

This series of Outdoor Block Upconverters provides one RF composite output covering 2 satellite transponder frequencies and accepts 2 separate & independent L-band IF inputs in an integral, self-contained weather proof package designed for outdoor antenna mounting.

Ka-band, Ku-band and C-band models are available covering the entire SatCom bands. A companion series of Down Converters is also available, as are reverse band models.

A strong set of monitor and control functions provides powerful remote control capability via either RS422/485 or 10/100BaseT Ethernet. A contact closure summary alarm is provided for fault monitoring.

The standard phase noise is superior to IESS-308/309 and options are available for lower phase noise surpassing the phase noise requirements of MIL-STD-188-164B.



## STANDARD FEATURES

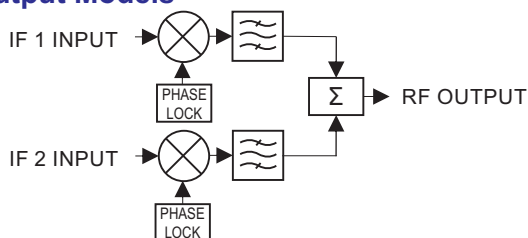
- Single wideband RF output with 2 independent IF inputs
- Small-size weather resistant enclosure
- Amplitude slope adjust
- RS422, RS485 and 10/100 Base-T Ethernet
- Serial output for Redundancy Switchover units
- RF and L-band monitor ports
- Automatic 5/10 MHz internal/external reference selection
- Electronic adjust of internal reference frequency
- IESS-308/309 phase noise
- Low intermodulation distortion
- 64 programmable memory locations
- 45 dB of independent RF and L-band level control
- Mute function on alarm or external mute input command
- Elapsed time and event log after power turn on
- CE Mark and RoHS

## BLOCK UP CONVERTERS

Output (GHz)	Input (GHz)	LO (GHz)	Model Number
12.75-13.25	0.95-1.45	11.8	UBE2-13.625
13.75-14.5	0.95-1.7	12.8	
12.75-13.75	0.95-1.95	11.8	UBE2-13.6
13.75-14.5	0.95-1.7	12.8	
28.0-29.0	0.95-1.95	27.05	UBE2-29
29.0-30.0	0.95-1.95	28.05	

## BLOCK DIAGRAM

### Dual Output Models -



## OPTIONS

- High performance package
- Lower gain
- Reference clean-up loop and improved stability
- Lower phase noise
- RF waveguide inputs

## SPECIFICATIONS

Return Loss (50 Ohms)	18 dB minimum
Signal Monitor	-20 dBc nominal

### OUTPUT CHARACTERISTICS -

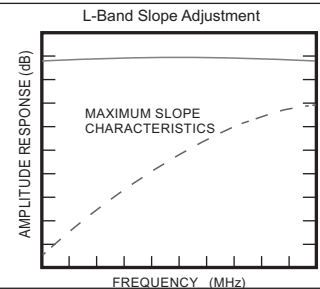
Return Loss (50 ohms)	18 dB minimum
Signal Monitor	-20 dBc nominal
Power Output (1 dB Compression)	+15 dBm minimum (note our standard is 13dBm)

### TRANSFER CHARACTERISTICS -

Gain	27 dB, $\pm 3$ dB at center frequency						
L-band Level Control	30 dB in 0.2 dB steps						
RF-band Level Control	15 dB in 0.2 dB steps						
Level Stability	$\pm 0.25$ dB over any 20°C, $\pm 1.5$ dB over -40° to 60°C						
Amplitude Response	$\pm 0.25$ dB/40 MHz maximum, $\pm 1$ dB maximum over RF frequency band						
Slope Adjust	0 to 6 dB minimum						
Noise Figure at Minimum Attenuation	15 dB maximum at maximum gain, single band						
Image Rejection	60 dB minimum						
Third Order Intermodulation Distortion With two inband signals each at 0 dBm, measured at the output	50 dBc minimum (+25 dBm IP3)						
Spurious Outputs (Inband) –							
Signal Related up to 0 dBm output	65 dBc minimum						
Signal Independent	-75 dBm maximum						
Signal Harmonic Related up to -10 dBm output	55 dBc minimum (including 2nd harmonic)						
Maximum Phase Noise (dBc/Hz) –	Offset (Hz)						
With Maximum Reference Phase	LO Frequency	10	100	1K	10K	100K	1M
10 Hz: -120 dBc/Hz	6.7 to 12 GHz	-65	-73	-85	-95	-104	-119
100 Hz: -145 dBc/Hz	16 to 20 GHz	-60	-70	-85	-85	-92	-112
1 KHz: -160 dBc/Hz	Up to 30 GHz	-47	-65	-78	-85	-87	-110
Frequency Stability	$\pm 5 \times 10^{-8}$ , -40° to +60°C (reference 25°C)						
Frequency Aging	$5 \times 10^{-9}$ /day after 24 hours on time						
Automatic Reference Configuration	External 5 or 10 MHz at +4 $\pm 3$ 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.						

### REMOTE CONTROLS

Serial Interface	RS485/RS422
Ethernet Interface	10/100Base-T Ethernet <ul style="list-style-type: none"> <li>• HTTP-based web server</li> <li>• Telnet access</li> <li>• Password protection</li> </ul>



### INDICATORS and ALARMS

Status Indicator	Red LED: Alarm, Yellow LED: External Reference
Power ON Indicator	Green LED
Summary Alarm	Contact closure/open for DC voltage and local oscillator (programmable LNA current alarm on downconverters +12VDC at 250 mA )

Note: All specifications are at maximum gain unless otherwise noted.

## OPTIONS

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### 41-1. High Performance Package -

Gain.....	27 ±1 dB
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 maximum/-40 to 60°C
Spurious Outputs (Inband)	
Signal Related .....	-65 dBc minimum at 0 dBm output
Signal Independent .....	-80 dBm maximum
Local Oscillator Leakage.....	-70 dBm maximum (upconverters only)
Image Rejection .....	80 dB minimum

### High Performance Phase Noise (dBc/Hz, maximum)

LO Frequency	Offset(Hz)					
	10	100	1K	10K	100K	1M
≤ 12 GHz	-60	-78	-105	-112	-117	-136
≤ 20 GHz	-42	-67	-98	-106	-109	-126
≤ 30 GHz	-41	-64	-94	-102	-107	-124

Group delay.....	1 ns maximum peak to peak/RF band segment
Mute .....	80 dB minimum on summary alarm or mute command
Intermodulation Distortion (Third Order) .....	With two inband signals at 0 dBm output, third order intermodulation products are less than 60 dBc minimum.
AM/PM Conversion (at 0 dBm Output).....	0.1°/dB maximum

41-1A High Performance Phase Noise only. Standard IF/RF performance.

Note: Consult factory for lower phase noise options.

41-2. Lower Gain.....	20 ±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)
41-3. Lower Gain.....	10 ±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)
41-4. 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: ±5 x10 <sup>-9</sup> , -40 to 60°C Frequency Aging: 1 x 10 <sup>-9</sup> per day after 24 hours operation preceded by 10 days operation

41-6. MIL-STD-188-164B Compliant Phase Noise

## PRIMARY POWER REQUIREMENTS

Voltage..... 90-250 VAC  
 Frequency..... 47-63Hz  
 Consumption ..... 40W typical  
 Fuse..... T1.25A

## PHYSICAL

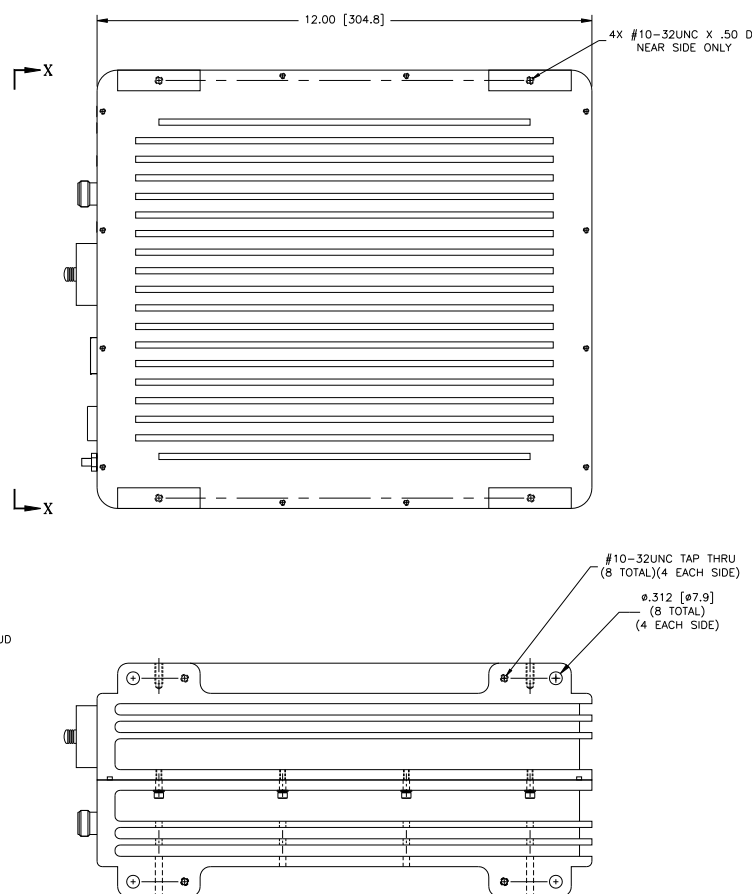
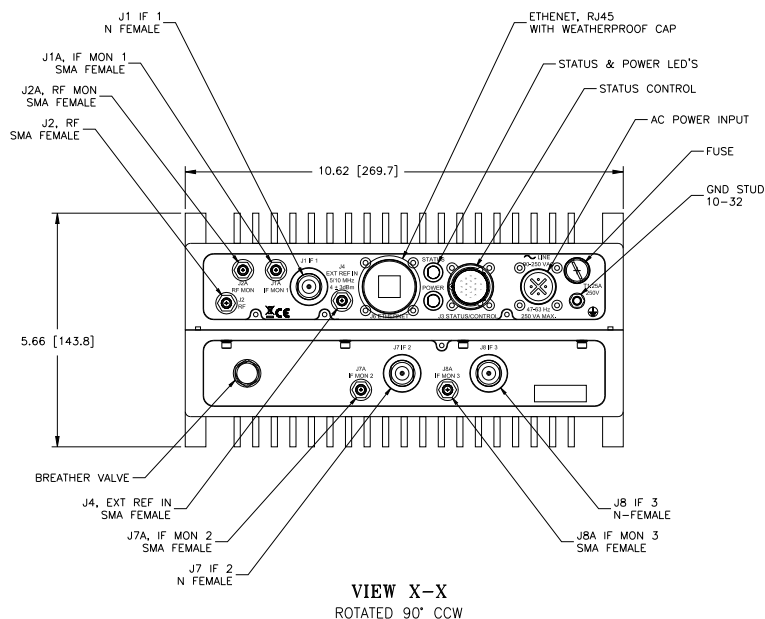
Weight ..... 22 pounds (10 kg) nominal

### Connectors-

RF ..... SMA female below 22 GHz, 2.92 mm female  
 L-band ..... N female  
 RF Monitor ..... SMA female compatible  
 L-band Monitor ..... SMA female  
 External Reference ..... SMA female  
 Status/Control Interface ..... MS3116F14-18P type for summary alarm, RS422, RS485, and LNA power  
 Remote Interface ..... RJ-45 female for Ethernet RS485 available on Status connector  
 Primary Power ..... FCI clipper series CL1M1102

## ENVIRONMENTAL

Enclosure Rating ..... IP-65  
 Operating-  
 Ambient Temperature ..... -40 to 60°C  
 Altitude ..... Up to 10,000 feet  
 Non-operating-  
 Ambient Temperature ..... -50 to 70°C  
 Altitude..... Up to 40,000 feet  
 Shock and Vibration ..... Normal handling by commercial carriers



Typical Outline (with option 41-1)

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