

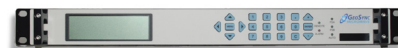
1:1 REDUNDANT RACK MOUNTED HOT SWAPPABLE BLOCK CONVERTERS

HOT SWAPPABLE" BLOCK CONVERTERS, CONVERTER TRAYS WITH INDEPENDENT OPERATION.

These block converter systems provide frequency translation between the transponder band and L-band frequencies.

The 1:1 Redundant System provides automatic and manual switch-over modes of operation.

The two independent converter assemblies are "hot swappable" through the rear of the chassis.



REDUNDANT STANDARD FEATURES

- Hot swappable converter trays with power supplies.
- RS422, RS485 and 10/100 Base-T Ethernet
- Amplitude slope adjust
- Low phase noise, better than IESS-308/309
- Low intermodulation distortion
- 30 dB level control
- Summary Alarm
- Auto/manual mode
- Input power divider, with output switching

REDUNDANT OPTIONS

- Reference clean-up loop and improved stability
- Lower gain
- High Performance Package
- Lower phase noise (included in high performance package)
- Dual reference oscillators
- Input signal switching

BLOCK UPCONVERTERS

Input (GHz)	Output (GHz)	LO (GHz)	Model Number
0.95 - 1.35	2 - 2.4	4.9/3.85	R1U-2.2
0.95 - 1.525	5.85 - 6.425	7.375	R1U-6.1-INV
0.95 - 1.75	5.85 - 6.65	4.9	R1U-6.25
0.95 - 1.825	5.85 - 6.725	4.9	R1U-6.28
0.95 - 1.35	6.7 - 7.1	5.75	R1U-6.9
0.95 - 1.45	7.9 - 8.4	6.95	R1U-8.15
0.95 - 1.45	12.75 - 13.25	11.8	R1U-13
0.95 - 1.7	13.75 - 14.5	12.8	R1U-14.125
0.95 - 1.45	14 - 14.5	13.05	R1U-14.25
0.95 - 1.75	17.3 - 18.1	16.35	R1U-17.7
0.95 - 2.05	17.3 - 18.4	16.35	R1U-17.85
0.95 - 1.25	18.1 - 18.4	17.15	R1U-18.25
0.95 - 1.95	30 - 31	28.05	R1U-30.5

BLOCK DOWNCONVERTERS

Input (GHz)	Output (GHz)	LO (GHz)	Model Number
2 - 2.4	0.95 - 1.35	3.85/4.9	R1D-2.2
3.4 - 4.2	0.95 - 1.75	6.55/9	R1D-3.8
3.7 - 4.2	0.95 - 1.45	6.4/9	R1D-3.95
4.5 - 4.8	0.95 - 1.7	3.55	R1D-4.65
7.25 - 7.75	0.95 - 1.45	6.3	R1D-7.5 ^(Note 1)
10.7 - 11.7	0.95 - 1.95	9.75	R1D-11.2
10.95 - 11.7	0.95 - 1.7	10	R1D-11.35
11.2 - 12	0.95 - 1.75	10.25	R1D-11.6
11.4 - 12.2	0.95 - 1.75	10.45	R1D-11.8
11.45 - 12.25	0.95 - 1.75	10.5	R1D-11.85
11.7 - 12.5	0.95 - 1.75	10.75	R1D-12.1
11.7 - 12.75	0.95 - 2	10.75	R1D-12.225
12.2 - 12.75	0.95 - 1.5	11.25	R1D-12.475
12.2 - 13.25	0.95 - 2	11.25	R1D-12.725
20.2-21.2	0.95 - 1.95	19.25	R1D-20.7

Note: 1. The R*D-7.5 Block Downconverter Incorporates an inter-stage filter to attenuate the transmit frequency. Published performance will be maintained with a presence of a 7.9 GHz signal at a level of -5 dBm.



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CONVERTER SPECIFICATIONS

	UPCONVERTER	DOWNCONVERTER
INPUT CHARACTERISTICS		
Return Loss (50 Ohms)	18 dB minimum	18 dB minimum
Signal Monitor	-20 dBc nominal	
LO Leakage	N/A	-80 dB maximum
OUTPUT CHARACTERISTICS		
Return Loss (50 ohms)	18 dB minimum	18 dB minimum
Signal Monitor	-20 dBc nominal	
Power Output (1 dB Compression)	+13 dBm minimum	+18 dBm minimum
TRANSFER CHARACTERISTICS		
Gain	33 dB, ± 3 dB	36 dB, ± 3 dB
RF-band Level Control	15 dB in 0.2 dB steps	
L-band Level Control	30 dB in 0.2 dB steps	
Level Stability	± 0.25 dB maximum constant temperature	
Amplitude Response	± 0.25 dB/40 MHz maximum, ± 1 dB maximum over RF frequency band	
Slope Adjust	0 to 6 dB	
Noise Figure at Minimum Attenuation	N/A	15 dB maximum
Noise Power Density	-125 dBm/Hz maximum	N/A
Image Rejection	60 dB minimum	
Third Order Intermodulation Distortion	50 dBc minimum	60 dBc minimum
With two inband signals each at	(+25 dBm IP3)	(+30 dBm IP3)
0 dBm, measured at the output		
Spurious Outputs (Inband)	65 dBc minimum up to 0 dBm output	
Signal Related	(including 2 x1 spurious on 1 GHz IF bandwidth units)	
Signal Independent	75 dBm maximum	
Maximum Phase Noise (dBc/Hz) -		
With Maximum Reference Phase Noise:		
10 Hz: -120 dBc/Hz		
100 Hz: -145 dBc/Hz		
1 kHz: -160 dBc/Hz		
Frequency Stability	$\pm 2 \times 10^{-8}$, 0° to 50°	
Frequency Aging	5 x 10 ⁻⁹ /Day after 24 hours on time	
Automatic Reference Configuration	External 5 or 10 MHz at +4 ± 3 dBm. If external reference is below +1 dBm nominal, the converter will automatically lock to the internal reference.	
Converter Mute	60 dB minimum on summary alarm or mute command.	

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REMOTE CONTROLS

Serial Interface	RS485/RS422
Ethernet Interface	10/100 Base-T Ethernet
	- HTTP-based web server - SNMP1.0 configuration - Telnet Access - Password protection

INDICATOR and ALARMS

Remote Mode	Green LED (front panel)
Alarm	Red LED (front panel)
Summary Alarm	Contact closure/open for DC voltage and local oscillator

Note: Performance specifications do not include redundancy configuration. Specifications apply to converter tray at 23°C. Please refer to switch specifications.

OPTIONS (1/4)

30-1. High Performance Package -

Power Output (1 dB Compression)	+20 dBm minimum
Gain Slope	0.03 dB/MHz maximum
Level Stability	±0.25 dB/day maximum at constant temperature, 1.0 dB peak-to-peak maximum, 0 to 50°C
Group Delay	1 ns peak-to-peak maximum
Spurious Outputs (Inband)	
Signal Related	65 dBc minimum at 0 dBm output
Signal Independent	-80 dBm maximum
Image Rejection	80 dB minimum
Intermodulation Distortion (Third Order)	With two inband signals at 0 dBm output each, third order inter-modulation products are less than 60 dBc minimum.
Noise Spectral Density	-85 dBm/4 KHz maximum
AM/PM Conversion (at 0 dBm output)	0.1°/dB maximum
Upconverter Mute	80 dB minimum on summary alarm, external mute input control or remote control.

High Performance Phase Noise (dBc/Hz maximum, not available with Multi-band units) -

	Offset (Hz)					
LO Frequency	10	100	1K	10K	100K	1M
<6.7 GHz	-54	-78	-108	-116	-119	-136
<12 GHz	-48	-73	-103	-112	-115	-132
<17.15 GHz	-47	-70	-100	-108	-111	-128
<17.15 GHz	-52	-67	-98	-106	-109	-126
<17.15 GHz	-47	-64	-94	-102	-107	-124



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OPTIONS (2/4)

30-1A. High Dynamic Range -

Power output (1 dB compression)

Group delay

20 dBm minimum

1 ns peak-to-peak maximum

30-2. Lower Gain

20 $\pm$ 3 dB at 23°C, 18 dB noise figure

(20 dB noise figure for upconverters with 1 GHz bandwidth)

(2 x 1 signal related, 65 dBc at -10 dBm output)

30-3. Lower Gain

10 $\pm$ 3 dB at 23°C, 20 dB noise figure

(22 dB noise figure for upconverters with 1 GHz bandwidth)

(2 x 1 signal related, 65 dBc at -10 dBm output)

30-4. Reference Clean-up Loop and Improved Frequency Stability

Reference oscillator acts as an analog phase lock with a 0.1 Hz nominal loop bandwidth.

Typical loop suppression of the external reference is as follows:

28 dB at 1 Hz offset; 65 dB at 10 Hz offset and 100 dB at 100 Hz offset

Frequency Stability: $\pm 2 \times 10^{-9}$, 0 to 50°C

Frequency Aging: 1×10^{-9} per day after 24 hours operation preceded by 10 days operation.

30-4A. Reference Clean-up Loop

Reference oscillator acts as an analog phase lock with a 40 Hz nominal loop bandwidth.

Typical loop suppression of the external reference is as follows:

24 dB at 100 Hz offset

Frequency Stability: $\pm 2 \times 10^{-8}$, 0 to 50°C

Frequency Aging: 1×10^{-9} per day after 24 hours operation preceded by 10 days operation.

30-5. Dual reference

30-6. Off Line Access

Each RF tray includes one reference oscillator

Adds second switch to 1:1 redundant configurations to provide off-line converter access.

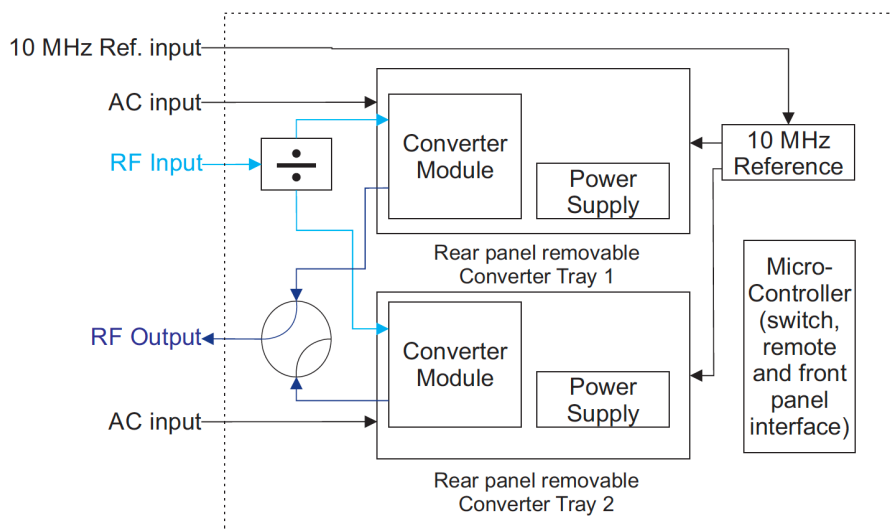




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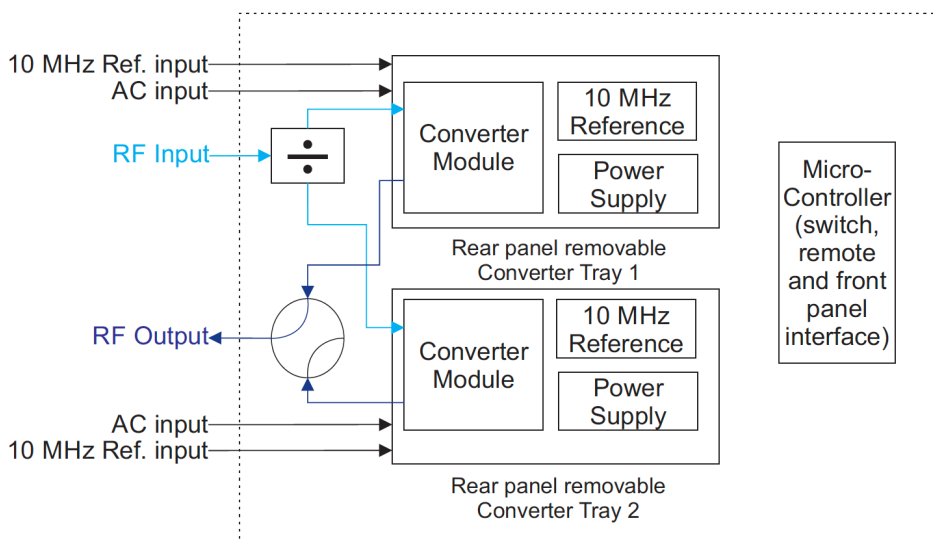
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OPTIONS (3/4)



Standard redundant configuration

- Lowest cost, Lowest reliability - Both converters at risk from reference failure, No standby unit access



Option 30-5 redundant configuration

- Higher cost, Best reliability, No standby unit access



EUROSATCOM
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3 avenue du Canada, bât. Zeta, 91940 Les Ulis, France

+33 1 69 18 19 30

www.eurosatcom.eu

sales@eurosatcom.eu

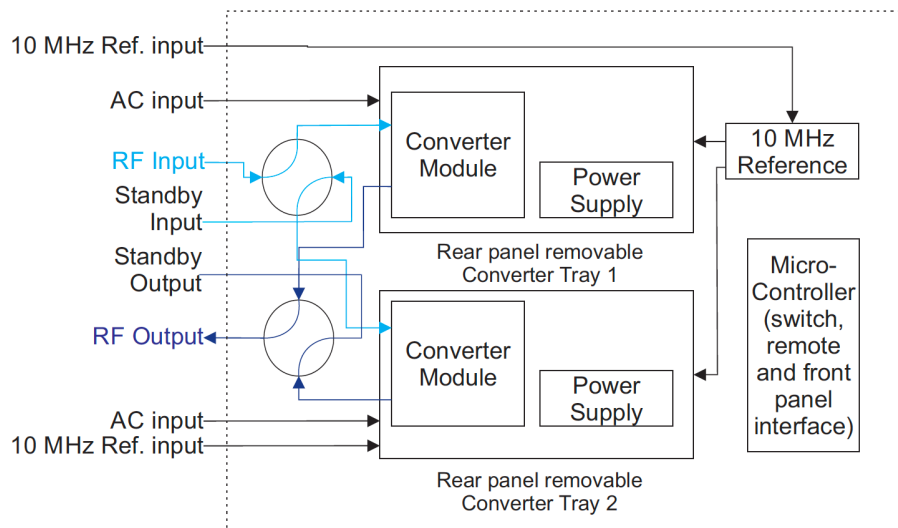




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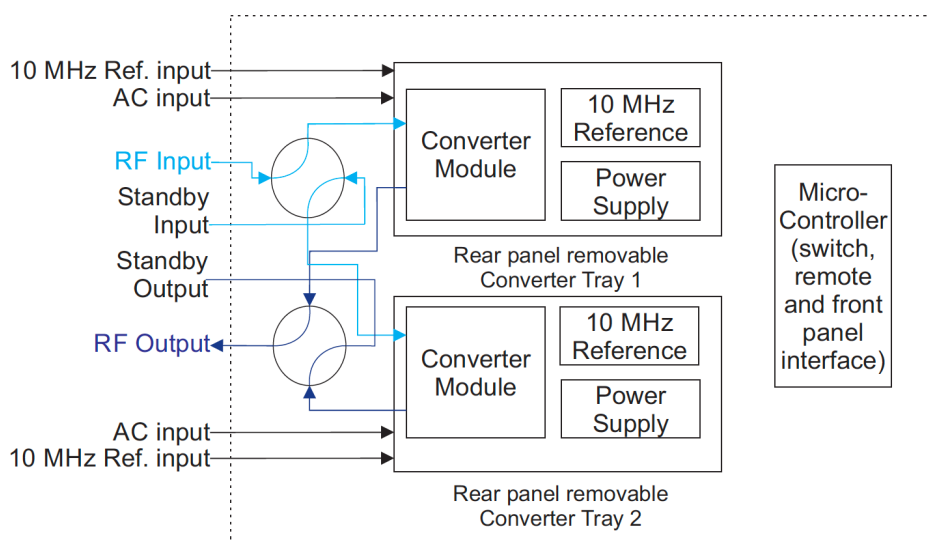
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OPTIONS (4/4)



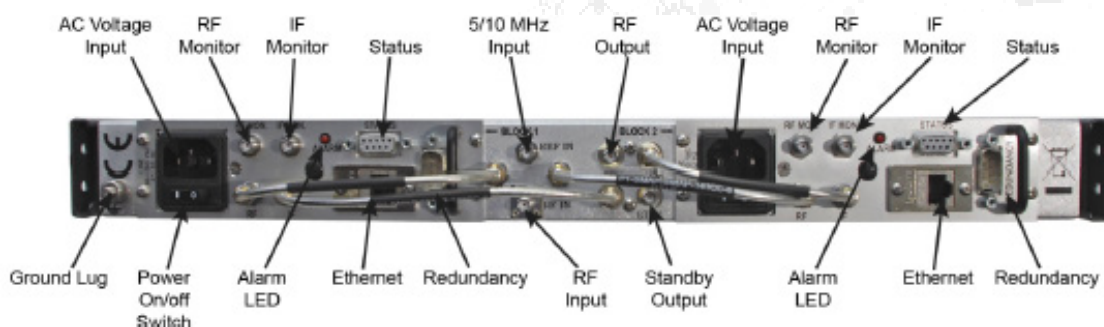
Option 30-5 redundant configuration

- Low cost, Lowest reliability - Both converters at risk from reference failure, Standby unit access



Options 30-4 and 30-5 redundant configuration

- Highest cost, Best reliability, Standby unit access



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3 avenue du Canada, bât. Zeta, 91940 Les Ulis, France

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www.eurosatcom.eu

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SWITCH SPECIFICATIONS

Frequency (GHz)	Insertion Loss (Maximum, dB)	Amplitude Flatness/40 MHz	Return Loss (Minimum, dB)	Isolation (Minimum, dB)	Switch Connector
0.05-0.180	0.1	0.2	26	80	SMA
0.95-3.0	0.2	0.2	20	80	SMA
3.0-8.0	0.3	0.3	17	70	SMA
8.0-12.4	0.4	0.3	15	60	SMA
12.4-18.4	0.5	0.4	13	60	SMA
18.4-26.5	0.7	0.5	11	55	2.9 mm
26.5-31	1.0	0.6	9.5	50	2.9 mm

Note: RF specifications apply to a single switch. IF switches (BNC female) are 50-180 MHz.

PRIMARY POWER REQUIREMENTS

Voltage	90-250 VAC
Frequency	47-63 Hz
Power Consumption	40W typical
Fuses	T1.5A

SUMMARY ALARM

Contact closure/open for DC voltage and/or amplifier alarm.
Status alarm readout on remote control bus.

PHYSICAL

Weight	10 pounds (4.5 kg), nominal without rack slides 14 pounds (6.4 kg), nominal with rack slides
Chassis Dimensions	19" x 1.75" panel height x 20" maximum
Connectors	
RF	SMA female
Summary	DE-9P
Remote Interface	DE-9S for RS422, RS485 RJ-45 female for Ethernet
Primary Power	IEC-320

ENVIRONMENTAL

Operating

Ambient Temperature	0 to 50°C
Relative Humidity	Up to 95% at 30°C
Altitude	Up to 10,000 feet

Non-operating

Ambient Temperature	-50 to +70°C
Relative Humidity	Up to 95% at 40°C
Altitude	Up to 40,000 feet
Shock and Vibration	Normal handling by commercial carriers

L-Band Slope Adjustment

