TRI-BAND UPCONVERTER AND DOWNCONVERTER

This series of synthesized, 1 RU panel height, dual-conversion converters operates in the standard C-, X-, and Ku-communication bands. An internal microwave synthesizer provides frequency tuning in 125 kHz or 1 kHz minimum frequency steps over the RF band. Local control is with a front panel keyboard and remote control is by RS485 input command. Up to thirty-two discrete frequency and attenuation settings may be programmed into a nonvolatile memory. Level control is available via the front panel keyboard or the remote control interface.

FEATURES

- **Low phase noise**
- **Low intermodulation distortion**
- **No spectral inversion**
- **Status monitors**
- **Summary alarm**
- **32 programmable frequency and attenuation settings**
- **Nonvolatile memory**
- **30 dB level control, local and remote control**
- **IF signal monitor output, -20 dBc**
- **Contact closure band lockout (upconverter)**
- **Low C-band second harmonic output (upconverter)**

OPTIONS

- **Output amplifier for increased dynamic range (upconverter)**
- **Higher stability reference**
- **RF signal monitor**
- **Remote RS422, RS232, IEEE-488 or contact closure**
- **140 MHz IF frequency, 80 MHz bandwidth**
- **Higher gain (downconverter)**
- **50 ohm IF impedance**
- **LO level alarm**

UPCONVERTER

Output Frequency (GHz)	1 kHz Step Size Model Number	125 kHz Step Size Model Number
5.845 – 6.425 7.9 – 8.4 14.0 – 14.5	U-96-37991A-1K	U-96-37991A
5.845 – 6.425 14.0 – 14.5	U-96-37991B-1K	U-96-37991B

Type ..... Dual conversion
Frequency sense ..... No inversion
Input characteristics
  Frequency ..... 70 ±20 MHz (140 ±40 MHz optional)
  Impedance ..... 75 ohms (50 ohms optional)
  Return loss ..... 26 dB minimum
  Signal monitor ..... -20 dBc nominal
Output characteristics
  Frequency ..... Refer to model number table
  Impedance ..... 50 ohms
  Return loss ..... 20 dB minimum
  Power output (1 dB compression) ..... -5 dBm minimum
  Output muting ..... 60 dB minimum,
  Output muting will occur for summary alarm or remote command
Transfer characteristics
  Gain ..... 11 dB nominal (higher gain optional)
  Image rejection ..... 80 dB minimum
  Level stability ..... ±0.25 dB/day maximum at constant temperature
  Noise figure ..... 20 dB typical, 25 dB maximum
  Amplitude response ..... ±0.25 dB/±20 MHz, ±0.2 dB/±18 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) ..... At -20 dBm output, 50 dBc minimum
  AM/PM conversion ..... 0.1°/dB to -15 dBm output
Spurious outputs
  Signal related ..... 65 dBc minimum
  Signal independent ..... -90 dBm maximum
  C-band second harmonic ..... 60 dBc minimum up to -15 dBm output
Gain adjustment ..... 30 dB local and remote control
Gain adjustment step size ..... 0.2 dB
Frequency stability ..... ±2 x 10^{-8}, 0 to 50°C (higher stability options available),
±5 x 10^{-9}/day typical (fixed temperature after 24 hour on time)
Phase noise ..... See graph

DOWNCONVERTER

Input Frequency (GHz)	1 kHz Step Size Model Number	125 kHz Step Size Model Number
3.62 – 4.205 7.25 – 7.75 10.95 – 12.75	D-96-37991A-1K	D-96-37991A
3.62 – 4.205 10.95 – 12.75	D-96-37991B-1K	D-96-37991B

Type..... Dual conversion
Frequency sense..... No inversion
Input characteristics
  Frequency ..... Refer to model number table
  Impedance ..... 50 ohms
  Return loss ..... 20 dB minimum
  LO leakage ..... -80 dBm maximum
Output characteristics
  Frequency ..... 70 ±20 MHz (140 ±40 MHz optional)
  Impedance ..... 75 ohms (50 ohms optional)
  Return loss ..... 26 dB minimum
  Power output (1dB compression)..... +15 dBm typical, +10 dBm minimum
  Signal monitor ..... -20 dBc nominal
Transfer characteristics
  Gain ..... 30 dB nominal (higher gain optional)
  Image rejection ..... 80 dB minimum
  Level stability ..... ±0.25 dB/day maximum at constant temperature
  Noise figure..... 10 dB typical, 12 dB maximum
  Amplitude response..... ±0.25 dB/±20 MHz, ±0.2 dB/±18 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 -10 dBm output signals, 60 dBc minimum
  AM/PM conversion..... 0.1°/dB maximum to +5 dBm output
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..... ±2 x 10^{-8}, 0 to 50°C (higher stability options available),
  ±5 x 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 (SMA) with -20 dBc nominal level.

4. A. 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)

5. Group delay equalization.
A. 70 MHz IF, 1.0 ns peak-to-peak maximum ±18 MHz.
B. 140 MHz IF, 2.0 ns peak-to-peak maximum ±36 MHz.

6. Redundant operation. Refer to separate data sheet for switchover unit with local/remote and auto/manual control features.

10. Higher frequency stability reference.
A. ±1 x 10^{-8}, 0 to 50°C,
5 x 10^{-9}/day typical (fixed temperature after 24 hour on time).
B. ±5 x 10^{-9}, 0 to 50°C,
1 x 10^{-9}/day typical (fixed temperature after 24 hour on time).
C. ±2 x 10^{-9}, 0 to 50°C,
1 x 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 26 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 in gain (Option 11A) will result in signal independent spurious of -80 dBm maximum).

15. 50 ohm IF impedance.

16. Higher gain option (downconverters).
A. 45 dB nominal RF/IF gain.
C. 55 dB nominal RF/IF gain.

Specification of signal independent spurious increases with increase in RF/IF gain (e.g. if without option, specification is -90 dBm maximum, an increase of 15 dB in gain (Option 16A) will result in signal independent spurious of -75 dBm maximum).

OPTIONS (CONT.)

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.

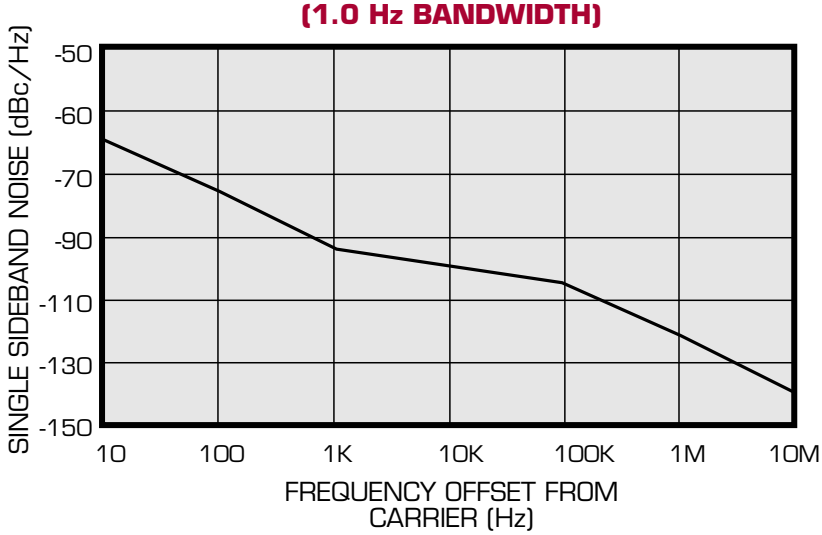
23. 5 MHz reference configuration.
- **A.** No internal 5 MHz reference provided. A rear panel BNC female connector is provided for external 5 MHz input (+4 ±3 dBm).
- **E.** Automatic reference switchover.
An internal 5 MHz reference and rear panel connector for external reference input (+4 ±3 dBm) 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.

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 25T009.

PHASE NOISE

TYPICAL PHASE NOISE CHARACTERISTICS
(1.0 Hz BANDWIDTH)



TRI-BAND UPCONVERTER AND DOWNCONVERTER

PRIMARY POWER REQUIREMENTS

Voltage	90–250 VAC
Frequency	47–63 Hz
Power consumption	100 W typical

SUMMARY ALARM

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

PHYSICAL

Weight	20 pounds nominal
Overall dimensions	19" x 1.75" panel height x 22" maximum (chassis depth 20")
Rear panel connectors	
RF	SMA female
IF	BNC female
IF signal monitor	BNC female
Remote interface	DEM-9S for RS485 and RS422 DB-25 for RS232 DB-25S for contact closure IEEE-488 receptacle for GPIB
Summary alarm	DE-9P
Redundancy alarm	DE-9P
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

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