

## 9900 Series C- and Ku-Band Communication Upconverter

With Auxiliary L-Band Output Ideal for ENG/SNG and Video Broadcasting Applications



Dual Conversion 1 kHz Step Size

Model U-9953-6-1K-L is a C-band upconverter covering 5.725–6.725 GHz band, while Model U-9956-6-1K-L is a Ku-band upconverter covering 13.75–14.8 GHz band. Both of these upconverters provide an L-band monitor output to a rear panel SMA connector. This enables the operator to monitor the uplink signal using an L-band receiver or spectrum analyzer. The L-band monitor signal is 1.15 GHz (1.22 GHz for Option 4) at a level of -2 dBc relative to the input, less any input attenuation.

A strong feature set of monitor and control functions supports powerful local and remote control. Among the features are control of frequency, attenuation and 64 memory locations for each converter where various setups can be stored and recalled.

A continuously updated log of time-stamped records of activity is also provided.

RF Frequency (GHz)	Model Number
<b>Upconverters</b>	
5.725 - 6.725	U-9953-6-1K-L
13.75 - 14.8	U-9956-6-1K-L

### Features

- L-band monitor output
- Supports expandable NSU 1:N Switchover series (D-323)
- Three monitor and control ports:
  1. RS485/RS422 remote interface (J6A) changes to RS232 with Option 17C
  2. RS485/RS422 control interface (J7) is provided for use with NSU redundancy system (D-323) or as an alternative interface
  3. 10/100Base-T Ethernet interface (J6B)
- RF, IF and LO monitor ports
- Automatic switching to external 5/10 MHz reference and electronic adjust of internal reference frequency
- Low intermodulation distortion
- Better than IESS-308/309 compliant phase noise
- 64 programmable memory locations
- 30 dB level control
- External alarm input via contact closure
- Time and date stamped event log
- CE Mark

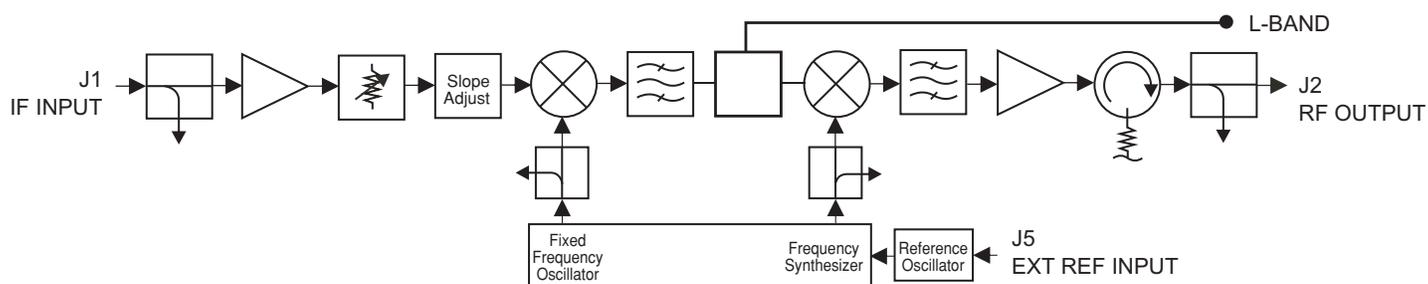
### Options

- Higher stability reference
- Remote RS232
- 140 MHz IF frequency
- 50 ohm IF impedance
- Type "N" RF connector (C-Band connectors only)

Specifications	Upconverter
Type	Dual conversion
Frequency step size	1 kHz
Frequency sense	No inversion
Input characteristics	
Frequency	70 ±20 MHz (140 ±40 MHz Option 4)
Impedance	75 ohms (50 ohms Option 15)
Return loss	26 dB minimum (70 ±20 MHz), 20 dB minimum (140 ±40 MHz)
Signal monitor	-20 dBc nominal
Input level (non-damage)	+15 dBm maximum
Output characteristics	
Frequency	Refer to model number table
Impedance	50 ohms
Return loss	20 dB minimum
Signal monitor	-20 dBc nominal
Power output (P1dB)	
C-band	+16 dBm minimum/17 dBm typical
Ku-band	+10 dBm minimum/12 dBm typical
Transfer characteristics	
Gain	+31–34 dB at 23°C
L-band monitor output	-2 dBc nominal relative to the input signal at 0 dB attenuation at 1.15 GHz (1.22 GHz for Option 4)
Noise figure at min. atten.	14 dB maximum
Noise power density	-125 dBm/Hz maximum
Image rejection	80 dB minimum
Level stability	±0.25 dB/day maximum at constant temperature ±0.5 dB typical from 0 to 50°C
Amplitude response	±0.3 dB maximum
Slope adjust	±1 dB typical in 0.2 dB steps
Group delay (70 ±18 MHz)	
Linear	0.03 ns/MHz maximum (15 to 50°C)
Parabolic	0.01 ns/MHz <sup>2</sup> maximum (15 to 50°C)
Ripple	1 ns peak-to-peak maximum
Group delay (140 ±36 MHz)	
Linear	0.025 ns/MHz maximum (15 to 50°C)
Parabolic	0.0035 ns/MHz <sup>2</sup> maximum (15 to 50°C)
Ripple	1 ns peak-to-peak maximum
Intermodulation distortion (third order)	Two signals each at 0 dBm output
C-band	55 dBc minimum (+27.5 dBm IP3 pt.)
Ku-band	45 dBc minimum (+22.5 dBm IP3 pt.)
AM/PM conversion	0.1°/dB maximum to 0 dBm output
Gain slope	0.03 dB/MHz typical, 0.05 dB/MHz maximum (10 MHz minimum)
Frequency Accuracy	C-band: ±10 Hz, Ku-band: ±22 Hz, maximum using external reference
Spurious outputs	
Signal related	65 dBc up to 0 dBm output
Signal independent	-80 dBm maximum
LO leakage at RF	-75 dBm maximum
Gain adjustment	30 dB in 0.2 dB steps
Frequency stability	±2 x 10 <sup>-8</sup> , 0 to 50°C (higher stability options available) ±5 x 10 <sup>-9</sup> /day typical (fixed temperature after 24 hour on time)
Option10B	±5 x 10 <sup>-9</sup> , 0 to 50°C, 1 x 10 <sup>-9</sup> /day typical (fixed temperature after 24 hour on time)
Option10C	±2 x 10 <sup>-9</sup> , 0 to 50°C, 1 x 10 <sup>-9</sup> /day typical (fixed temperature after 24 hour on time)
Upconverter mute	80 dB minimum
External reference	5 or 10 MHz, +4 ±3 dBm Unit will automatically switch to internal reference if external reference level falls below +1 dBm nominal
Phase noise	See table
Remote interface	RS485/RS422: 2 ports user selectable each port (1 port with Option 17C) Ethernet interface: HTTP based web server, SNMP 1.0 configuration, Alarm reporting via SNMP trap, Telnet access, Password protection

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

## Representative Block Diagram



## Options

- 4.** 140 MHz IF frequency.
- 10.** Higher frequency stability reference.
  - B.**  $\pm 5 \times 10^{-9}$ , 0 to 50°C, 1 x 10<sup>-9</sup>/day typical (fixed temperature after 24 hour on time).
  - C.**  $\pm 2 \times 10^{-9}$ , 0 to 50°C, 1 x 10<sup>-9</sup>/day typical (fixed temperature after 24 hour on time).
- 15.** 50 ohm IF impedance.
- 17.** Remote control.
  - C.** RS232 remote interface.
- NRF.** Type N-female RF connector (Note: Monitor remains SMA female). RF return loss: 18 dB, 9–13 GHz (not available above 13 GHz).

Notes: Missing option numbers are not applicable for this product. For literature describing Local control (front panel) and remote control (bus protocols), refer to MITEQ's Technical Note 25T063.

Protocols are backwards compatible with Technical Notes 25T010 and 25T009.

## Phase Noise Specifications

Model	10	100	1K	3K	10K	100K	Offset (Hz)
U-9953-6-1K-L	-63	-80	-95	-	-97	-97	Maximum Phase Noise (dBc/Hz) (1.0 Hz bandwidth) Straight line curve defined by the points in the table
U-9956-6-1K-L	-55	-70	-78	-80	-90	-100	
<b>Maximum External Reference</b>							
All Systems	-120	-150	-160	-160	-160	-160	

# 9900 Series C- and Ku-Band Communication Upconverter

## General Specifications

### Primary Power Requirements

Voltage .....	90–250 VAC
Frequency .....	47–63 Hz
Consumption	
C-band (U-9953-6-1K-L).....	35 W typical
Ku-band (U-9956-6-1K-L).....	45 W typical

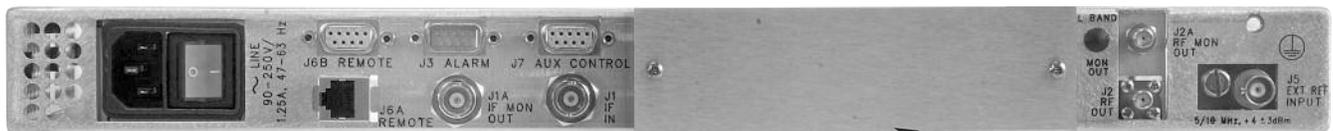
### Physical

Weight .....	12 pounds nominal
Chassis dimensions .....	19" x 1.75" panel height x 20" maximum
Connectors	
RF .....	SMA female (N female, Option NRF)
RF monitor .....	SMA female
IF BNC female	
IF monitor .....	BNC female
LO monitors .....	SMA female
L-band monitor output .....	SMA female
Alarm .....	DE-9P
External reference .....	BNC female
Remote interface .....	DE-9S for RS485, RS422 and RS232, RJ-45 female for Ethernet
Primary power input.....	IEC-320
Control interface .....	DE-9S

### Environmental

Operating	
Ambient temperature .....	0 to 50°C
Relative humidity .....	Up to 95% at 30°C
Atmospheric pressure.....	Up to 10,000 feet
Nonoperating	
Ambient temperature .....	-50 to +70°C
Relative humidity .....	Up to 95% at 40°C
Atmospheric pressure.....	Up to 40,000 feet
Shock and vibration .....	Normal handling by commercial carriers

## Rear Panel View



RSM Switch Module Location  
(see D-323 for more information)



100 Davids Drive, Hauppauge, NY 11788  
TEL.: +1-631-436-7400 • FAX: +1-631-436-7430  
www.miteq.com