INMARSAT C- and L-Band Converters

Synthesized or Crystal Controlled

This series of converters is designed to operate in INMARSAT satellite communication terminals.

Features

- External 5 MHz reference
- Low intermodulation distortion
- Low phase noise
- Summary alarm

Synthesized Converter Features

- Dual conversion
- Local and remote control
- Digital attenuation control
- Nonvolatile memory

Frequency Step Size	AFC Capability	Model Number
C-Band Converters		
Synthesized Upconverters		
125 kHz	No	U-94-INMST
1 kHz	No	U-94-INMST-1K
125 kHz	Yes	U-94-INMST-AFC
1 kHz	Yes	U-94-INMST-1K-AFC
Synthesized Downconverters		
125 kHz	No	D-94-INMST
1 kHz	No	D-94-INMST-1K
125 kHz	Yes	D-94-INMST-AFC
1 kHz	Yes	D-94-INMST-1K-AFC

Frequency Step Size	Frequency Conversion Scheme	Model Number
L-Band Converters		
Synthesized Upconverters		
125 kHz	Dual	U-9448-2 (see note)
1 kHz	Dual	U-9448-2-1K (see note)
Crystal-Controlled Upconverters		
None	Single	U-90-INMST
Synthesized Downconverters		
125 kHz	Dual	D-9400-2 (see note)
1 kHz	Dual	D-9400-2-1K (see note)
Crystal-Controlled Downconverters		
None	Single	D-90-INMST

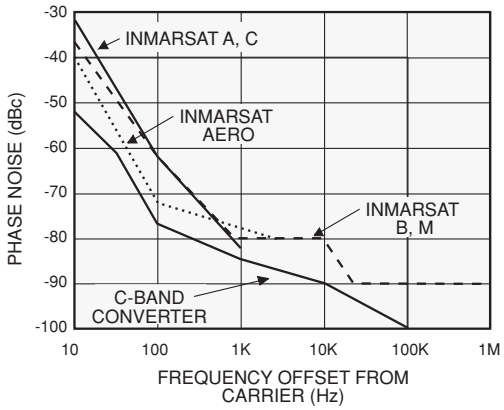
Note: Please refer to 9400 Series data sheet D-148 for complete specifications for these converters. To ensure that these converters will meet the INMARSAT phase noise profile, the converters should be ordered with the following statement: “Option: INMARSAT phase noise.”

Specifications	C-Band Upconverters	C-Band Downconverters
Type	Dual conversion	
Tunability	Second local oscillator only	First local oscillator only
Frequency sense	No inversion	
Input characteristics		
Frequency	70 ±20 MHz	3.575–4.225 GHz Note: For crystal controlled units, frequency of operation must be supplied at time of order.
Impedance	75 ohms (50 ohms optional)	50 ohms
Return loss	26 dB minimum	20 dB minimum
LO leakage	-20 dBc nominal	-80 dBm maximum
Output characteristics		
Frequency	5.925–6.475 GHz Note: For crystal controlled units, frequency of operation must be supplied at time of order	70 ±20 MHz
Impedance	50 ohms	75 ohms (50 ohms optional)
Return loss	20 dB minimum	26 dB minimum
Power output (1 dB compr.)	-5 dBm nominal (up to +20 dBm with optional output amplifiers, refer to options)	+15 dBm typical, +10 dBm minimum
Signal monitor	N/A	-20 dBc nominal
Transfer characteristics		
Noise figure	20 dB typical, 25 dB maximum	10 dB typical, 12 dB maximum
Gain	11 dB nominal (at minimum attenuation)	30 dB nominal (higher gain optional)
Image rejection	80 dB minimum	
Level stability	±0.25 dB/day maximum at constant temperature	
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 maximum parabolic, 1 ns peak-to-peak maximum ripple	
Intermodulation distortion (third order)	At -20 dBm output, 50 dBc minimum	With two -10 dBm output signals, 60 dBc minimum
AM/PM conversion	0.1°/dB maximum to -15 dBm output	0.1°/dB maximum to +5 dBm output
Gain slope	0.02 dB/MHz maximum	
Spurious outputs		
Signal related	65 dBc minimum	
Signal independent	-90 dBm maximum (synthesized converters) -80 dBm maximum (crystal controlled converters)	N/A
Gain adjustment	30 dB	
Gain adjustment step size	0.2 dB (synthesized converters), continuous adjust (crystal controlled converters)	
External reference	5 MHz, +4 ±3 dBm	
AFC input (AFC capable units only)	5 MHz ±57.5 kHz, 0 ±3 dBm	
IF output mute	N/A	60 dB (AFC capable units only. IF monitor output is not muted)

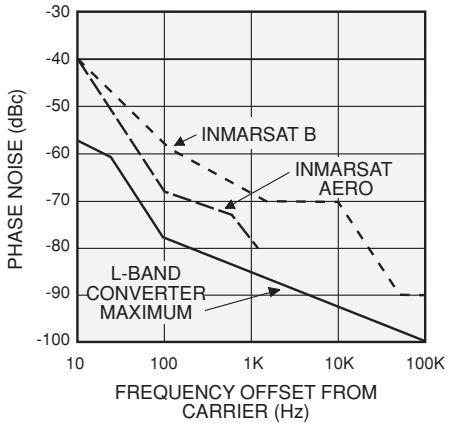
Specifications	L-Band Upconverters	L-Band Downconverters
Type	Single conversion	
Frequency sense	No inversion	
Input characteristics		
Frequency	70 ±20 MHz	1.50–1.58 GHz Note: For crystal controlled units, frequency of operation must be supplied at time of order.
Impedance	75 ohms (50 ohms optional)	50 ohms
Return loss	26 dB minimum	20 dB minimum
Output characteristics		
Frequency	1.61–1.67 GHz Note: For crystal controlled units, frequency of operation must be supplied at time of order.	70 ±20 MHz
Impedance	50 ohms	75 ohms (50 ohms optional)
Return loss	20 dB minimum	26 dB minimum
Power output (1 dB compr.)	+10 dBm minimum	+15 dBm typical, +10 dBm minimum
Transfer characteristics		
Noise figure	N/A	12 dB maximum
Gain	30 dB nominal (at minimum attenuation)	30 dB nominal (higher gain optional)
Image rejection	80 dB minimum	
Level stability	±0.25 dB/day maximum at constant temperature	
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 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	65 dBc minimum	
Signal independent	-60 dBm maximum	
Gain adjustment	30 dB continuously variable	
External reference	5 MHz, +4 ±3 dBm	5 MHz, to ±3 dBm
Upconverter mute	60 dB	N/A

Phase Noise Specifications

C-Band Phase Noise Characteristics (1.0 Hz Bandwidth)



L-Band Phase Noise Characteristics (1.0 Hz Bandwidth)



Options

2. A. RF signal monitor.
Rear panel RF connector (SMA) with -20 dBc nominal level.

8. LO level alarm.
Summary alarm is generated for loss of power in any of the required local oscillators.

10. Internal 5 MHz crystal oscillator reference.

A. $\pm 2 \times 10^{-8}$ (0 to 50°C),
$\pm 5 \times 10^{-9}$/day typical (fixed temperature after 24 hour on time).

B. $\pm 1 \times 10^{-8}$ (0 to 50°C),
5×10^{-9}/day typical (fixed temperature after 24 hour on time).

C. $\pm 5 \times 10^{-9}$ (0 to 50°C),
1×10^{-9}/day typical (fixed temperature after 24 hour on time).

D. $\pm 2 \times 10^{-9}$ (0 to 50°C),
1×10^{-9}/day typical (fixed temperature after 24 hour on time).

11. Increased output power (C-band upconverters).

A. +5 dBm minimum power output, (1 dB compression).

B. +10 dBm minimum power output, (1 dB compression).
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 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.

17. Remote control (synthesized converters only).

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

Options (Cont.)

22. Dedicated remote control panel.
Provides remote control and status over a dedicated RS485 bus.
Option 17B (RS485 remote bus) must be ordered.

23. Reference configuration (must be ordered with Option 10).

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 ±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 ±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 ±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.

Note: Missing option numbers are not applicable to this product.

For literature describing the synthesized converters local control (front panel) and remote control (bus protocols), refer to MITEQ's Technical Note 25T010 (9400 Series). For literature describing the AFC capable synthesized converters local control (front panel) and remote control (bus protocols), refer to MITEQ's Technical Note 25T015.

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	160 W maximum

Summary Alarm

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

Physical

Weight	20 pounds [9.0 kg] nominal, 30 pounds [9.0 kg] nominal (C-band crystal controlled converters)
Overall dimensions	19"[482.6mm] x 3.5"[88.9mm] panel height x 22"[558.8mm] maximum (chassis depth 20"[508mm])
Rear panel connectors	
RF	N female
IF	BNC female
IF signal monitor	BNC female
RF signal monitor	SMA female
External reference input	BNC female
AFC input	BNC female (AFC capable units only)
Remote interface (synthesized converters only)	DEM-9S for RS485 and RS422, DB-25P for RS232, DB-25S for contact closure, IEEE-488 receptacle for GPIB
Summary alarm	DE-9P
Redundancy alarm	DE-9P
External mute control	DE-9P (AFC capable units only)
LO phase voltage	Jack (front panel display for synthesized converters)
LO frequency power monitor	SMA female (front panel for synthesized converters)

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

100 Davids Drive, Hauppauge, NY 11788
TEL.: +1-631-436-7400 • FAX: +1-631-436-7431
www.miteq.com

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