High-Value Outdoor Communication Converters

Output Frequency (GHz)	Input Frequency (GHz)	Model Number
Upconverters		
5.725 – 6.725		U-173-6
7.9 – 8.4		U-174
12.75 – 13.25		U-175-2
13.75 – 14.5		U-176-3
17.3 – 18.4		U-177-2
Downconverters		
	3.4 – 4.2	D-121-1
	4.5 – 4.8	D-122-2
	7.25 – 7.75	D-125
	10.95 – 12.75	D-128-3

Upconverter RF Band (GHz)	Downconverter RF Band (GHz)	Model Number
Independent RF Frequency Control Up/Downconverters		
5.845 – 6.430	3.4 – 4.2	U/D-173-1/121-1
7.9 – 8.4	7.25 – 7.75	U/D-174/125
13.75 – 14.5	10.95 – 12.75	U/D-176-3/128-3
17.3 – 18.1	12.2 – 12.75	U/D-177-1/130
Shared RF Local Oscillators Up/Downconverters		
5.850 – 6.425	3.625 – 4.2	U/D-153
14.0 – 14.5	11.7 – 12.2	U/D-156
14.0 – 14.5	12.25 – 12.75	U/D-156-2

The frequency difference between upconverter output and downconverter input is 2225 MHz for the U/D-153, 2300 MHz for the U/D-156 and 1750 MHz for the U/D-156-2.

The high-value 100 Series of synthesized frequency converters are designed for both single and redundant operation in an outdoor environment. An internal synthesizer provides frequency tuning. All units are fully compliant with INTELSAT requirements IESS-308/309.

In addition to an RS485 or RS422 remote monitor and control port, each unit has an RS232 local control port. A robust feature set is provided with the local control software that communicates with the converter via a COM port on an IBM compatible PC.

Features

- **Compact outdoor unit**
- **Low phase noise**
- **Dual conversion**
- **Low intermodulation distortion**
- **No spectral inversion**
- **Simple control via RS232 remote**
- **Remote control via RS485**
- **Monitoring of the SSPA detected DC output level (upconverter only)**
- **Monitoring of the supplied LNA power (downconverter only)**
- **Simple installation**
- **Temperature compensated gain**
- **Separate up/downconverter summary alarm outputs**
- **Remote reference oscillator adjust**
- **Time-stamped alarm history**
- **System temperature monitor**

Specifications	Upconverters	Downconverters
Type	Dual conversion	
Tunability	125 kHz minimum step size	
Frequency sense	No inversion	
IF characteristics		
Frequency	70 ±20 MHz (140 ±40 MHz available as an option)	
Impedance	75 ohms (50 ohms optional)	
Return loss	23 dB minimum	
Signal monitor	-20 dBc nominal	
RF characteristics		
Frequency	Refer to model number table	
Impedance	50 ohms	
Return loss	20 dB minimum	
Power output (1dB compression)	+10 dBm minimum	
Downconverter LO leakage	-80 dBm maximum at input port	
Transfer characteristics		
Gain (minimum attenuation)	26 dB nominal (with RF output above 8.5 GHz) 30 dB nominal (with RF output below 8.5 GHz)	45 dB nominal (higher gain option available)
Image rejection	80 dB minimum	
Level stability		
Constant temperature	±0.25 dB/day at constant temperature	
Operating temperature range	±1.0 dB ±0.5 dB typical	±1.5 dB
Noise figure	18 dB typical, 25 dB maximum	12 dB typical, 15 dB maximum
Amplitude response	±0.35/±20 MHz	
Group delay (±18 MHz)		
Linear	0.03 ns/MHz maximum	
Parabolic	0.01 ns/MHz^2 maximum	
Ripple	1 ns peak-to-peak maximum	
Intermodulation distortion (third order)	With two 0 dBm output signals, 40 dBc minimum	
Spurious outputs		
Signal related	60 dBc minimum	
Signal independent	-70 dBm maximum	
Gain adjustment	30 dB in 0.2 dB steps	
Frequency stability	±5 x 10^{-8}, -30 to +60°C (higher stability options available), 5 x 10^{-9}/day typical (fixed temperature after 24 hour on time)	
Automatic reference configuration	External 5 or 10 MHz input (+4 ±3 dBm) is provided. If external reference is below +1 dBm nominal, the converter will automatically lock to the internal reference.	
Upconverter mute	60 dB minimum	

General Specifications

Primary Power Requirements

Voltage ..... 90–250 VAC
Frequency ..... 47–63 Hz
Power consumption
  Up or downconverter units ..... 80 W typical
  Combined up/downconverter ..... 120 W typical

Summary Alarm

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

Physical

Converter enclosure ..... Refer to outline drawing
RF connectors ..... SMA female
IF connectors ..... N female
External reference connector ..... BNC female
SSPA/LNA interface mating connector MS3116F12-8P*
Redundancy interface mating connector MS3116F14-18P*
Status interface mating connector MS3116F12-10S*
Local control (RS232) interface mating connector MS3116F10-6P*
AC input connector ..... FCI Clipper series CL1M1102*
(Clipper series is interchangeable with MIL-C-5015 and AMP CPC product)

*Note: Unit supplied with mating connector.

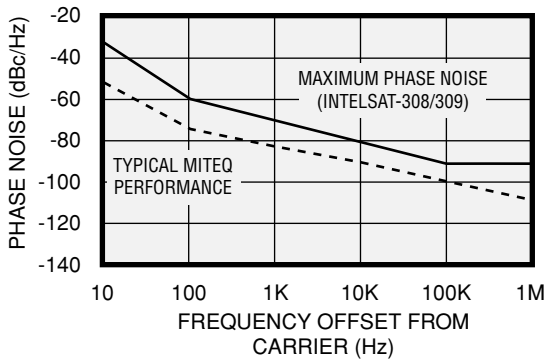
Converter enclosure weight
  Up or downconverter units ..... 22 (9.9 kg) pounds typical
  Combined up/downconverters ..... 30 (13.6 kg) pounds typical

Environmental

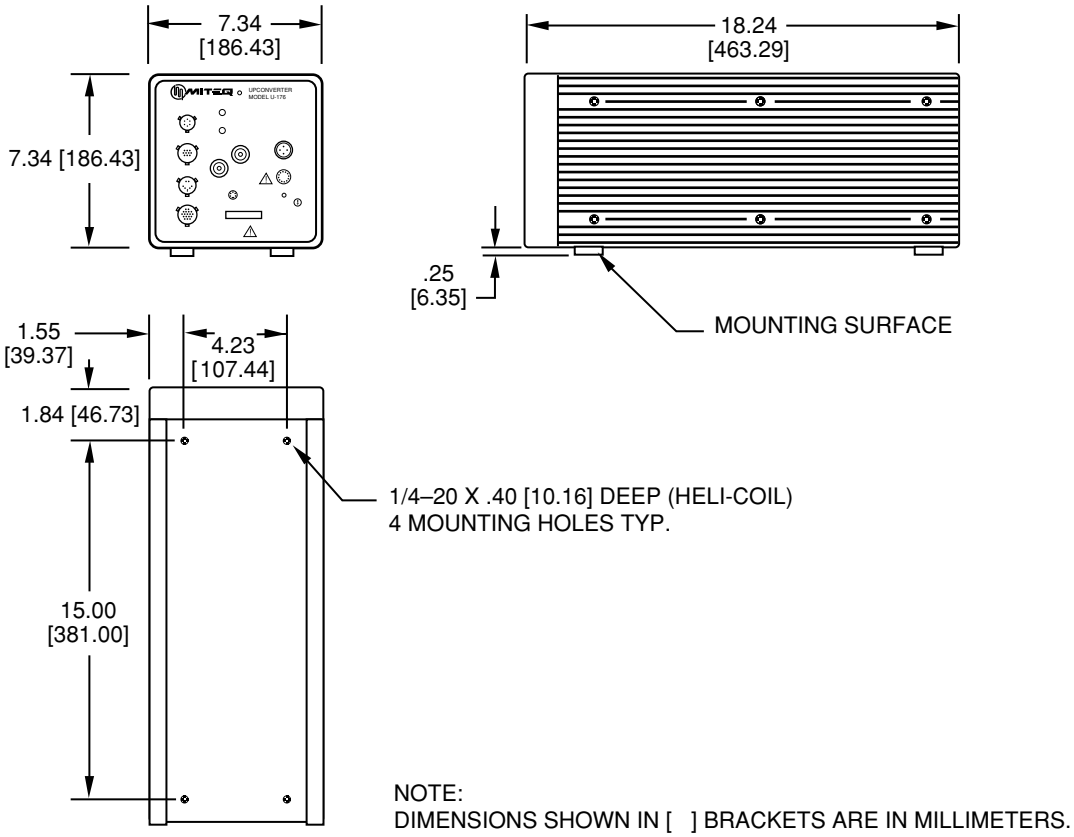
Operating
  Ambient temperature ..... -30 to +60°C
  Atmospheric pressure ..... Up to 10,000 feet
Nonoperating
  Temperature ..... -50 to +70°C
  Atmospheric pressure ..... Up to 40,000 feet
  Shock and vibration ..... Normal handling by commercial carriers

Phase Noise Specifications

TYPICAL PHASE NOISE CHARACTERISTICS (1.0 Hz BANDWIDTH)

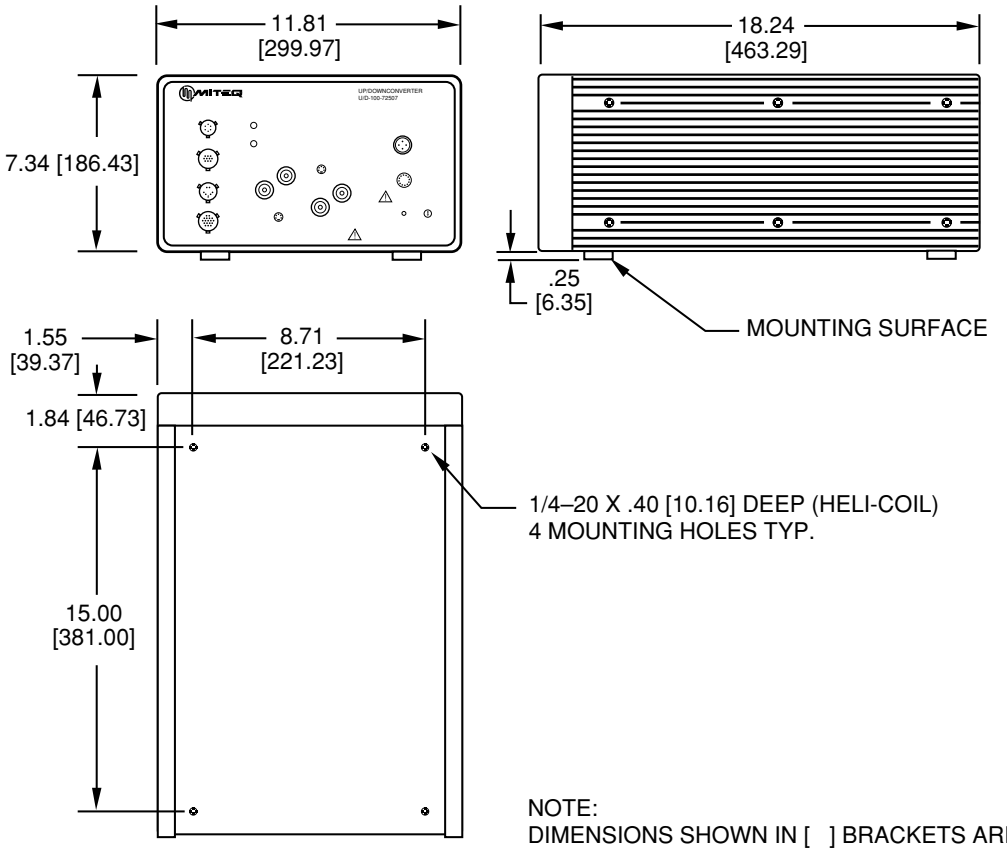


Up or Downconverter Outline Drawing



NOTE:
DIMENSIONS SHOWN IN [ ] BRACKETS ARE IN MILLIMETERS.

Up/Downconverter Outline Drawing



NOTE:
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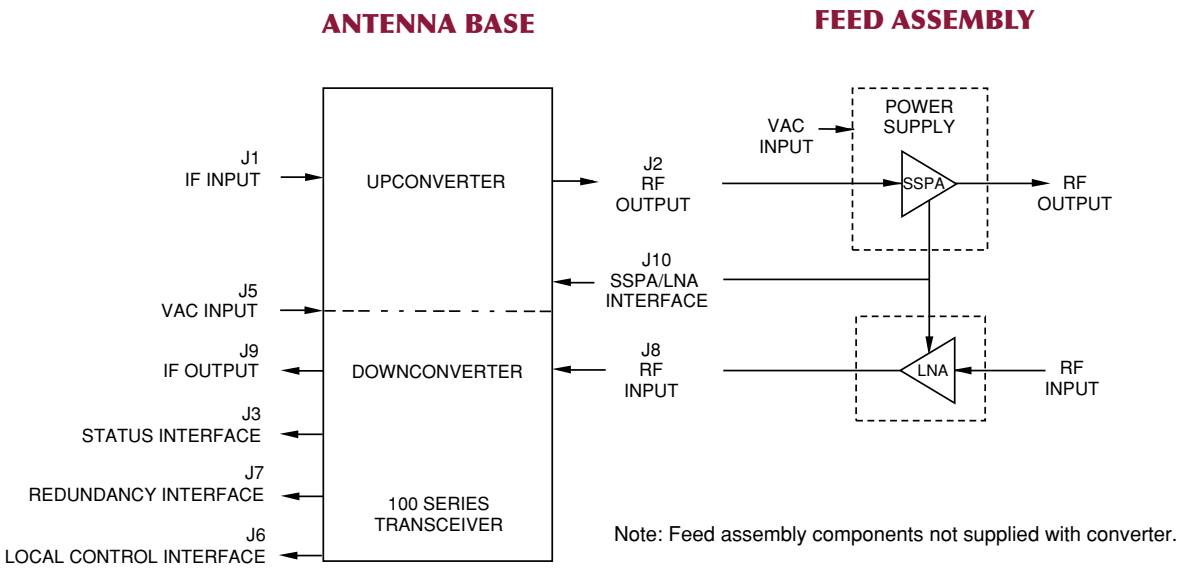
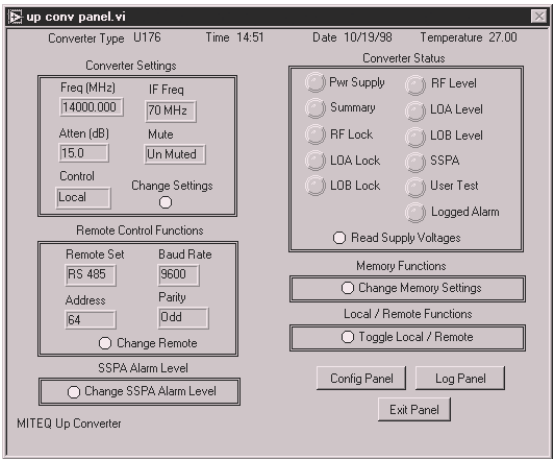
System Diagram



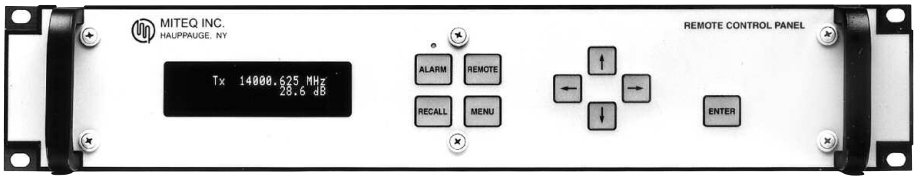
Note: Feed assembly components not supplied with converter.

Control Options



Robust software feature set
(supplied as standard)

Weather resistant
hand-held control unit
MITEQ Model Number HCT-100
(sold separately)



19" Rack-mount control unit, 2 RU
MITEQ Model Number RCT-100
(sold separately)

Options

2. RF Signal Monitor (RF connector (SMA) with -20 dBc nominal level).

4. 140 MHz IF frequency.
Bandwidth: 80 MHz minimum
Flatness: 0.75 dB/76 MHz
Group delay (±36 MHz)
Linear: 0.025 ns/MHz
Parabolic: 0.0035 ns/MHz^2
Ripple: 1 ns peak-to-peak
IF return loss (140 ±40 MHz): 20 dB minimum
Gain slope: 0.04 dB/MHz maximum (10 MHz minimum)

10. Higher frequency stability reference.
B. ±1 x 10^{-8}, -30 to +60°C,
1 x 10^{-9}/day typical (fixed temperature after 24 hour on time).
C. ±5 x 10^{-9}, -30 to +60°C,
1 x 10^{-9}/day typical (fixed temperature after 24 hour on time).

15. 50 ohm IF impedance.

16. Higher gain option (downconverters only).
C. 55 dB nominal RF/IF gain.
Specification of signal independent spurious increases with increase in IF/RF gain (e.g., if without option, specification is -90 dBm maximum, an increase of 10 dB in gain will result in signal independent spurious of -80 dBm maximum).

17. Remote control.
A. RS422.
Note: All units are supplied with an RS232 local control interface.

26. Pressurization.
Converter enclosures capable of 0.5 PSI.
Leak rate 3.0 standard cubic feet per hour maximum.

Notes: Missing option numbers are not applicable for this product.

For literature describing local control and remote control (bus protocols), refer to MITEQ's Technical Note 25T032.

For SATCOM low-noise amplifiers, refer to MITEQ's Catalog C-23B.

100 Davids Drive, Hauppauge, NY 11788
TEL.: +1-631-436-7400 • FAX: +1-631-436-7431
www.miteq.com

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