HIGH-VALUE COMMUNICATION CONVERTERS

Dual Conversion
125 kHz Step Size

UPCONVERTERS

Model Number	Frequency (GHz)
U-9688-4	2.0 – 2.4
U-9693-1	5.85 – 6.665
U-9693-6	5.725 – 6.725
U-9693-2	6.7 – 7.1
U-9694	7.9 – 8.4
U-9695-2	12.75 – 13.25
U-9696-3	13.75 – 14.5
U-9697-1	17.3 – 18.1
U-9697-2	17.3 – 18.4

DOWNCONVERTERS

Model Number	Frequency (GHz)
D-9640-6	2.0 – 2.4
D-9641-1	3.4 – 4.2
D-9642-2	4.5 – 4.8
D-9645	7.25 – 7.75
D-9648	10.95 – 11.7
D-9648-3	10.95 – 12.75
D-9648-6	10.7 – 12.75
D-9649	11.7 – 12.2
D-9650	12.2 – 12.75

These frequency converters use an internal synthesizer to provide frequency tuning. Level control is available via the front panel or the remote control interface.

FEATURES

- **Local or remote control**
- **Output amplifier for increased dynamic range (upconverters)**
- **Low intermodulation distortion**
- **Low phase noise**
- **32 programmable frequency and attenuation settings**
- **Nonvolatile memory**
- **30 dB level control**
- **IF signal monitor output, -20 dBc**

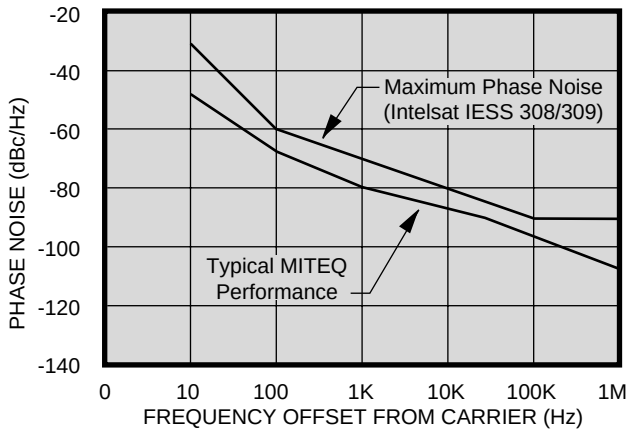
OPTIONS

- **Higher stability reference**
- **Remote RS422, RS232, IEEE-488, or contact closure interface**
- **140 MHz IF frequency**
- **Higher gain (downconverters)**
- **50 ohm IF impedance**
- **Automatic reference selection**

SPECIFICATIONS

Type	Dual conversion
Tunability	RF local oscillator only
Frequency sense	No inversion
IF characteristics	
Frequency	70 ±20 MHz (140 ±40 MHz available as option)
Impedance	75 ohms (50 ohms available as option)
Return loss	26 dB minimum
Signal monitor	-20 dBc nominal
RF characteristics	
Frequency	See table (on cover)
Impedance	50 ohms
Return loss	20 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 with RF output above 8.5 GHz), 30 dB nominal (upconverters with RF output below 8.5 GHz), 45 dB nominal (downconverters)
Image rejection	80 dB minimum
Level stability	±0.25 dB/day maximum at constant temperature
Noise figure	20 dB typical, 25 dB maximum (upconverters), 10 dB typical, 12 dB maximum (downconverters), 12 dB typical, 15 dB maximum (D-9648-3, D-9640-6, D-9648-6)
Amplitude response	±0.25 dB/±20 MHz, ±0.20 dB/±18 MHz
Group delay (±18 MHz)	0.03 ns/MHz maximum linear, 0.01 ns/MHz^2 maximum parabolic, 1 ns peak-to-peak maximum ripple
Intermodulation distortion (third order)	At -10 dBm output, 60 dBc minimum
AM/PM conversion	0.1°/dB maximum to 5 dBm output
Gain slope	0.02 dB/MHz maximum
Spurious outputs	
Signal related	60 dBc min. (for converters with RF frequency above 8.5 GHz), 65 dBc min. (for converters with RF frequency below 8.5 GHz)
Signal independent	-75 dBm max., -70 dBm max. (for upconverters with RF frequency below 8.5 GHz)
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)
Upconverter mute	60 dB

TYPICAL PHASE NOISE CHARACTERISTICS (1.0 Hz BANDWIDTH)



OPTIONS

2. A. RF signal monitor.
Rear panel 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.
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).

15. 50 ohm IF impedance.

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

Specification of signal independent spurious increases with increase in RF/IF gain. For example, if without option, specification is -75 dBm maximum, an increase of 10 dB in gain (Option 16C) will result in signal independent spurious of -65 dBm maximum.

17. Remote control.
A. RS422.
B. RS485 (supplied as standard).
C. RS232.
D. Contact closure selection of up to sixteen preprogrammed frequencies.
F. IEEE-488.
G. BCD contact closure.

23. D. 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. External reference input connector is BNC female.

F. Automatic reference configuration, reference output.
An internal 5 MHz reference is provided. Rear panel connectors are provided for 5 MHz reference output and external reference input (+4 dBm ±3 dBm). The converter will lock to the external reference when the external reference is present. If the external reference is not present, the converter oscillators will automatically lock to the internal reference.

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 25T009.

HIGH-VALUE COMMUNICATION CONVERTERS

PRIMARY POWER REQUIREMENTS

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

SUMMARY ALARM

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

PHYSICAL

Weight	20 pounds nominal
Overall dimensions	19" x 1.75" panel x 22" maximum (chassis depth 20")
Rear panel connectors	
RF	N female for RF below 8.5 GHz, SMA female for RF above 8.5 GHz
IF	BNC female
IF signal monitor	BNC female
Remote interface	DEM-9S for RS485 and RS422, DB-25P for RS232, DB-25S for contact closure, and BCD 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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