

225-400 MHz UHF Upconverter and UHF Downconverter



MITEQ offers synthesized frequency converters in 2RU panel height for the UHF frequency band, 225–400 MHz. An internal synthesizer provides frequency tuning in 125 kHz, 1 kHz or 100 Hz minimum frequency steps over the UHF band. Frequency and level control are available via the front panel keyboard or the remote control interface. Downconverters have automatic gain control (AGC) which maintain downconverter output at a factory set nominal level. Up to 32 discrete frequency, attenuation, and filter bandwidth selection settings may be programmed into a nonvolatile memory. Level control is available via front panel or the remote control interface.

Features

- Automatic gain control (AGC) with 90 dB of range (downconverters)
- Local or remote control (RS485)
- Low intermodulation distortion
- Low phase noise contributions
- No spectral inversion
- 32 programmable frequency and attenuation settings
- 30 dB of output level control, local and remote control

Options

- Output amplifier for increased dynamic range (upconverters)
- RF signal monitor
- Higher stability reference
- Remote RS422, RS232, IEEE-488 or contact closure remote interface
- Summary alarm
- 50 ohm IF impedance
- LO level alarm

Model Number	Step Size
Upconverter	
U-70-313	125 kHz
U-70-313-1K	1 kHz
U-70-313-100	100 Hz

Specifications	Upconverter
Type	Dual conversion
Tunability	Second local oscillator only
Frequency sense	No inversion
Input characteristics	
Frequency	70 MHz
Impedance	75 ohms (50 ohms optional)
Return loss	14 dB minimum
Output characteristics	
Frequency	225–400 MHz
Impedance	50 ohms
Return loss	14 dB minimum
Power output (P1 dB)	-5 dBm minimum
Transfer characteristics	
Gain	11 dB nominal at minimum attenuation
Bandwidth	250 kHz or 2 MHz nominal (local/remote selectable)
Group delay (± 1 MHz)	± 50 ns peak-to-peak for 2 MHz bandwidth
Noise figure at min. atten.	20 dB typical, 25 dB maximum
Image rejection	80 dB minimum
Level stability	± 0.25 dB/day maximum at constant temperature
Intermodulation distortion (third order)	At -20 dBm output, 50 dBc minimum
Spurious outputs	
Signal related	65 dBc minimum
Signal independent	-90 dBm maximum
Gain adjustment	30 dB, local and remote control
Gain adjustment step size	0.2 dB
Frequency stability	$\pm 2 \times 10^{-8}$, 0 to 50°C (higher stability options available), $\pm 5 \times 10^{-9}$ /day typical (fixed temperature after 24 hour on time)
Upconverter mute	60 dB
Phase noise	See graph

Model Number	Step Size
Downconverter	
D-313-70-AGC	125 kHz
D-313-70-1K-AGC	1 kHz
D-313-70-100-AGC	100 Hz

Specifications	Downconverter
Type	Single conversion
Frequency sense	No inversion
Input characteristics	
Frequency	225–400 MHz
Input level	-110 dBm to -20 dBm
Impedance	50 ohms
Return loss	14 dB minimum
LO leakage	-80 dBm maximum
Output characteristics	
Frequency	70 MHz
AGC output level	-20 dBm nominal
Impedance	75 ohms (50 ohms optional)
Return loss	26 dB minimum
Power output (P1 dB)	-10 dBm minimum at all AGC settings
Signal monitor	-20 dBc nominal
Third order intercept point	0 dBm minimum
Transfer characteristics	
AGC range	90 dB nominal
Filter bandwidth	250 kHz, or 2 MHz, nominal 3 dB bandwidth (local/remote selectable)
Group delay (± 1 MHz)	± 50 ns peak-to-peak for 2 MHz bandwidth
Noise figure at min. atten.	4 dB typical, 5 dB maximum at maximum gain
Image rejection	80 dB minimum
Level stability	± 0.25 dB/day maximum at constant temperature
Spurious outputs	
Signal related	65 dBc minimum
Signal independent	-65 dBm maximum, for 0 to 60 dB gain
Signal independent	-45 dBm maximum, for 60 to 90 dB gain
Output level adjustment	30 dB down from AGC nominal output level, local and remote control
Output level step size	0.2 dB
Frequency stability	$\pm 2 \times 10^{-8}$, 0 to 50°C (higher stability options available), $\pm 5 \times 10^{-9}$ /day typical (fixed temperature after 24 hour on time)
Phase noise	See graph

Options

- 2. A.** RF signal monitor.
Rear panel RF connector (BNC) with -20 dBc nominal level.
- B.** IF signal monitor (upconverter only).
Rear panel IF connector (BNC) with -20 dBc nominal level.
- 6.** Redundant operation. Refer to separate data sheet for switchover unit with local/remote and auto/manual control features.
- 8.** LO level alarm.
Summary alarm is generated for loss of power in any of the required local oscillators.
- 10.** Higher frequency stability reference.
A. $\pm 1 \times 10^{-8}$, 0 to 50°C, 5×10^{-9} /day typical (fixed temperature after 24 hour on time).
B. $\pm 5 \times 10^{-9}$, 0 to 50°C, 1×10^{-9} /day typical (fixed temperature after 24 hour on time).
C. $\pm 2 \times 10^{-9}$, 0 to 50°C, 1×10^{-9} /day typical (fixed temperature after 24 hour on time).
- 11.** Increased output power (upconverters).
A. +5 dBm minimum power output (1 dB compression), IF/RF gain is 20 dB typical.
B. +10 dBm minimum power output (1 dB compression), IF/RF gain is 30 dB typical.

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 (Option 11A) in gain will result in signal independent spurious of -80 dBm maximum).
- 15.** 50 ohm IF impedance.
- 17.** Remote control.
A. RS422 remote interface.
B. RS485 remote interface (supplied as standard).
C. RS232 remote interface.
D. Contact closure selection of up to sixteen preprogrammed frequencies.
F. IEEE-488 remote interface.
G. BCD contact closure.
- 22.** Dedicated remote control panel.
Provides remote control and status over a dedicated RS485 bus.
Option 17B (RS485 remote bus) must be ordered.

Options (Cont.)

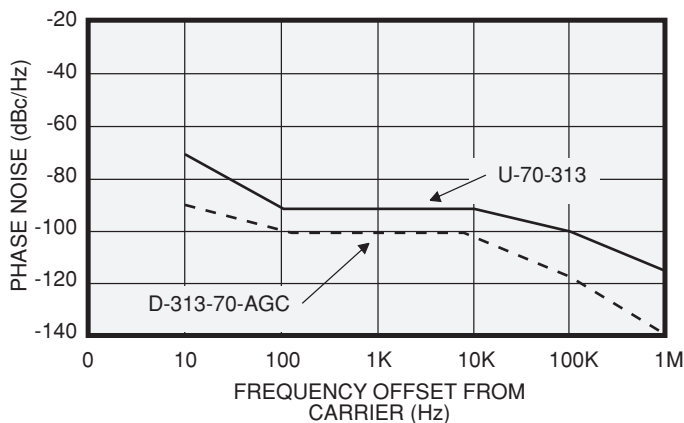
- 23.** Reference configuration.
- A.** No internal 5 MHz reference is provided. A rear panel BNC female connector is provided for external 5 MHz input (+4 \pm 3 dBm).
 - B.** An internal 5 MHz reference is provided. The internal 5 MHz reference is brought out of and back into the rear panel with a "U link" coaxial cable (BNC connectors). This allows, after "U link" removal, insertion of an external 5 MHz reference input (+4 \pm 3 dBm).
 - C.** Internal/external reference selection.
An SPDT switch is used to select either the internal 5 MHz reference or an external 5 MHz reference. External 5 MHz reference input is through a rear panel BNC female connector (+4 \pm 3 dBm). Reference selection is controlled from a rear panel toggle switch.
 - D.** Automatic reference switchover.
An internal 5 MHz reference and rear panel connector for external reference input (+4 \pm 3 dBm) is provided. The converter oscillators will lock to the external reference. If external reference is not present, the converter oscillators will automatically lock to the internal reference.
- 24.** 10 MHz reference frequency.

Notes: Missing option numbers are not applicable for these systems.

For literature describing the local control (front panel) and remote control (bus protocols), refer to MITEQ's Technical Note 25T025.

Phase Noise

TYPICAL PHASE NOISE CHARACTERISTICS (1.0 Hz BANDWIDTH)



General Specifications

PRIMARY POWER REQUIREMENTS

Voltage	100, 120, 220, 230/240 VAC +10%, -13% (rear panel selectable), 250 VAC maximum
Frequency	47–63 Hz
Power consumption	150 W typical

SUMMARY ALARM

Contact closure/open for DC voltage alarm
Contact closure/open for DC voltage and/or LO alarm

PHYSICAL

Weight	25 pounds nominal
Overall dimensions	19" x 3.5" panel height x 22" maximum (chassis depth 20")
Rear panel connectors	
IF	BNC female (TNC optional)
IF signal monitor	BNC female
RF	BNC female (TNC optional)
RF signal monitor (Option 2A)	BNC female (TNC optional)
External reference input (Option 23)	BNC female (TNC optional)
Remote interface	DE-9S for RS485 and RS422, DB-25P for RS232, DB-25S for contact closure, IEEE-488 receptacle for GPIB
Test points (front panel)	
DC voltage	Front panel display
LO phase voltage	Front panel display
LO frequency/power monitor	SMA female

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

