



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

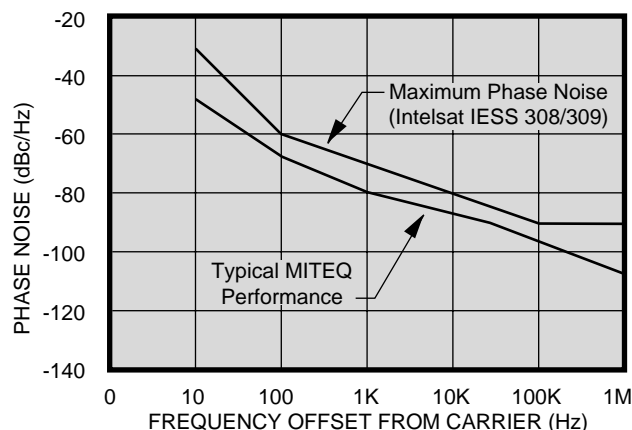
OPTIONS

- 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 × 10 ⁻⁸ , 0 to 50°C (higher stability options available), ±5 × 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/MHz²
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.
A. $\pm 1 \times 10^{-8}$, 0 to 50°C,
5 $\times 10^{-9}$ /day typical (fixed temperature after 24 hour on time).
B. $\pm 5 \times 10^{-9}$, 0 to 50°C,
1 $\times 10^{-9}$ /day typical (fixed temperature after 24 hour on time).
C. $\pm 2 \times 10^{-9}$, 0 to 50°C,
1 $\times 10^{-9}$ /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 \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. 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 \pm 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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