



**Dual-Conversion
125 kHz Step Size**

SYNTHESIZED Ka-BAND COMMUNICATION CONVERTERS



MITEQ offers the 9400 series synthesized frequency converters operating in the Ka communication bands. An internal synthesizer provides frequency tuning in 125 kHz step size. Level control is available via the front panel or the remote control interface. The 9400 series converters have panel heights of 2RU.

FEATURES

- Local or remote control (RS485 standard)
- 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

- Output amplifier for increased dynamic range (upconverters)
- Higher stability reference
- RF signal monitor
- Remote RS422, RS232, IEEE-488, BCD contact closure or contact closure interface
- 140 MHz IF frequency
- Higher gain (downconverters)
- 50 ohm IF impedance

2RU (3.5 INCHES) CONVERTERS – 9400 SERIES



UPCONVERTERS

Output Frequency GHz (GHz)

Model Number

28 – 29.1
29 – 30.25
30 – 31
27.5 – 31

U-9458
U-9458-1
U-9458-2
U-9458-3

DOWNCONVERTERS

Input Frequency GHz (GHz)

Model Number

17.7 – 18.8
18.8 – 19.3
19.2 – 20.2
20 – 21.2
17.7 – 21.2

D-9413
D-9413-1
D-9413-2
D-9413-3
D-9413-4*

*References noise figure under “Downconverter Specifications” section

DOWNCONVERTER SPECIFICATIONS

Type	Dual conversion
Tunability	First local oscillator only
Frequency sense	No inversion
Input characteristics	
Frequency	Refer to model numbers and table
Impedance	50 ohms
Return loss	20 dB minimum
LO leakage	-80 dBm maximum
Output characteristics	
Frequency	70 \pm 20 MHz (140 \pm 40 MHz optional)
Impedance	75 ohms (50 ohms optional)
Return loss	26 dB minimum
Power output (1 dB compression)	+15 dBm typical, +10 dBm minimum
Signal monitor	-20 dBc nominal
Transfer characteristics	
Noise figure	12 dB typical, 15 dB maximum, *15 dB typical, 18 dB maximum
Gain	30 dB nominal (higher gain optional)
Image rejection	80 dB minimum
Level stability	\pm 0.25 dB/day maximum at constant temperature
Amplitude response	\pm 0.25 dB/ \pm 20 MHz, \pm 0.20 dB/ \pm 18 MHz
Group delay (\pm 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
Gain slope	0.02 dB/MHz maximum
Spurious outputs	
Signal related	60 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)
Phase noise	See curve

UPCONVERTER SPECIFICATIONS

Type	Dual conversion
Tunability	Second local oscillator only
Frequency sense.....	No inversion
Input characteristics	
Frequency	70 \pm 20 MHz (140 \pm 40 MHz available as option)
Impedance	75 ohms (50 ohms optional)
Return loss	26 dB minimum
Signal monitor	-20 dBc nominal
Output characteristics	
Frequency	Refer to model number and tables
Impedance	50 ohms
Return loss	20 dB minimum
Power output (1 dB compression.)	-5 dBm nominal (up to +20 dBm with optional output amplifiers, refer to options)
Transfer characteristics	
Gain.....	11 dB nominal (at minimum attenuation)
Image rejection.....	80 dB minimum
Level stability.....	\pm 0.25 dB/day maximum at constant temperature
Noise figure.....	20 dB typical, 25 dB maximum
Amplitude response	\pm 0.25 dB/ \pm 20 MHz, \pm 0.20 dB/ \pm 18 MHz
Group delay (\pm 18 MHz)	
Linear.....	0.03 ns/MHz maximum linear,
Parabolic.....	0.01 ns/MHz ² maximum parabolic,
Ripple	1 ns peak-to-peak maximum ripple
Intermodulation distortion	
(third order).....	At -20 dBm output signals, 50 dBc minimum
AM/PM conversion	0.1°/dB maximum to -15 dBm output
Gain slope	0.02 dB/MHz maximum
Spurious outputs	
Signal related	60 dBc minimum
Signal independent	-85 dBm maximum, -90 dBm typical
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 curve

OPTIONS

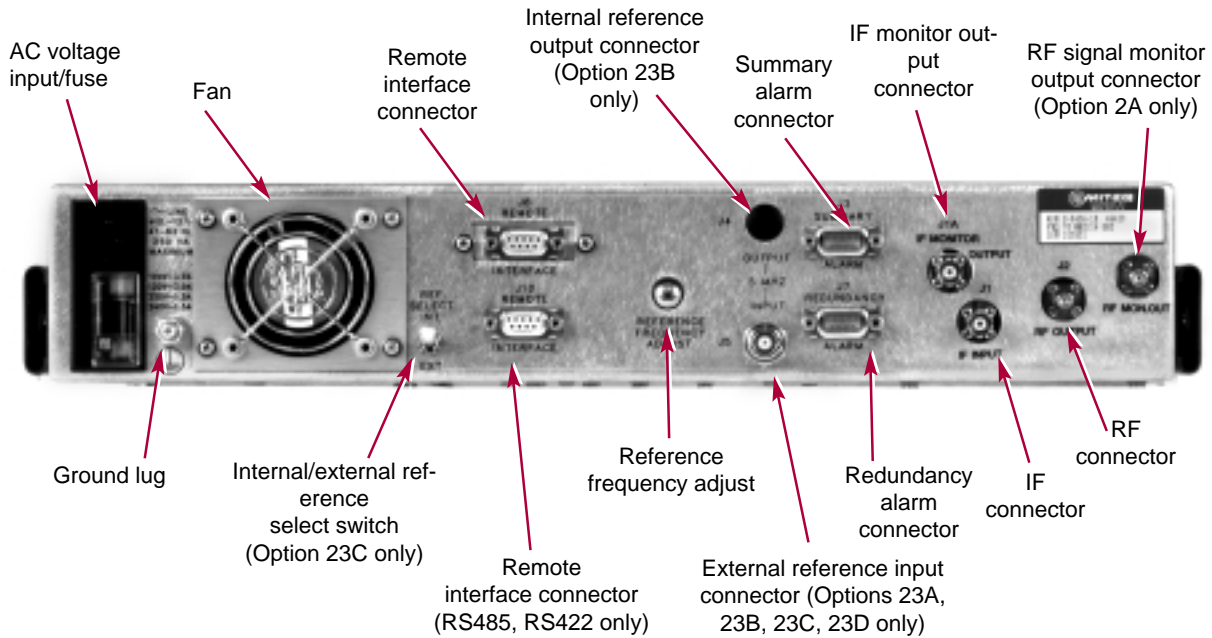
- 2. A.** RF signal monitor.
Rear panel RF connector (SMA) with -20 dBc nominal level.
- 4. A.** 140 MHz IF frequency.
Bandwidth: 80 MHz minimum
Flatness: 0.75 dB/76 MHz
Group delay (± 36 MHz)
 Linear: 0.025 ns/MHz
 Parabolic: 0.0035 ns/MHz²
 Ripple: 1 ns peak-to-peak
IF return loss (140 \pm 40 MHz): 20 dB minimum
Gain slope: 0.04 dB/MHz maximum (10 MHz minimum)
- 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.
- 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 -85 dBm maximum, an increase of 10 dB in gain (Option 11A) will result in signal independent spurious of -75 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.
 - B.** RS485 (supplied as standard).
 - C.** RS232.
 - D.** Contact closure selection of up to sixteen preprogrammed frequencies.
 - F.** IEEE-488.
 - G.** BCD contact closure.
- 19.** Input prime voltage -48 VDC.
Connector MS3102E10SL-3P
Pin A: -48 VDC
Pin B: Common
Pin C: Chassis ground
- 20.** Switchable 70 MHz and 140 MHz IF frequencies.
Two IF connectors provided at rear panel (BNC female). Selection of IF frequency is available from the front panel and over the remote bus. Unit panel height is 5.25".
- 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 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.

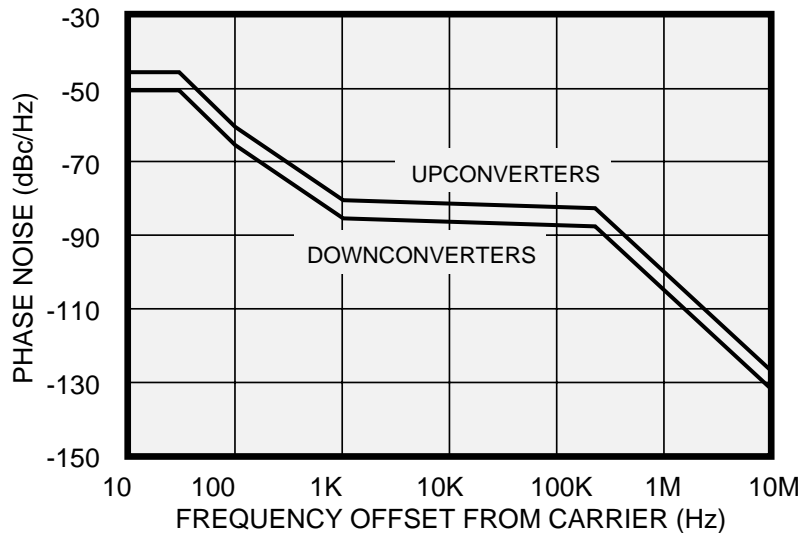
Notes: Missing option numbers are not applicable to this product.
For literature describing local control (front panel) and remote control (bus protocols), refer to MITEQ's Technical Note 25T010.

9400 SERIES – REAR PANEL



PHASE NOISE

**TYPICAL PHASE NOISE CHARACTERISTICS
(1.0 Hz BANDWIDTH)**



These phase noise curves are indicative of typical performance for a group of converters. If specific phase noise data is required for a converter, please consult the factory.

SYNTHESIZED Ka-BAND 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 3.5" panel height x 22" maximum (chassis depth 20")
Rear panel connectors	
RF.....	WR-28 (upconverter), SMA compatible (downconverter)
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

