz	-5
2005-20P	125	S	0.95-2.150	140	1	± 25 kHz	-15, +5
2009-38	WEB	C	3.80-5.05	0.90-2.15	FIXED	± 4 PPM	-40
2009-59	126	C	5.925-6.425	0.95-1.45	FIXED	± 4 PPM	-40
2009-59H	CALL	C	5.925-6.425	0.95-1.45	FIXED	± 4 PPM	-40
2009-72P	WEB	X	7.25-7.75	0.95-1.45	FIXED	± 4 PPM	-10
2009-79P	WEB	X	7.95-8.45	0.95-1.45	FIXED	± 4 PPM	-10
2009-117	WEB	Ku	11.7-12.2	0.95-1.45	FIXED	± 5 PPM	-30
2009-140	127	Ku	14.0-14.5	0.95-1.45	FIXED	± 10 PPM	-20
TEST UP/DOWNCONVERTER COMBOS							
2017-TD02	WEB	L,L	0.95-2.150	70/140	1	± 1 PPM	-10 to +10
2017-T03	WEB	L,L	0.95-1.525	70/140	1	± 1 PPM	-10 to +10

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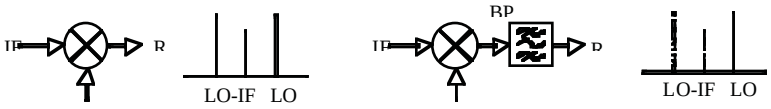
AN2006 - Using Test Up and Down Converters Some Practical Applications

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.



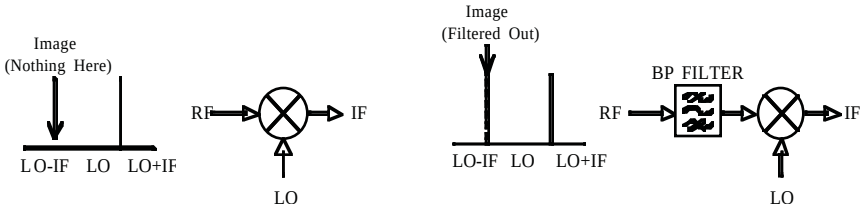
TEST UPCONVERTER **“REGULAR” UPCONVERTER**

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

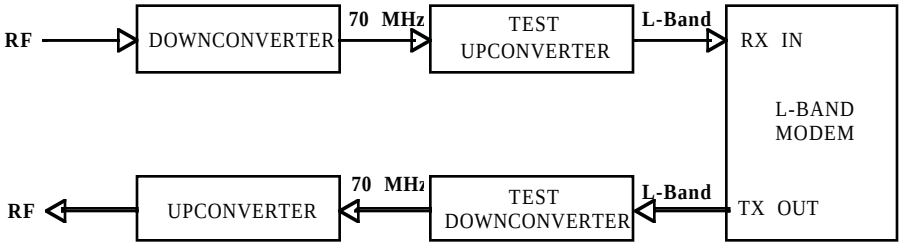


TEST DOWNCONVERTER **"REGULAR" DOWNCONVERTER**

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.



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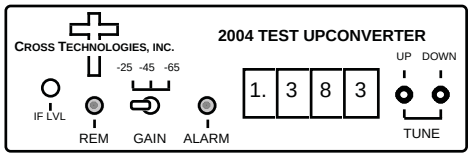
CROSS TECHNOLOGIES, INC.

DATA SHEET

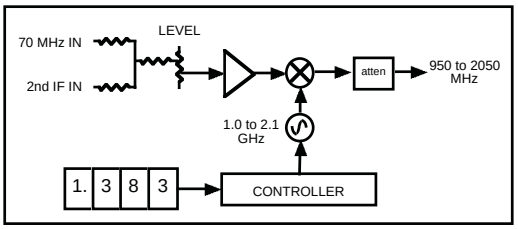
Rev B
12/12/08

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 FRONT PANEL



2004 BLOCK DIAGRAM

EQUIPMENT SPECIFICATIONS*

Input Characteristics		
	Impedance / RL	75Ω / 15dB
	Frequency	70 or 140 MHz center
	Level	-20 to -10 dBm
	1dB Compression	+5dBm
Output Characteristics		
	Impedance / RL	75Ω / 10dB
	Frequency	950 to 2050 MHz (70 MHz IF, high side LO)
	Level	selectable -35dBm, -55dBm, or -75dBm with -10dBm in
Channel Characteristics		
	Gain	Selectable -25, -45 dB, -65 dB ±3 dB
	Spurious Response	NA; output not filtered
	Frequency Sense	Inverted (C) or Non-inverted (Ku)
	Frequency Response	±3 dB, 950 - 2050 MHz @ -25, -45 gain; ±0.5 dB, any 10 MHz increment
Synthesizer Characteristics		
	Frequency Accuracy	± 25 kHz maximum
	Frequency Step	1.0 MHz minimum
	Phase Noise	< -80 @ 10kHz; < -90 @ 100kHz; < -100 @ 1MHz
Controls		
	Frequency Selection	Push-button switches with direct frequency readout
	Output Level	Potentiometer and Toggle switch
Indicators		
	PLL Alarm	Red LED (with FET open drain)
	Remote	Yellow LED
Other		
	RF Connectors	BNC (female)
	IF Connectors	BNC (female)
	Size, Bench Top	4.7” wide X 1.75” high X 12.5” deep
	Size, (option -R)	19 inch standard chassis 1.75” high X 13.0” deep (rack mount option)
	Power (std)	120 ±10% VAC, 60Hz, 20 watts max, wall mount power supply
	Model 2004-01	No power supply, Requires 2001-01 Universal Power Supply, 100-240 ±10% VAC, 60Hz, 20 watts max. (not included)

*10˚C to 40˚C; Specifications subject to change without notice

CROSS TECHNOLOGIES, INC.

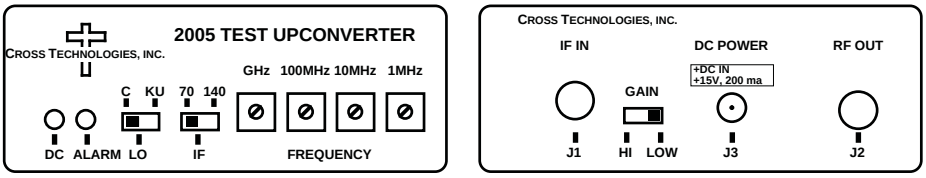
DATA SHEET

REV A
01/06/09

2005-02,-03 Test Upconverters

The **2005-02** converts a 70 MHz signal to a 950-2050 MHz output signal range in 1 MHz steps utilizing a high-side LO (C-band) that ranges from 1020 to 2120 MHz. The 2005-02 can also operate over a limited output frequency range converting a 70 MHz signal to 1090-2050 MHz utilizing a low-side LO (Ku-band), a 140 MHz signal to 950-1980 MHz utilizing a high-side LO, and a 140 MHz signal to 1160-2050 MHz utilizing a low-side LO. The **2005-03** converts a 70 or 140 MHz signal to the full 950-1450 MHz output signal range in 1 MHz steps with either a high-side LO (C-band) or a low-side LO (Ku-band). The LO frequency ranges from 810 to 1590 MHz.

Featuring low phase noise, these units are used to loop 70 or 140 MHz modulators to L-band receivers in uplinks. The 70 or 140 MHz "clean" carrier input (containing only the desired 70 or 140 MHz signal) 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). Power is provided by the LNB voltage from the receiver under test and connectors are BNC (female) for the IF input and type F (female) for the RF output. Optionally, the 2005 can be powered by an external wall mount power supply (**option -P or -P4**). The 2005 can be mounted on a 1 3/4" X 19" rack mount panel (**option -R**).



Front and Rear Panels

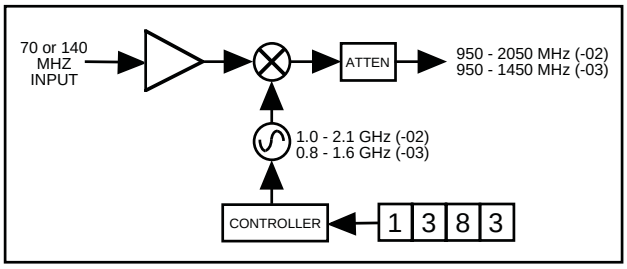
EQUIPMENT SPECIFICATIONS*

Input Characteristics

Impedance	75 Ω / 15 dB
Return Loss	12 dB
Frequency	70 or 140 MHz center
Input Level	-10 to -40 dBm
1 dB comp / 3rd order	0/+10 dBm (low gain); -20/-10 dBm (high gain)

Output Characteristics

Impedance	75 Ω
Return Loss	8 dB
Frequency Band	950 - 2050 MHz (-02); 950 - 1450 MHz (-03)



Block Diagram

Channel Characteristics

Gain (at 1200 MHz)	**-20** ± 3 dB (low gain); **-5** ± 3 dB (high gain)
Spurious Response	NA; output not filtered
Frequency Response	±4 dB, 950-2050 MHz (-02); ±3 dB, 950-1450 MHz (-03); ±0.5 dB, any 10 MHz increment

Synthesizer Characteristics

Frequency Accuracy	± 25 kHz max
Frequency Step	1.0 MHz minimum

Phase Noise @ Freq	10kHz	100kHz	1 MHz
dBC/Hz	-80	-90	-100

Controls

L-Band Freq Selection	BCD switches with direct readout
LO, IF Freq Selection	SPDT slide switches

Indicators

DC Power; Alarm	Green LED; Red LED

Other

RF, IF Connector	F type (female), BNC (female)
Size	4.7" wide X 1.75" high X 6.5" deep (**Bench Top**); 19-inch standard 1RU chassis 1.75"H x 7.0"D (**option -R**)
Power	+14 to +20 VDC, 200ma on RF IN; 120 ± 10% VAC, 60Hz (**option -P**); 90-260VAC, 47-63Hz (**option -P4**)
Power (**option -P, -P4**)	120 ± 10% VAC, 60Hz (**option -P**), 100-240 ±10% VAC, 47-63Hz (**option -P4**) wall mount power supply

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

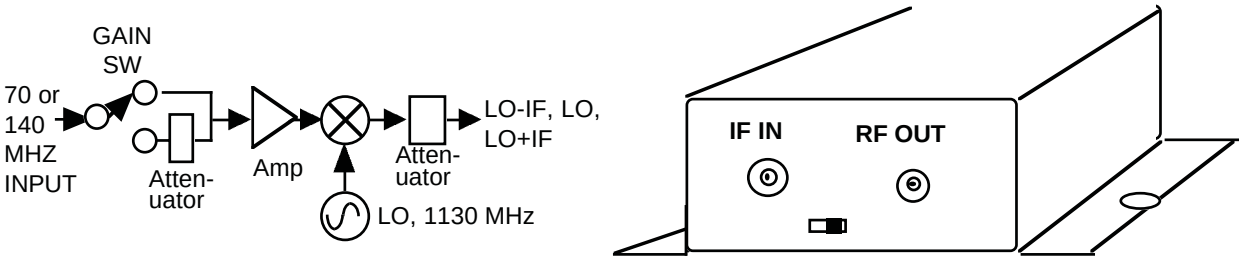
CROSS TECHNOLOGIES, INC.

DATA SHEET

2/20/03

Series 2006-11, -12 Fixed Frequency Test Upconverter

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.



2006-11, -12 Test Upconverter Block Diagram and Chassis

EQUIPMENT SPECIFICATIONS*

	2006-11	2006-12
Input Characteristics		
Input Impedance/RL	75 Ω /15 dB	75 Ω /15 dB
Frequency	70 or 140 MHz center	70 or 140 MHz center
Input Level, range	-30 to -10 dBm (low gain), -50 to -30 dBm (high gain)	
Input 1 dB Compr	+0 dBm (low gain), -20dBm (high gain)	
Output Characteristics		
Impedance/RL	75 Ω/12 dB	75 Ω/12 dB
Freq. , LO	1130 MHz	1020 - 1520 MHz, fixed
Freq. , Ku, 70 MHz	1200 MHz	LO + 70, +140 MHz
Freq. , C, 70 MHz	1060 MHz	LO - 70, -140 MHz
Level, with -10 dBm in	-35 dBm (low gain)	-35 dBm (low gain)
Channel Characteristics		
Gain	-25, ±3 dB (low gain); -5, ±3 dB (high gain);	
Spurious Response	NA; output not filtered	NA; output not filtered
Frequency Response	±0.5 dB, over 10 MHz	±0.5 dB, over 10 MHz
Synthesizer Characteristics		
Frequency Accuracy	± 25 kHz max	± 25 kHz max
Phase Noise (dBC/Hz)	≤-80, 10 kHz; ≤-90, 100 kHz; ≤-100, 1 MHz	
Frequency Selection	NONE: Fixed tuned	Changeable
Indicators		
DC Power	Green LED	Green LED
Other (Applies to both 2006-01 and 2006-02)		
RF, IF Connectors	F, female, BNC, female	
Size	3.4" wide X 1.2" high X 4.0" deep	
Power	+14 to +20 VDC, 150 ma on RF In;	
	(-P) +15 VDC, 150 ma, 115 VAC, wall power supply	
Approvals	UL, FCC, CE	

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

MODEL 2004-10, -11 AGILE TEST 2.0 - 2.4 GHZ UPCONVERTER

The 2004-10 converts a 70 or 140 MHz IF signal to 2000 to 2400 MHz in 1MHz steps with a high side or low side 1.8 to 2.54 GHz LO. The IF input is mixed with a synthesized 1.8 to 2.54 GHz local oscillator signal. Up and down tune push buttons control the output frequency displayed on the LED indicators . Pushing these switches simultaneously allows selection of high side LO (C) or low side LO (Ku) and 70 or 140 MHz input. PLL alarm lights red LED when the PLL is unlocked and goes to an open drain FET output. Yellow LED indicates remote operation. An output switched attenuator provides IF to RF gains of -25dB, -45dB, or -65dB. Powered by a wall power supply; connectors are BNC female. Rack mount **option -R**. The 2004-10 without the wall power supply is a **2004-11**.

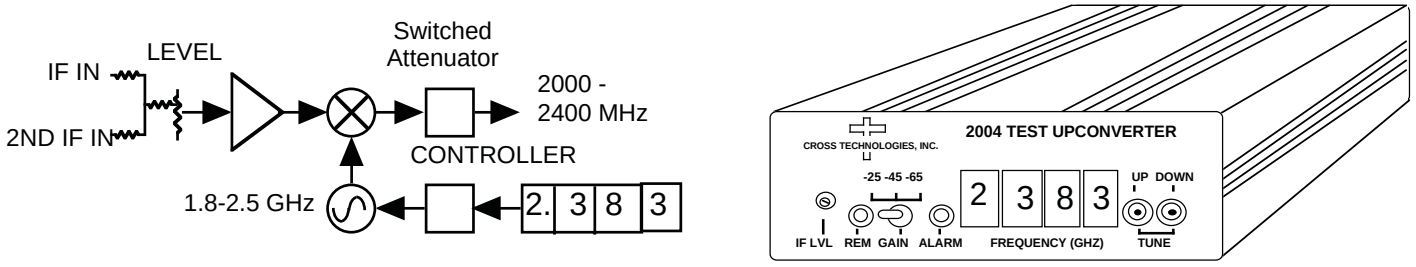


FIGURE 1.1 2004-10 Agile Test Upconverter Block Diagram and Front Panel

2004 FRONT PANEL

EQUIPMENT SPECIFICATIONS*

Input Characteristics	
Input Impedance/RL	75 Ω /15db
Frequency	70 or 140 MHz center
Input Level	-10 to -20 dBm
Input 1dB/3RD ORDER	+5/+15 dBm
Output Characteristics	
Impedance/RL	75 Ω /10db
Frequency Band	2.0 - 2.4 GHz, (70 or 140 MHz IF, high or low side LO)
Level	selectable -35dBm, -55dBm, or -75dBm with -10dBm in
Channel Characteristics	
Gain	Selectable -25, -45 dB ±4 dB, -65 dB ±6 dB
Spurious Response	NA; output not filtered
Frequency Response	±4 dB, 2.0 - 2.4 GHz, @ -25, -45 gain; ±0.7 dB, any 10 MHz increment
Synthesizer Characteristics	
Frequency Accuracy	± 50 kHz maximum
Frequency Step	1.0 MHz minimum
Phase Noise	Suitable for 128 kB/s QPSK with 1/2 rate FEC
Controls	
Frequency Selection	PB 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 (-R)	19 inch standard chassis 1.75"high X 13.0" deep (Optional)
Power	100-240 ± 10% VAC, 60Hz, 20 watts max, wall mount power supply

*Specifications subject to change without notice

CROSS TECHNOLOGIES, INC.

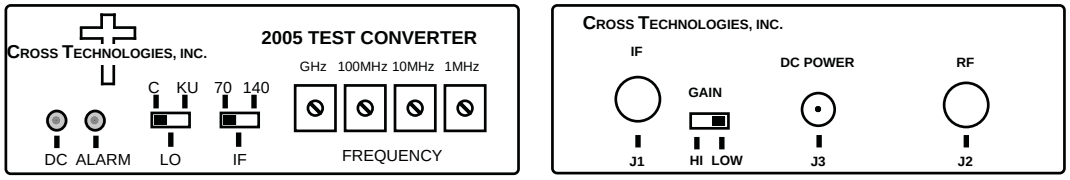
DATA SHEET

9/07/2006

2005-10P Test Upconverter

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). Wall power supply options are **-P** for 120 VAC, 60Hz, and **-P4** is 90-260 VAC. The 2005 can be mounted on a 1 3/4" X 19 " rack mount panel (**option -R**).



Front and Rear Panel

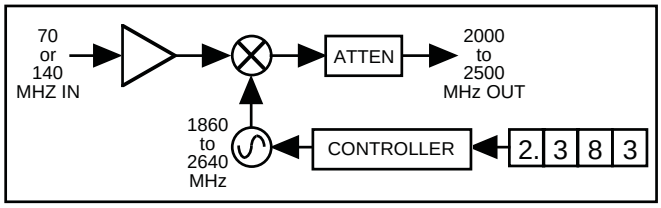
EQUIPMENT SPECIFICATIONS*

Input Characteristics

Impedance	50Ω
Return Loss	15 dB
Frequency	70 or 140 MHz center, ± 20 MHz
Level	-10 to -25 dBm (LOW GAIN) -25 to -40 dBm (HI GAIN)
1dB compression	0 dBm (LOW GAIN) -15 dBm (HI GAIN)

Output Characteristics

Impedance	50Ω
Return Loss	12 dB
Frequency Range	2.0 to 2.5 GHz



Block Diagram

Channel Characteristics

Gain	-20 dB ± 3 dB (LOW GAIN) -10 dB ± 3 dB (HI GAIN)
Spurious Response	< -40dBC max, < -45dBC typ; **OUTPUT NOT FILTERED**
Frequency Response	± 2 dB, 2.0 - 2.5 GHz; ± 0.5 dB, any 10MHz increment

Synthesizer Characteristics

Frequency Accuracy	± 25 kHz max					
Frequency Step	1.0 MHz minimum					
Phase Noise	@ Freq	100Hz	1kHz	10kHz	100kHz	1MHz
	dBC/Hz	< -70	< -70	< -75	< -90	< -100

Indicators

DC Power	Green LED
PLL Alarm	Red LED

Other

RF, IF Connectors	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 standard chassis 1.75"high X 7.0" deep (**option -R**)
Power	+15 VDC, 180 ma, 115 VAC, wall power supply

*10˚C to 40˚C; Specifications subject to change without notice

CROSS TECHNOLOGIES, INC.

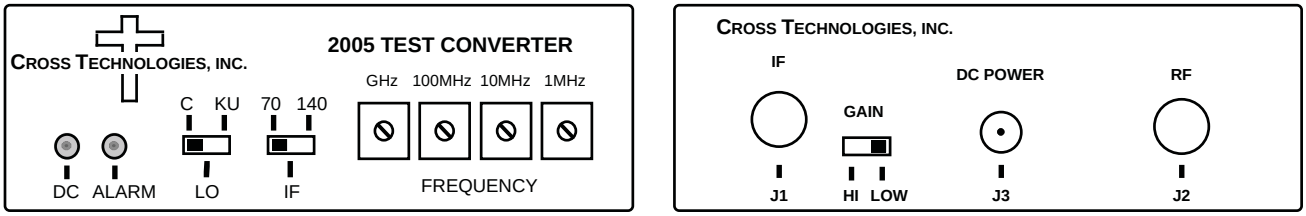
DATA SHEET

REV A
11/30/06

Model 2005-22P Test Downconverter

The 2005-22P Test Downconverter 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 (see Section 2.5.2, page 7).

Featuring low phase noise, these units are used to loop 0.95 - 2.05 GHz receivers to 70 or 140 MHz modulators for test purposes. The input frequency is selected with four BCD switches which control the synthesized local oscillator (LO) signal. The 0.95 - 2.05 GHz input is mixed with this synthesized LO to the 70 or 140 MHz IF signal. 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 +0 dB (high gain) or -20 dB (low gain). Connectors are 75Ω BNC (female) for the IF input and 75Ω Type F (female) for the RF output (other connector options are available). Wall power supply options are **-P** for 120 VAC, 60Hz, and **-P4** is 90-260 VAC. The 2005 can be mounted on a 1 3/4" X 19 " rack mount panel (**option -R**).



2004 FRONT AND REAR PANELS

EQUIPMENT SPECIFICATIONS*

Input Characteristics

Impedance	75Ω
Return Loss	10 dB
Frequency Range	0.95 to 2.05 GHz, Inverted, 70 MHz out
Level	-10 to -30 dBm
1dB compression	-5 dBm

Output Characteristics

Impedance	75Ω
Return Loss	15 dB
Frequency	70 or 140 MHz center, ± 20 MHz

Channel Characteristics

Gain	-20 dB ± 3 dB (LOW GAIN) +0 dB ± 3 dB (HI GAIN)
Spurious Response	< -40dBC max, < -45dBC typ; **OUTPUT NOT FILTERED**
Frequency Respons	e± 3 dB, 0.95 - 2.05 GHz; ± 0.5 dB, any 10MHz increment

Synthesizer Characteristics

Frequency Accuracy	± 25 kHz max
Frequency Step	1.0 MHz minimum

Phase Noise @ Freq	100 Hz	1kHz	10kHz	100kHz	1 MHz
dBC/Hz	-70	-70	-80	-90	-100

Indicators

DC Power	Green LED
PLL Alarm	Red LED

Other

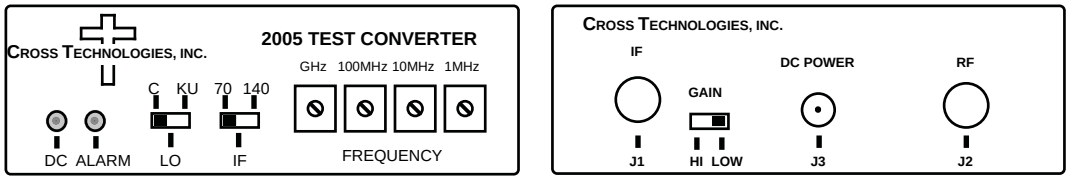
RF, IF Connectors	Type F (female), BNC (female)
Size, Bench Top	4.7" wide X 1.75" high X 6.5" deep
Size, Rack Mount	19 inch standard chassis 1.75" high X 7.0" deep (**option -R**)
Power	+14 to +24 VDC, 180 ma on RF Out
AC Power	100-240 ±10% VAC, 60 Hz, 10W max wall mount power supply (**option -P**)

*Specifications subject to change without notice

2005-20P Test Downconverter

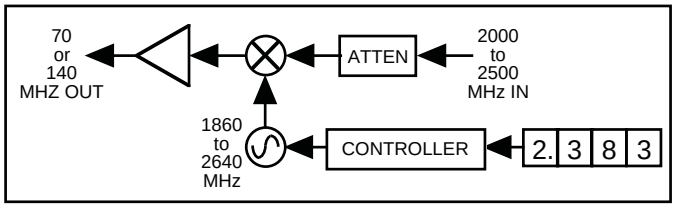
The 2005-20 Test Downconverter converts a 2000 to 2500 MHz signal to 70 MHz or 140 MHz IF in 1 MHz steps with selection of high side LO (C = inverted) or low side LO (Ku = non-inverted) and 70 or 140 MHz output over the 2.0 - 2.5 GHz range.

Featuring low phase noise, these units are used to loop 2.0 - 2.5 GHz receivers to 70 or 140 MHz modulators for test purposes. The input frequency is selected with four BCD switches which control the synthesized local oscillator (LO) signal. The 2.0 - 2.5 GHz input is mixed with this synthesized LO to the 70 or 140 MHz IF signal. 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 +5 dB (high gain) or -15 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**).



Front and Rear Panel

EQUIPMENT SPECIFICATIONS*



Block Diagram

Input Characteristics

Impedance	50Ω
Return Loss	12 dB
Frequency	2.0 to 2.5 GHz
Level	-10 to -30 dBm
1dB compression	-5 dBm

Output Characteristics

Impedance	50Ω
Return Loss	15 dB
Frequency Range	70 or 140 MHz center, ± 20 MHz

Channel Characteristics

Gain	-15 dB ± 3 dB (LOW GAIN) +5 dB ± 3 dB (HI GAIN)
Spurious Response	< -40dBC max, < -45dBC typ; **OUTPUT NOT FILTERED**
Frequency Response	± 2 dB, 2.0 - 2.5 GHz; ± 0.5 dB, any 10MHz increment

Synthesizer Characteristics

Frequency Accuracy	± 25 kHz max
Frequency Step	1.0 MHz minimum

Phase Noise @ Freq	100 Hz	1kHz	10kHz	100kHz	1 MHz
dBC/Hz	-70	-70	-80	-90	-100

Indicators

Frequency Selection	BCD switches
DC Power	Green LED
PLL Alarm	Red LED

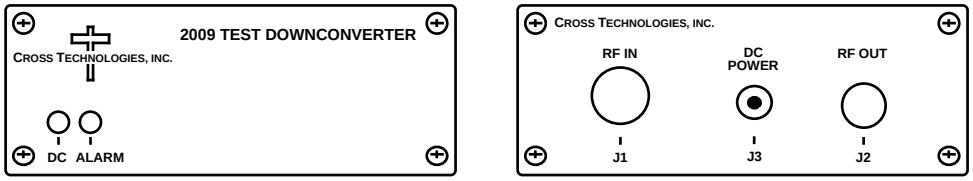
Other

RF, IF Connectors	BNC (female)
Size, Bench Top	4.7" wide X 1.75" high X 6.5" deep
Size, Rack Mount	19 inch standard chassis 1.75"high X 7.0" deep (**option -R**)
Power	120 ± 10% VAC, 60 Hz, 10W max wall mount power supply
Power (**option -P4**)	100-240 ±10% VAC, 47-63 Hz wall mount power supply (**option -P4**)

*10˚C to 40˚C; Specifications subject to change without notice

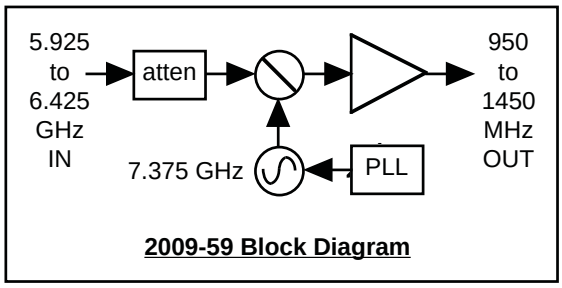
2009-59 Test Downconverter, 5.925 - 6.425 GHz

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 Front and Rear Panels

EQUIPMENT SPECIFICATIONS*



2009-59 Block Diagram

Input Characteristics		
	Input Impedance/RL	50 Ω /12 db
	Frequency	5.925 to 6.425 GHz
	Level	-10 to +15 dBm
	Input 1 dB compression	+20 dBm
Output Characteristics		
	Impedance/RL	75 Ω/12 db
	Frequency	950 -1450 MHz
	Level	-50 to -25 dBm
Channel Characteristics		
	Gain at band center	-40 dB ±2 dB
	Spurious Response	<-40 dBC, 950-1450 MHz out
	Spectrum Sense	Inverting
	Frequency Response	± 2 dB, 950 -1450 MHz; ± 0.5 dB, any 10 MHz increment
Synthesizer Characteristics		
	Frequency Accuracy	± 4ppm max
	Phase Noise (dBc/Hz)	≤ -70 @ 10 kHz; ≤ -85 @ 100 kHz; ≤ -95 @ 1 MHz
Indicators		
	DC Power	Green LED
	Alarm	Red LED
Other		
	RF In Connector	Type-N (female)
	RF Out Connector	Type-F (female)
	Size, Bench Top	4.7" wide X 1.75" high X 6.5" deep
	Size, Rack Mount (-R)	19 inch standard chassis 1.75"high X 7.0" deep (optional)
	Power	+16 to +20 VDC, 250 ma on RF Out
Options		
	-H	Operates over an extended -20˚C to 60˚C temp range
	-P	115 VAC Wall Power Supply
	-P4	100-240± 10% VAC Wall Power Supply
	-R	1RU Rack Mounting

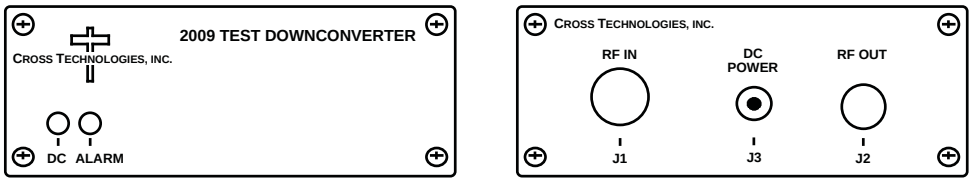
*+10˚C to +40˚C; 2000 meters max elevation; 80% max humidity; Specifications subject to change without notice

CROSS TECHNOLOGIES, INC.

DATA SHEET
Rev. B
5/3/2007

2009-140 Test Downconverter, 14.0 - 14.5 GHz

The 2009-140 Test Downconverter 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 and high stability, this unit is used to downconvert "clean" (having only this frequency) 14.0 - 14.5 GHz signals to 950 - 1450 MHz for test purposes. The 14.0 - 14.5 GHz input is mixed with a synthesized local oscillator (LO) signal to 950 - 1450 MHz. The mixer output is applied to the output amplifier providing a nominal gain of -20 dB. Connectors are 75Ω type-F (female) for the 950 - 1450 MHz output and 50Ω 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 external wall mount power supply (**option -P or -P4**). The 2009 can be mounted on an 1 3/4" X 19 " rack mount panel (**option -R**). **Option -H** allows the 2009-140 to be operated over an extended -20˚C to +60˚C temperature range.



Front and Rear Panels

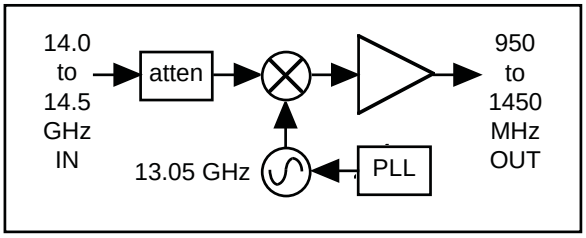
EQUIPMENT SPECIFICATIONS*

Input Characteristics

Impedance / Return Loss	50Ω / 12 db
Frequency	14.0-14.5 GHz
Level	-15 to 0 dBm
Input 1 dB compression	+5 dBm

Output Characteristics

Impedance / Return Loss	75Ω / 12 db
Frequency	950 to 1450 MHz
Level	-35 to -20 dBm



Block Diagram

Channel Characteristics

Gain at band center	-20 dB ±2 dB
Spurious Response	<-40 dBC, 950-1450 MHz out
Spectrum Sense	Non-inverting
Frequency Response	± 2 dB, 950-1450 MHz; ± 0.5 dB, any 10 MHz increment

Synthesizer Characteristics

Frequency Accuracy	± 2.5ppm max					
Phase Noise	@ Freq	100Hz	1kHz	10kHz	100kHz	1MHz
	dBC/Hz	< -60	< -75	< -80	< -100	< -110

Indicators

DC Power	Green LED
Alarm	Red LED

Other

RF In Connector	Type-N (female), 50Ω
RF Out Connector	Type-F (female)
Size, Bench Top	4.7" wide X 1.75" high X 6.5" deep
Size, Rack Mount (-R)	19 inch standard chassis 1.75"high X 7.0" deep (optional)
Power	+16 to +20 VDC, 250 ma on RF Out

Options

-H	Operates over an extended -20˚C to 60˚C temp range
-P	120 VAC Wall Power Supply
-P4	100-240 ± 10% VAC Wall Power Supply
-R	1RU Rack Mounting

*+10˚C to +40˚C; 2000 meters max elevation; 80% max humidity; Specifications subject to change without notice

XVI. SUBCARRIER PRODUCTS -

(DATA SHEETS ON WEBSITE)

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)

Current pricing for most products can be found on our website at
www.crosstechnologies.com

XVII. POWER SUPPLIES, OTHER PRODUCTS

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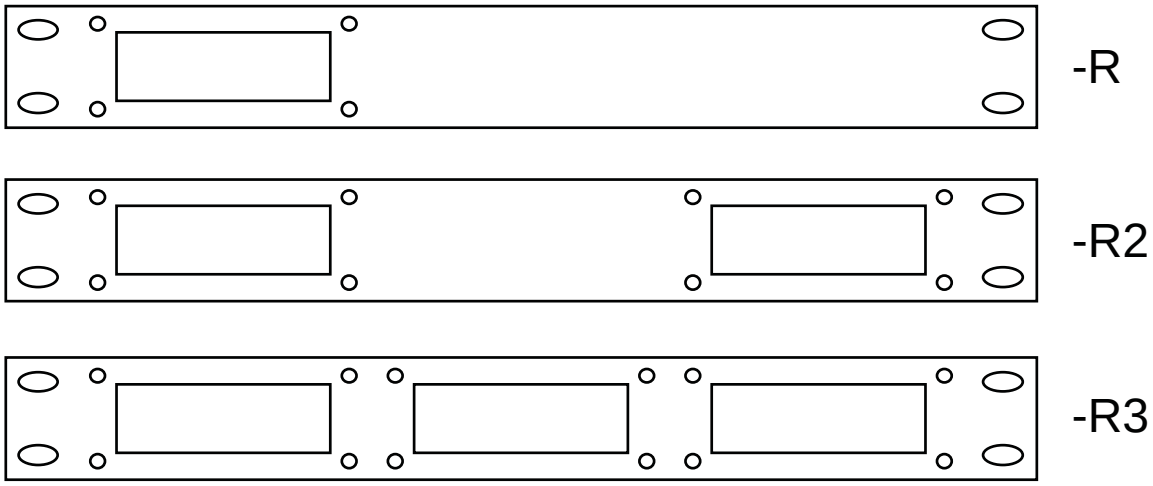
2000 Series Rack Adapters

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.



2000 Series Rack Adapters

CROSS TECHNOLOGIES, INC.

DATA SHEET

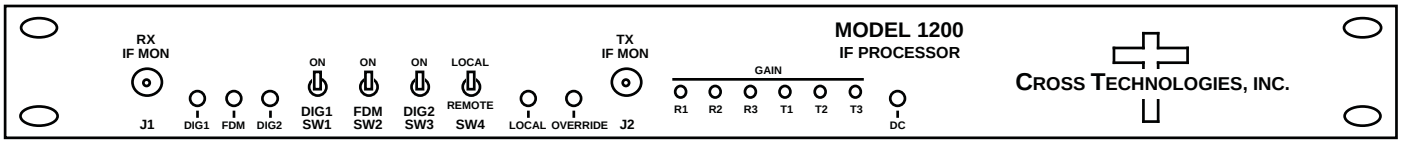
10/9/06

1200-03 IF Processor

The 1200-03 IF Processor consists of a transmit and receive side. The receive side consists of one IF signal passing through an Automatic Gain Control (AGC) amplifier and then split into three output signals each having variable attenuators to adjust their levels via front panel multi-turn potentiometers. The AGC amplifier adjusts a -80 to 0 dBm, 50 to 90 MHz IF input signal to a -35 dBm ± 10 dB output. A front panel output port provides a monitor signal directly out of the AGC amplifier, and front panel potentiometers adjust the attenuation (between 0 and 30 dB) to each of the three output signals, DIG1RX, FDMRX, and DIG2RX.

The transmit side consists of three transmit IF signals combined into one. DIG1TX, FDMTX, and DIG2TX signals each pass through individual attenuators controlled via front panel potentiometers and a switch that is controlled remotely through a DB9 connector or locally with three SPDT switches located on the front panel. A SPDT switch on the front panel selects either REMOTE or LOCAL operation. A local override feature is included such that when the REMOTE/LOCAL switch is left in the LOCAL position, the override pin on the DB9 can be set to override the LOCAL control and allow for REMOTE control.

DIG1 and DIG2 on both transmit and receive sides are 75Ω in/out while FDM on both transmit and receive sides are 50Ω in/out. When power is removed from the 1200-03, the FDM TX and FDMRX signals pass through to the output. IF connectors are BNC female. The 1200-03 is housed in a 1RU x 14" deep chassis and powered by a 100-240 ± 10% VAC, 47-63 HZ input power supply.



Front Panel

EQUIPMENT SPECIFICATIONS*

RX Input Characteristics

Impedance/RL	50Ω/18 dB
Frequency	50 to 90 MHz
Level range	0 to -80dBm
1dB compression	+5dBm

RX Output Characteristics

Output Impedance/RL	50Ω,75Ω /18 dB
Monitor/AGC Out Level	-35 ± 10 dBm
Level Range	-35 to -65 dBm

RX Channel Characteristics

Gain, AGC	-35 to +35 dB
Gain adjustment	0 to -30 dB
Frequency Response	± 1.0 dB

TX Input Characteristics

Input Impedance/RL	50Ω,75Ω /18 dB
Frequency	50 to 90 MHz
Level range	-20 to +5 dBm

TX Output Characteristics

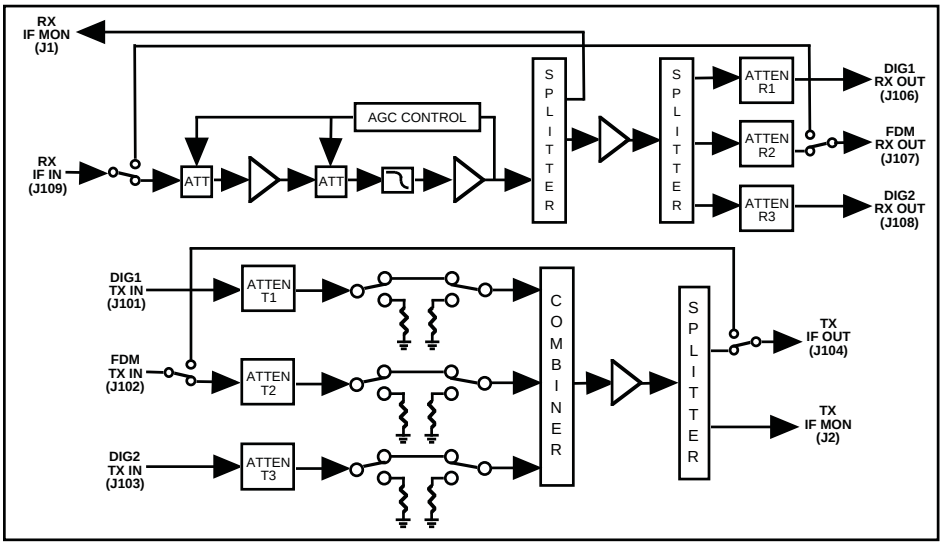
Impedance/RL	50Ω/18 dB
Level range	+5 to -20 dBm
1 dB compression	+10dBm

TX Channel Characteristics

Gain adjustment	0 to -30 dB
Frequency Response	± 1.0 dB
Group Delay, max	± 5 ns, max

TX Switch Characteristics

Isolation, Switch off	≥ 60dB
Isolation, Port to Port	≥ 50dB, all "ON"
Switch time	≤10 milliseconds



Block Diagram

Controls/Indicators

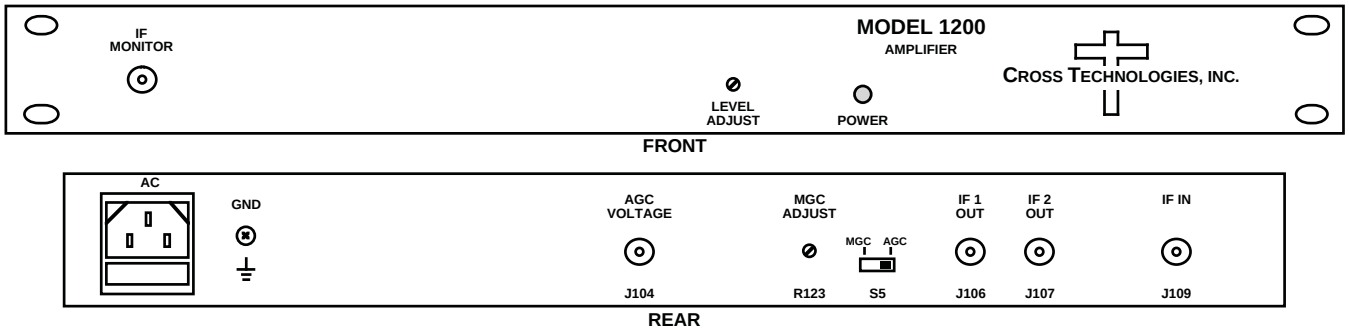
DIG1TX,FDMTX,DIG2TX	Green LEDs and SPDT switches
LOCAL/REMOTE	Red LED and SPDT switch
OVERRIDE	Yellow LED
POWER	Green LED

Other

IF Connectors	BNC (female)
Connector, DC, Control	DB9 (female)
Size,	19 inch 1RU chassis X 14.0" deep
Power	100-240 ± 10% VAC, 47-63Hz, 30 watts max

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 ± 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 90-260 VAC switching power supply and is housed in a 1RU x 14" deep chassis.



Front and Rear Panels

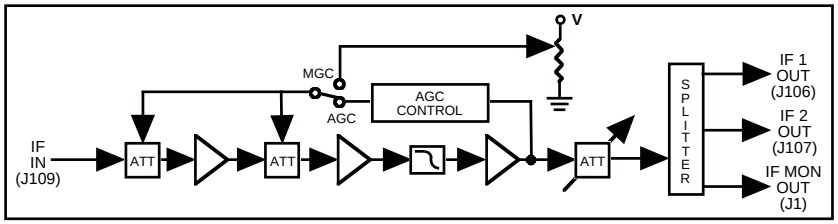
EQUIPMENT SPECIFICATIONS*

Input Characteristics

Impedance/Return Loss	50Ω/18 dB
Frequency	50 to 200 MHz
Input Level range	-80 to 0 dBm
Input 1 dB comp.	+5 dBm

Output Characteristics

Impedance/Return Loss	50 Ω /12 dB
Output Level	-35 ± 10 dBm



Block Diagram

Channel Characteristics

Gain	-35 to +35 dB (AGC)
Frequency Response	± 1.0 dB, ± 18 MHz
Group Delay, max	± 5 ns, max 50 to 100 MHz

Controls/Indicators

AGC/MGC Switch	Switches between Manual (MGC) or Automatic (AGC) Gain control
MGC Potentiometer	Controls manual gain in MGC mode
AGC Voltage	Allows for monitoring of the AGC gain (BNC female connector)
DC Power	Green LED

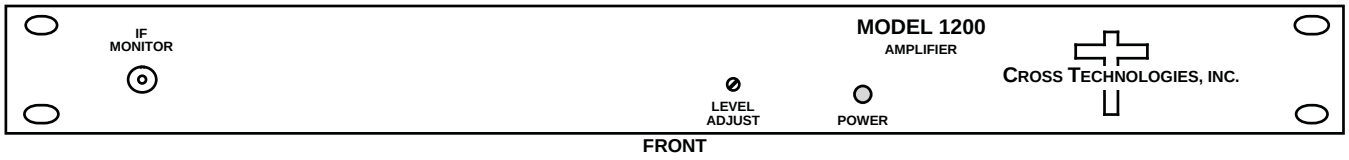
Other

IF Connectors	BNC (female)
Size	19 inch standard 1RU chassis 1.75"high X 14.0" deep
Power	100-240± 10% VAC, 47-63 Hz, 30 W max

*+10˚C to +40˚C; 2000 meters max elevation; 80% max humidity; Specifications subject to change without notice

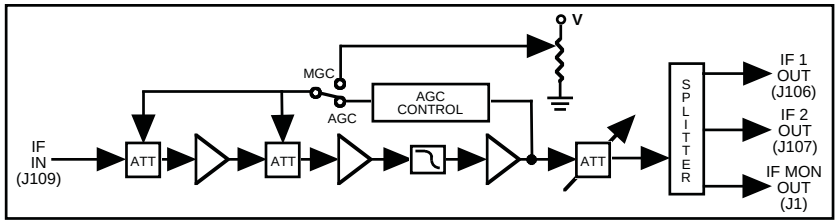
1200-08 IF AGC Amplifier

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 (± 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 90-260 VAC switching power supply and is housed in a 1RU x 14" deep chassis.



Front and Rear Panels

EQUIPMENT SPECIFICATIONS*



Block Diagram

Input Characteristics

Impedance	50Ω or 75Ω
Return Loss	14 dB
Frequency	50 to 200 MHz
Input Level range	-35 to 0 dBm
Input 1 dB comp.	+5 dBm @ min gain

Output Characteristics

Impedance	50Ω or 75Ω
Return Loss	14 dB
Output Level	0 to +10 dBm
Output 1 dB comp.	+15 dBm

Channel Characteristics

Gain	0 to +45 dB (AGC)
Frequency Response	±1.0 dB, 50-200 MHz; ±0.5 dB, ± 20 MHz
Group Delay, max	±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 female connector)
Power	Green LED

Other

IF Connectors	BNC (female)
Size	19 inch standard 1RU chassis 1.75"high X 14.0" deep
Power	100-240± 10% VAC, 47-63 Hz, 30 W max

*+10˚C to +40˚C; 2000 meters max elevation; 80% max humidity; Specifications subject to change without notice

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DATA SHEET

10/15/03

1583-09A Data Splitter

The 1583-09A Data Splitter provides 9 RS232C outputs of the data signal (pin 2 of the DB9 connector).

EQUIPMENT DESCRIPTION

The 1583-09A 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 1583-09A with front panel LEDs indicating proper power supply operation. The unit is housed in a 1 3/4", rack mount chassis and all data connectors are DB9, female.

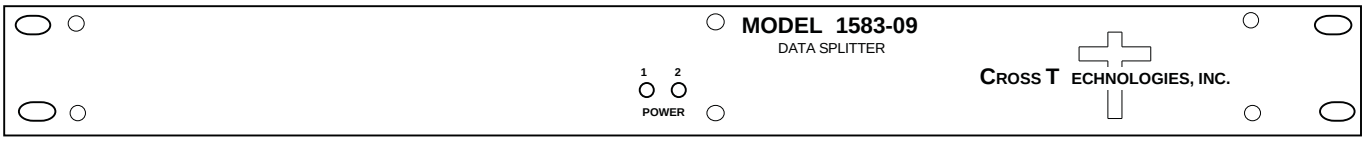


FIGURE 1.0 1583-09A DATA SPLITTER

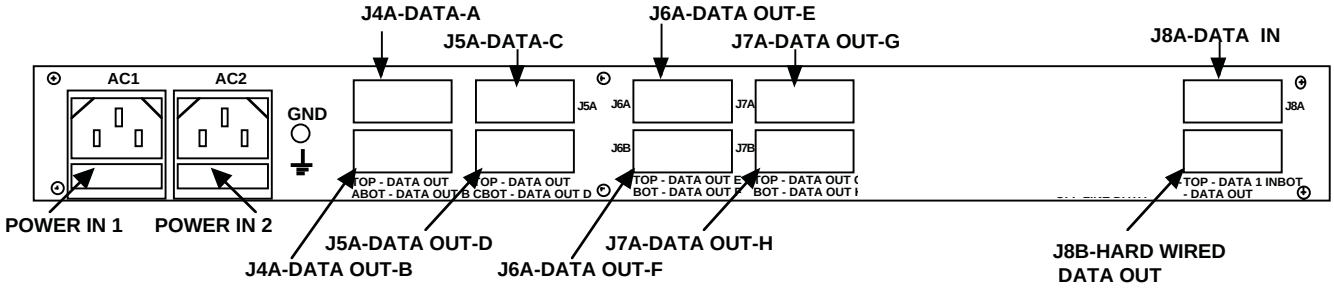


FIGURE 2.0 1583-09A REAR PANEL

1583-09A Technical Specifications

Data Characteristics	
Input/Output	RS232C
Data rate	128 kB/s max
Number of outputs	1 - Hard wired loop of the input, pin 2 8 - Buffered RS232C outputs, pin 2
Connector	DB9, female
Indicators	
POWER CH1 LED	Turns green when power is applied to number 1 input on the rear panel
POWER CH2 LED	Turns green when power is applied to number 2 input on the rear panel
Other	
Mechanical	19 inch standard chassis 1.75"high X 11.5" deep
Power	100-240 ± 10% VAC, 47 - 63 Hz, 10 watts, Redundant Supplies

*+10 to +40 degrees C; 2000 meters max elevation; 80% max humidity; Specifications subject to change without notice

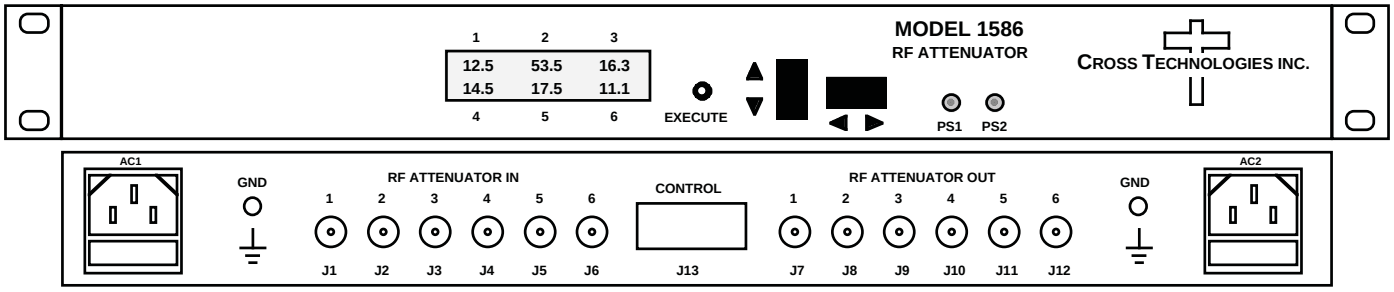
CROSS TECHNOLOGIES, INC.

DATA SHEET

5/27/04

1586-06 Programmable Attenuators, 6 to 12 GHz

1586-06 Programmable Attenuators - Contains six General Microwave Model 3496H-64-4 11 Bit 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 General Microwave 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 90-260 VAC power supply; 1 3/4" X 19 " X 19" rack mount chassis.



1586-06 Front and Rear Panels

EQUIPMENT SPECIFICATIONS*

Input/Output Characteristics	
Impedance/Return Loss	50 Ω /10 dB
Frequency	6 to 12 GHz
Level, maximum	+20 dBm
Level/1 dB	+10 dBm?
Channel Characteristics	
Attenuator range	4 to 68 dB
Frequency Response	
4 to 24 dB attenuation	±1.5 dB
25 to 44 dB attenuation	±2.0 dB
45 to 68 dB attenuation	±2.0 dB
Attenuator Accuracy	
4 to 34 dB attenuation	±0.5 dB
35 to 54 dB attenuation	±1.0 dB
55 to 68 dB attenuation	±1.5 dB
Temp Coefficient	±0.025 dB/Degree C
Controls, Indicators	
Attenuation Selection	direct readout LCD; pushbutton switches or remote selection
PWR	Red/Green LED; Alarm/Normal
Remote	RS422, 9600 baud,no parity, 8 data bits, 1 start and stop bit
Other	
RF Connectors	SMA, female
Connector, Remote	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

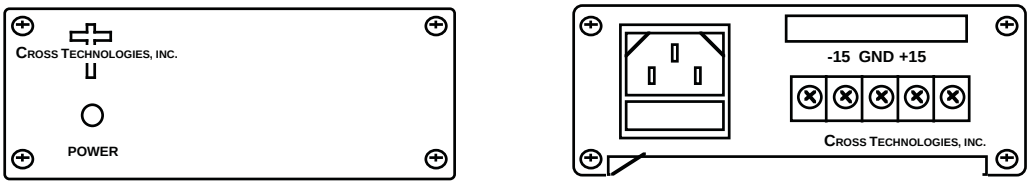
*-20 to +55 degrees C; 0 to 100% humidity; all based on Model 3496H-64 specifications; Specifications subject to change without notice

CROSS TECHNOLOGIES, INC.

DATA SHEET
Rev. A
9/12/06

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 ± 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 barrier strip. The 2000-01 can be mounted on an 1 3/4" X 19 " rack mount panel (**option -R**)



Front and Rear Panels

EQUIPMENT SPECIFICATIONS*

AC Input Characteristics

Voltage	90 - 260 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 Regulation, max.	± 5%
Power Supply type	Switcher
Switching Frequency	50 kHz, typical

Indicators

DC Power	Green LED

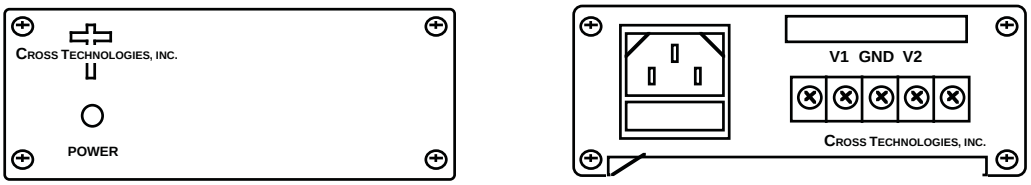
Other

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 (-R)	19 inch standard chassis 1.75"high X 9.0" deep (Optional)

*+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 ± 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 and Rear Panels

EQUIPMENT SPECIFICATIONS*

AC Input Characteristics

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

DC Output Characteristics

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

Indicators

DC Power	Green LED

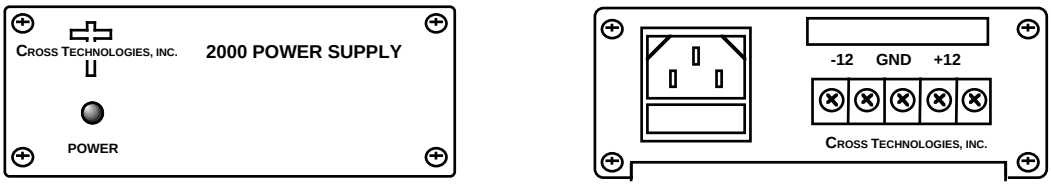
Other

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 (-R)	19 inch standard chassis 1.75"high X 9.0" deep (Optional)

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

2000-12 Power Supply

The 2000-12 Power Supply is a switching power supply which provides regulated +12 VDC at 1.2 amps and -12 VDC at 0.5 amps with a 100-240 ±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 barrier strip. The 2000-01 can be mounted on an 1 3/4" X 19 " rack mount panel (**option -R**)



2000-12 POWER SUPPLY Front and Rear Panels

EQUIPMENT SPECIFICATIONS*

AC Input Characteristics

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

DC Output Characteristics

Voltage / Current	+12 VDC/ 1.2 amps, -12 VDC/ 0.5 amps
Load Regulation, max.	± 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 (-R)	19 inch standard chassis 1.75" high X 9.0" deep (Optional)

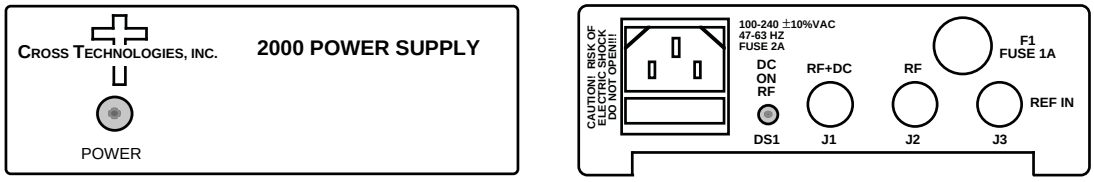
*+10˚C to +40˚C; Specifications subject to change without notice

CROSS TECHNOLOGIES, INC.

DATA SHEET
Rev. B
01/20/10

2000-2XX LNB Power Supply

The 2000-XX LNB Power Supply is a switching power supply which provides either regulated **+18 VDC (-218) at 0.5 amps *OR* +24 VDC (-224) at 1 amp** through RF connectors for insertion on an RF line. 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 optional 1 3/4" x 19" rack mount panel (**option -R**).

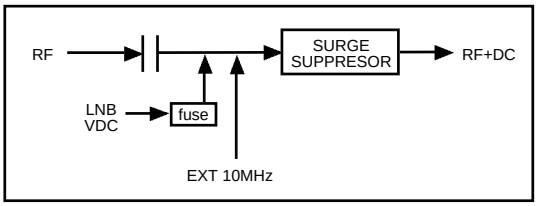


Front and Rear Panels

EQUIPMENT SPECIFICATIONS*

RF Input/Output Characteristics

Impedance/Return Loss	75Ω/14 dB
Frequency	950 - 2150 MHz
Insertion Loss	1 ± 0.5 dB
Frequency Response	±1.0 dB



Block Diagram

AC Input Characteristics

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

DC Output Characteristics

Voltage / Current	+18 VDC/ 0.5 amps (**Model 2000-218**)
	+24 VDC/ **1 amp** (**Model 2000-224**)
Load Regulation, max.	± 5%
Power Supply type	Switcher
Switching Frequency	50 kHz, typical

Indicators

DC Power (front)	Green LED
DC Power Insertion (rear)	Yellow LED

Other

AC Input Connector	IEC 320 C13
RF Connectors	Type F (female)
10MHz REF Connector	BNC (female), 50Ω/75Ω
Size, Bench Top	4.7" wide x 1.75" high x 8.5" deep
Size, Rack Mount	19 inch standard chassis 1.75" high x 9.0" deep (**option R**)

Options

R, R2, R3	Rack Mount Panel (1, 2, or 3 position)
Connectors/Impedance	
B	75Ω BNC (RF)
D	50Ω BNC (RF)

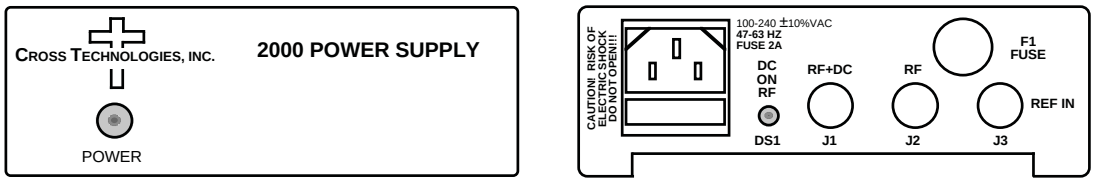
*+10˚C to +40˚C; Specifications subject to change without notice

CROSS TECHNOLOGIES, INC.

DATA SHEET
Rev. A
11/23/09

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 line. 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 optional 1 3/4" X 19" rack mount panel (**option -R**).



Front and Rear Panels

EQUIPMENT SPECIFICATIONS*

RF Input/Output Characteristics

Impedance/Return Loss	75Ω/14 dB
Frequency	950 - 2150 MHz
Insertion Loss	1 ± 0.5 dB
Frequency Response	±1.0 dB

AC Input Characteristics

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

DC Output Characteristics

Voltage / Current	+18 VDC/ 2.5 amps (**Model 2000-318**)
	+24 VDC/ 2.5 amps (**Model 2000-324**)
Load Regulation, max.	± 5%
Power Supply type	Switcher
Switching Frequency	50 kHz, typical

Indicators

DC Power (front)	Green LED
DC Power Insertion (rear)	Yellow LED

Other

AC Input Connector	IEC 320 C13
RF Connectors	Type F (female)
10MHz REF Connector	BNC (female), 50Ω/75Ω
Size, Bench Top	4.7" wide X 1.75" high X 8.5" deep
Size, Rack Mount	19 inch standard chassis 1.75"high X 9.0" deep (**option R**)

Options

R, R2, R3	Rack Mount Panel (1, 2, or 3 position)
Connectors/Impedance	
B	75Ω BNC (RF)
D	50Ω BNC (RF)

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

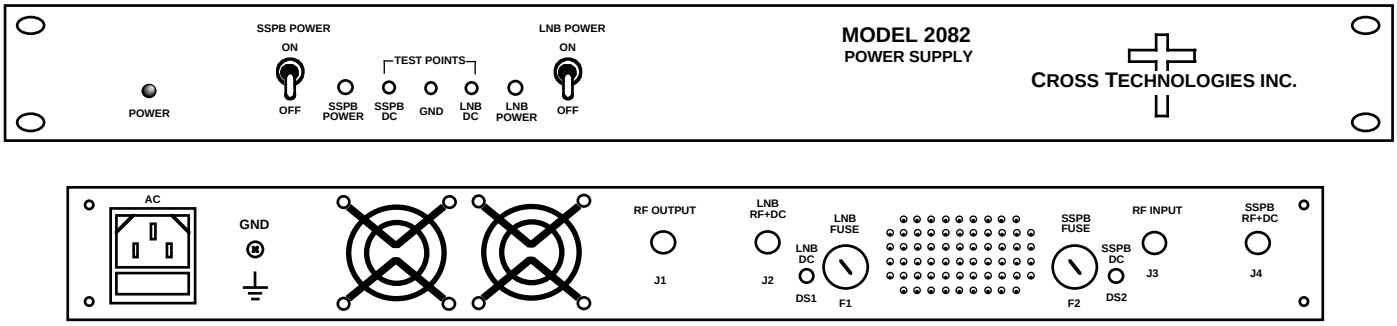
CROSS TECHNOLOGIES, INC.

DATA SHEET

12/01/09

2082-1848 DC Power Supply

The 2082-1848 DC Power Supply is a DC voltage Power Supply used for SSPB and LNB applications. DC Power is inserted via two L-Band loop-throughs. A +48 VDC, 5A output is provided on the SSPB "RF + DC" output and a +18 VDC, 1A output is provided on the LNB "RF + DC" output. Two front panel locking toggle switches allow the user to disable the DC power insertion on either or both outputs. Each DC power source is fused using rear panel mount fuse holders. Front panel LEDs indicate AC power (green), and front panel LED's (green) and rear panel LEDs (yellow) indicate the presence of voltage on either RF1 or RF2. Connectors are TNC female for both loop-throughs. The unit is powered by a 100-240 ±10% VAC, 47-63 Hz supply, and housed in a 19.0", 1RU x 1.75"H x 7.75"D chassis.



2082-1848 Front and Rear Panels

EQUIPMENT SPECIFICATIONS*

-------- L-Band Insertion---------

RF Input/Output Characteristics

Impedance/Return Loss	50Ω /10 dB minimum
Frequency	950 - 2150 MHz and 10MHz
Insertion Loss	1 ± 0.5 dB (L-Band)
	1dB max. (10 MHz)
Frequency Response	±1.0 dB, 950 - 2150 MHz;
	± 0.5 dB, 36 MHz BW

DC Power Characteristics

Voltage/Current, PS1/RF1	+48 VDC, 5 A, max.
Voltage/Current, PS2/RF2	+18 VDC, 1 A, max.
Call for other voltages	
Load Regulation	± 5 %

----------Chassis/Other--------

Controls, Indicators

PS1 On/Off	FP SPST Locking Toggle switch
PS2 On/Off	FP SPST Locking Toggle switch
PS1, PS2, Gnd	FP Test Points (10k impedance)
AC Power (PS1 and PS2)	FP Green LED
VDC on RF1/RF2	RP Yellow LEDs
VDC on RF1/RF2	FP Green LEDs

Other

RF Connectors	TNC, 50Ω (female)
Call for other connectors	
Size	19 inch, 1RU, 1.75"H X 7.75"D
Power, PS1 + PS2	100-240 ±10 VAC,
	47-63 Hz, 350W

*10˚C to 40˚C; Specifications subject to change without notice

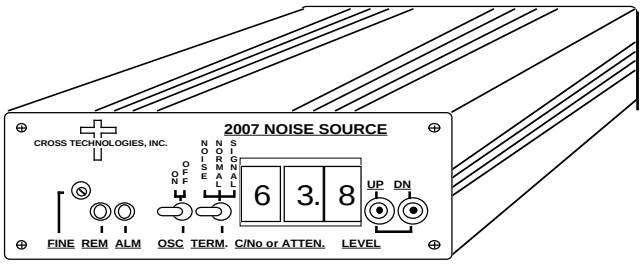
CROSS TECHNOLOGIES, INC.

DATA SHEET

10/23/08

2007, 2007R
Noise Source

The Model 2007 Noise Source provides 70 MHz band limited noise in 0.1dB increments and summing of an external signal.

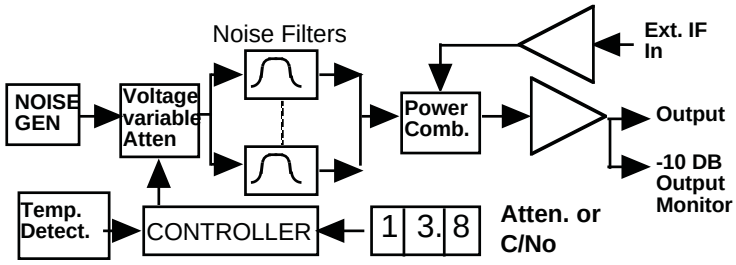


EQUIPMENT FEATURES

- 10MHz or 40 MHz bandwidth at 70 MHz center frequency
- Accurate attenuator provides 0.1 dB steps of noise power
- Display shows C/No or attenuation from max. noise power

EQUIPMENT DESCRIPTION

Broad band noise goes to precision attenuators controlled by front panel "up" and "down" pushbutton switches 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. Bandpass filters are selected with on board jumpers to band limit the noise at 70 MHz. The 2007 has a front panel red LED that lights if the ambient temperature is outside the +15 to +40 C calibrated temperature range. A yellow LED o the front panel indicates if in remote operation.



2007 Noise Source Block Diagram

EQUIPMENT SPECIFICATIONS*

Input Characteristics- carrier input

Input Impedance/RL	75 Ω/15db
Frequency	70 MHz center
Input Level	-20.0 dBm
Gain	0 dB ± 0.1 dB

Output Characteristics

Impedance/RL	75 Ω/15db
Frequency Band	52 - 88 MHz
	allows C/No range of 50 to 90 dB-Hz
	(with 10 MHz filter; 60 to 90 dB-Hz with 40 MHz filter) with a -20.0 dBm carrier
Monitor level	-10dB down from main output
Level	noise power range

Channel Characteristics - noise source

Selectable BW(MHz)	10MHz or 40 MHz @ 70MHz
Frequency Response	±0.5 dB 8 MHz, 36MHz
Noise Power Accuracy	±0.25 dB, 15 to 40 deg C; ±0.5 dB, 10 to 15, 40 to 50 deg C
Noise Power stability	±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 lights when remote control of noise power level is selected
Level	Three digit displays show C/No for a -20.0dBm carrier 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 (-R)	19 inch standard chassis 1.75"high X 13.0" deep (Optional)
Power (std)	120 ±10% VAC, 60Hz, 20 watts max, wall mount power supply
Model 2007C	No power supply, **Requires** 2001-01 Universal Power Supply, 100-240 ±10% VAC, 60Hz, 20 watts max. **(not included)**

CROSS TECHNOLOGIES, INC.

DATA SHEET

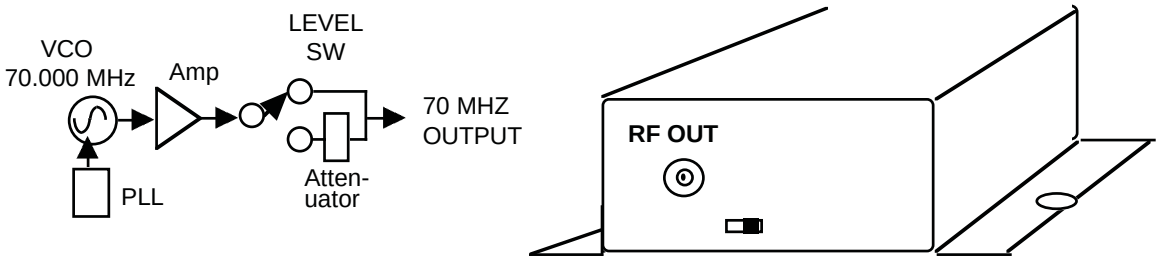
REV A 1/21/03

Model 2098-007 Frequency Source

The Model 2098-007 Frequency Source, is a 70 MHz, synthesized frequency generator.

EQUIPMENT DESCRIPTION

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 90-260 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 Block Diagram and Chassis

EQUIPMENT SPECIFICATIONS*

Output Characteristics	
Impedance	75 Ω
Return Loss	>15 dB
Frequency	70.000 ± 0.0005 MHz
Level	0.0 dBm ±0.5 dB(high level); -15 dBm ± 0.5 dB(low level)
Harmonics	< -30 dBC, max, -35 dBC typ for second and third, <-50 dBC for all others
Spurious	< -60 dBC, max
Synthesizer Characteristics	
Frequency Accuracy	± 0.5 kHz max. over time and temperature, ± 0.25 kHz, typical
Phase Noise (dBC/Hz)	≤ -100, 10 kHz; ≤ -120, 100 kHz; ≤ -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 (W x H x D)	3.3 x 1.2 x 4.0 (in.); 83.8 x 30.5 x 101.6 (mm)
Power	Wall power supply is for 115 VAC, 60Hz and provides +15 VDC, 150 ma
option -P4	covers100-240± 10% VAC, 47-63 Hz. Specify US, EUR, AUS or UK plug

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

XVIII. Cross Technologies, Inc.

Ethernet Interface Installation & Operation

1.0 General Information

This manual applies to Cross Technologies products equipped with a 10/100 Base-T compatible Ethernet interface for control and monitoring of its operating parameters. Option W8 includes an HTML script interface which allows the user to monitor and control product parameters using a standard web browser. Option W18 includes an HTML script interface and SNMP (Simple Network Management Protocol) control. Contact Cross Technologies for the SNMP MIB file.

NOTE: The default, Factory Set IP Address is: 192.168.123.2

1.1 Methods of Connection

1.1.1 Directly Connected to a PC:

For control from a local PC, attach the product's Ethernet port to the Ethernet network connector on the PC using a crossover RJ-45 cable.

1.1.2 LAN Connection

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

1.2 Ethernet Configuration

Each product must be configured with an appropriate IP address, Netmask, and Gateway assigned by your network manager. The product is set at the factory with a static address that is written on a tag attached to the unit. The device server in the product has a built in HTTP based configuration manager that is used to configure network settings. To access the configuration manager open a web browser and enter the IP address of the product in the browser's address field. The window shown in Figure 1-A will appear. As delivered, there is no password set. Choose your user name and password here or leave those fields blank and click OK to proceed to the configuration manager web page.

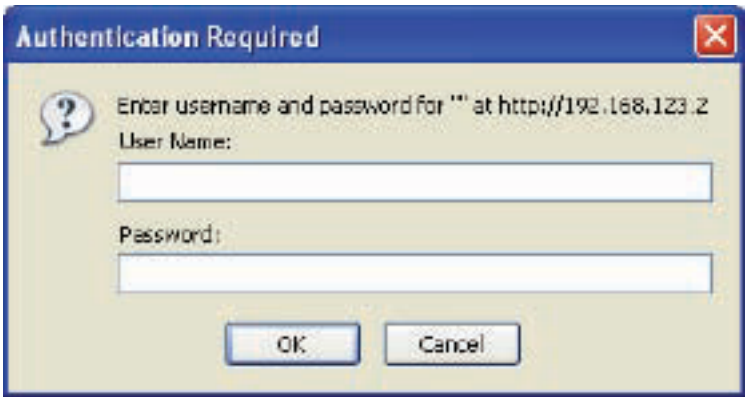


Figure 1-A: Password Screen

Figure 1-B: Configuration Manager Screen

In the left frame of the configuration manager click on Network to display the Network Settings screen. Enter the IP address, Subnet mask, and Gateway address with delimiter dots (example: 192.168.123.2 (Default)). Click to apply settings in the left frame to apply the new settings in the network device.

1.3 Webpage M & C (Options W8 and W18)

Enter the following address in a web browser to access the M & C webpage:
http://<ip address>/serial/0/setup.htm where <ip address> is the IP address of the unit.

Figure 1-C shows the webpage for model number 2016-25-01 frequency converter.

Figure 1-C: Example Webpage

1.4 SNMP Configuration (Option W18)

Setting of SNMP parameters such as Community Write and Community Read strings requires a *Telnet* connection to port 9999. The following instructions explain how to establish such a *Telnet* connection using Windows XP's Hyper Terminal utility .

Start the Hyper Terminal application and select “New Connection” from the “File” drop down

menu. The next screen is a “Connect To” dialog box. Select TCP/IP (Winsock) from the “Connect” drop down menu.

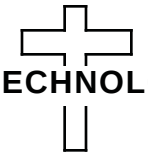
Enter the IP address of the product in the “Host address:” field and 9999 in the “Port number” field.

Figure 1-E shows an example of the Hyper Terminal settings required to access the SNMP configuration menu.

Figure 1-E: Telnet Settings in Hyper Terminal

Once the *Telnet* connection is established you will be prompted to “Press Enter for Setup Mode”. Press enter and a menu of device server configuration options will appear (see Figure 1-F). Select menu item 3, “SNMP configuration.” You will be prompted to enter SNMP community read and write strings. After setting your desired community strings you will be prompted to “Enter IP addresses for SNMP traps.” You must enter at least one and up to four IP addresses of SNMP managers that will access the unit. This is required even though SNMP traps are not implemented. The unit will not process SNMP SET and GET requests from an SNMP manager unless the IP address associated with that manager is entered in the device server.

IMPORTANT: After “save and exit” is selected, the product’s power must be cycled off and on for the SNMP settings to load properly.



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