



# Ka-BAND OUTDOOR COMMUNICATION CONVERTERS



## FEATURES

- Compact outdoor unit
- Low phase noise
- Dual conversion
- Low intermodulation distortion
- No spectral inversion
- Simple local control via RS232
- 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

The 100 Series of synthesized frequency converters are designed for both single and redundant operation in an outdoor environment. An internal synthesizer provides frequency tuning.

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.

## SPECIFICATIONS

### UPCONVERTERS

#### Output Frequency (GHz)

#### 125 kHz Step Size Model Number

28.0 – 29.1	U-158
29.0 – 30.25	U-158-1
30.0 – 31.0	U-158-2
27.5 – 31.0	U-158-3

### DOWNCONVERTERS

#### Input Frequency (GHz)

#### 125 kHz Step Size Model Number

17.7 – 18.8	D-113
18.8 – 19.3	D-113-1
19.2 – 20.2	D-113-2
20.0 – 21.2	D-113-3
17.7 – 21.2	D-113-4

### INDEPENDENT RF FREQUENCY CONTROL UP/DOWNCONVERTERS

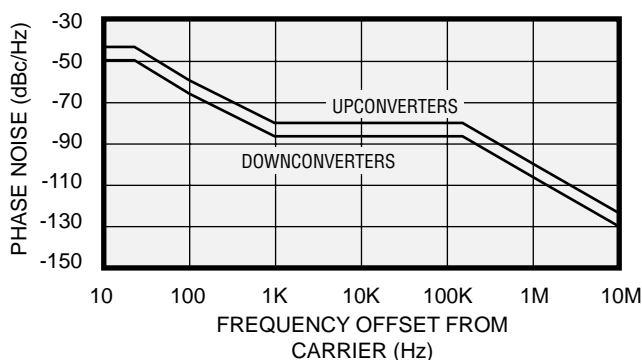
#### Upconverter RF Band (GHz)

#### Downconverter RF Band (GHz)

#### 125 kHz Step Size Model Number

28.0 – 29.1	17.7 – 18.8	U/D-158/113
29.0 – 30.25	18.8 – 19.3	U/D-158-1/113-1
29.0 – 30.25	19.2 – 20.2	U/D-158-1/113-2
30.0 – 31.0	19.2 – 20.2	U/D-158-2/113-2
27.5 – 31.0	17.7 – 21.2	U/D-158-3/113-4

### TYPICAL PHASE NOISE CHARACTERISTICS (1.0 Hz BANDWIDTH)



These phase noise curves are of typical performance for a group of converters. If a specific phase noise is required for a converter, please consult the factory.

## SPECIFICATIONS (CONT.)

Type .....	Dual conversion
Tunability .....	Refer to model number table
Frequency sense .....	No inversion
IF characteristics	
Frequency .....	70 $\pm$ 20 MHz (140 $\pm$ 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.....	18 dB minimum
Power output (1 dB compression) .....	+10 dBm minimum
Downconverter LO leakage .....	-80 dBm maximum at input port
Transfer characteristics	
Gain (minimum attenuation) .....	26 dB nominal (upconverters), 45 dB nominal (downconverters) (higher gain option available)
Image rejection .....	80 dB minimum
Level stability	
Constant temperature .....	$\pm$ 0.25 dB/day at constant temperature
Operating temperature range .....	$\pm$ 1.0 dB (upconverters), $\pm$ 0.5 dB typical (upconverters), $\pm$ 1.5 dB (downconverters)
Noise figure.....	18 dB typical, 25 dB maximum (upconverters), 15 dB typical, 18 dB maximum (downconverters)
Amplitude response .....	$\pm$ 0.35/ $\pm$ 20 MHz
Group delay ( $\pm$ 18 MHz)	
Linear.....	0.03 ns/MHz maximum
Parabolic.....	0.01 ns/MHz <sup>2</sup> 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 .....	$\pm$ 5 x 10 <sup>-8</sup> , -30 to +60°C (higher stability options available), 5 x 10 <sup>-9</sup> /day typical (fixed temperature after 24 hour on time)
Automatic reference configuration .....	External 5 or 10 MHz input (+4 $\pm$ 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, auto selectable
Frequency.....	47–63 Hz
Power consumption	
Up or downconverter units.....	80 W typical
Combined up/downconverters.....	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 .....	WR-28 (upconverter) (SMA compatible optional), SMA compatible (downconverter) (WR-42 optional)
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.....	36 pounds typical (Outline, Figure 1)
Combined up/downconverters.....	55 pounds typical (Outline, Figures 2 and 3)

### 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

# UP OR DOWNCONVERTER OUTLINE DRAWING

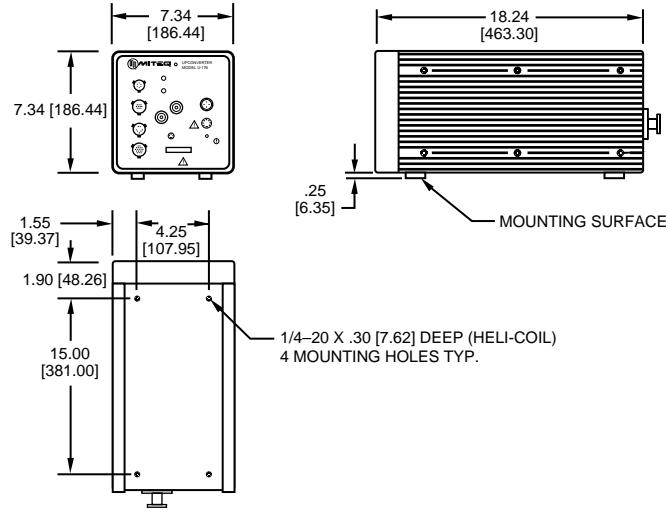


FIGURE 1

# UP/DOWNCONVERTER OUTLINE DRAWING

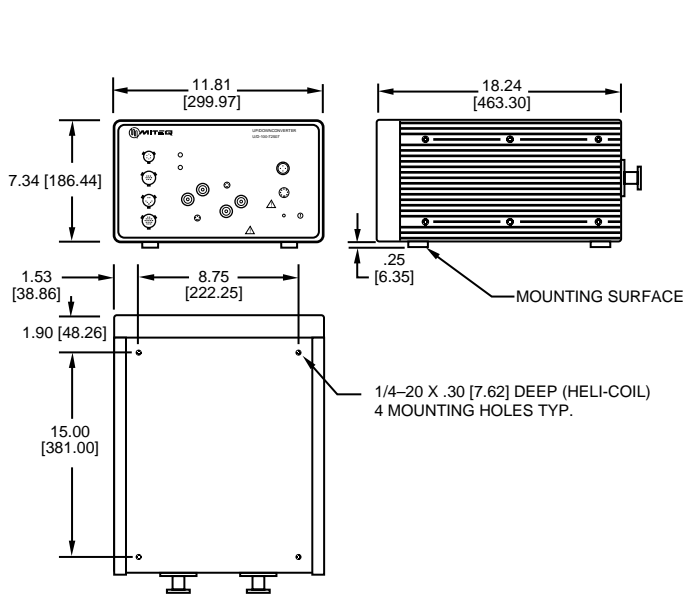


FIGURE 2

## U/D-158-3/113-4

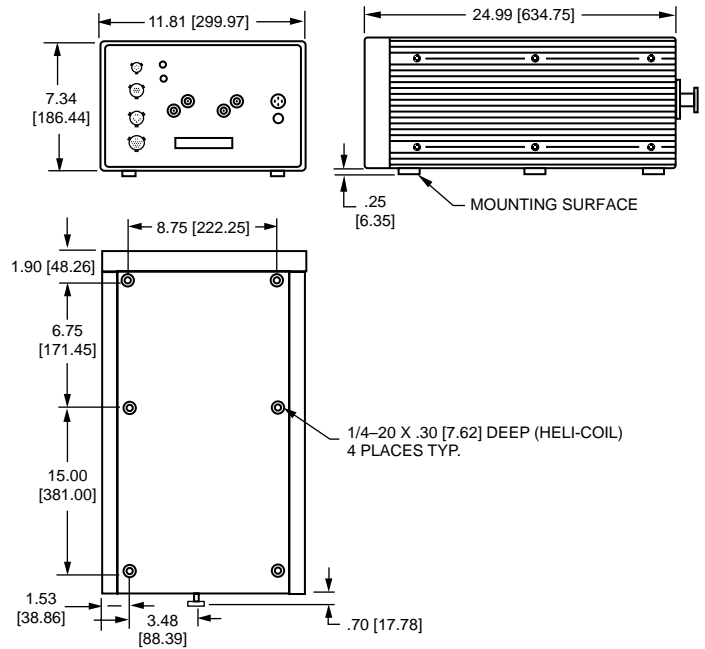


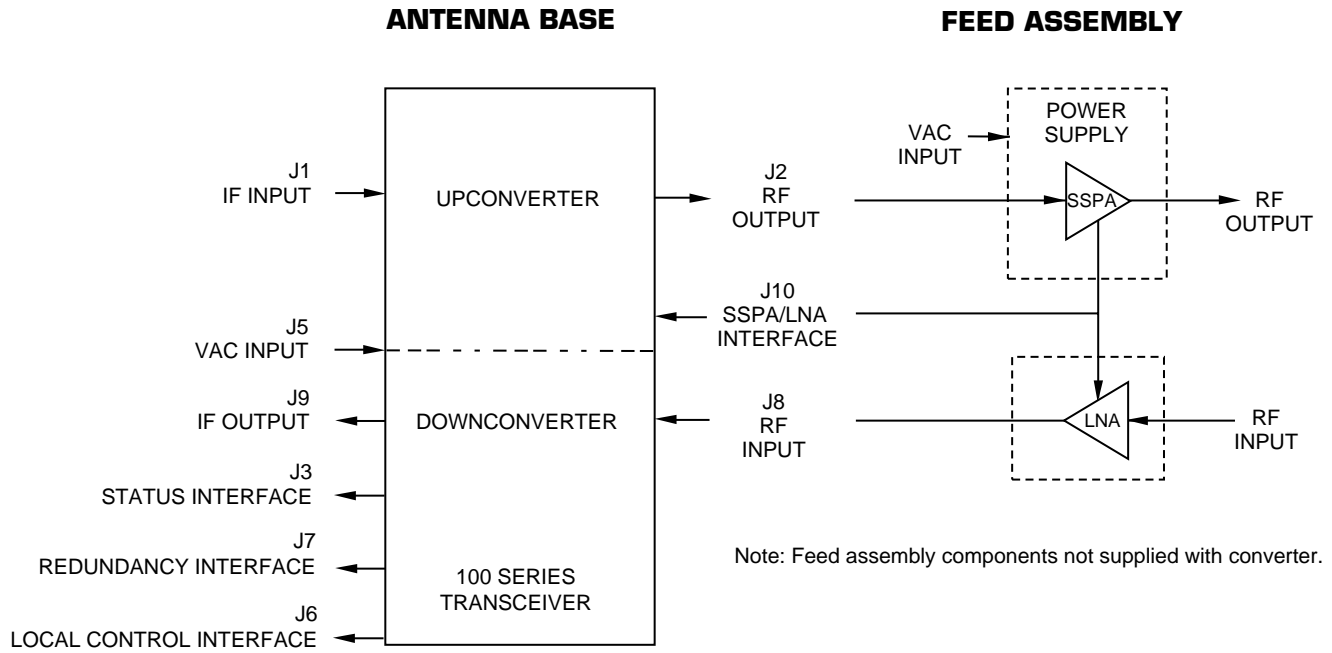
FIGURE 3

**Notes:**

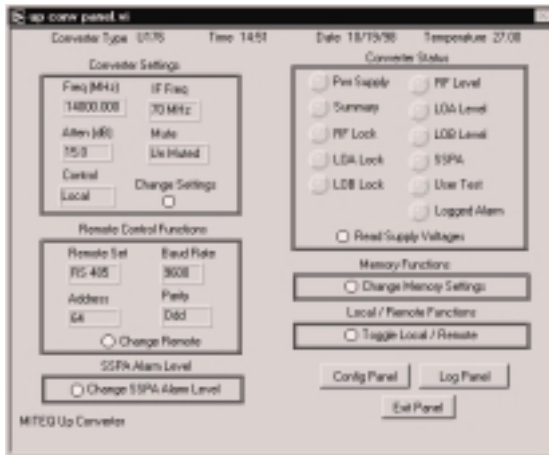
Dimensions shown in [ ] brackets are in millimeters.

Waveguide location may vary with model and option configurations. Consult factory at time of order.

# SYSTEM DIAGRAM



# 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 compatible) with -20 dBc nominal level).  
(All U-158 models will change to Figure 2 package outline with Option 2. Up/downconverter models will change to Figure 3 package outline with Option 2).
- 4.** 140 MHz IF frequency.
  - Bandwidth: 80 MHz minimum
  - Flatness: 0.75 dB/76 MHz
  - Group delay ( $\pm 36$  MHz)
    - Linear: 0.025 ns/MHz
    - Parabolic: 0.0035 ns/MHz<sup>2</sup>
  - Ripple: 1 ns peak-to-peak
  - IF return loss (140  $\pm$ 40 MHz): 20 dB minimum
  - Gain slope: 0.04 dB/MHz maximum (10 MHz minimum)
- 10.** Higher frequency stability reference.
  - B.**  $\pm 1 \times 10^{-8}$ , -30 to +60°C,  
1  $\times 10^{-9}$ /day typical (fixed temperature after 24 hour on time).
  - C.**  $\pm 5 \times 10^{-9}$ , -30 to +60°C,  
1  $\times 10^{-9}$ /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 to 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.

# **Ka-BAND OUTDOOR COMMUNICATION CONVERTERS**



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D-232C