9900 SERIES FREQUENCY CONVERTERS

C, Ku, and DBS Bands

SPECIFICATION		
	UPCONVERTER	DOWNCONVERTER
Type	Dual conversion	
Frequency step size	1 kHz	
Frequency sense	No inversion	
Input characteristics		
Frequency	70 ± 20 MHz (140 ± 40 MHz Option 4)	Refer to model number table
Impedance	75 ohms (50 ohms Option 15)	50 ohms
Return Loss	26 dB minimum (70 ± 20 MHz), 20 dB minimum (140 ± 40 MHz)	20 dB minimum
Signal monitor	–20 dBc nominal	
Input level (non-damage)	+15 dBm nominal	
Output characteristics		
Frequency	Refer to model number table	70 ± 20 MHz (140 ± 40 MHz Option 4)
Impedance	50 ohms	75 ohms (50 ohms Option 15)
Return loss	20 dB minimum	26 dB minimum (70 ± 20 MHz), 20 dB minimum (140 ± 40 MHz)
Signal monitor	–20 dBc nomimal	
Power output (P1 dB)		
C-band	+16 dBm minimum/17 dBm typical	
Ku-band	+10 dBm minimum/12 dBm typical	+16 dBm minimum/17 dBm typical
Transfer characteristics		
Gain	+31–34 dB at 23°C	+44–48 dB at 23°C
Noise figure at min. atten.	14 dB maximum	11 dB maximum
Noise power density	–125 dBm/Hz maximum	N/A
Image rejection	N/A	80 dB maximum
Level stability	±0.25 dB/day maximum at constant temperature, ±0.5 dB typical from 0°C to 50°C	
Amplitude response	±0.3 dB maximum/40 MHz, ±0.45 dB maximum/80 MHz (140 ± 40 MHz Option 4)	
Slope adjust	±1 dB typical in 0.2 dB steps	
Group delay (140 ± 18 MHz)		
Linear	0.03 ns/MHz maximum (15°C to 50°C)	
Parabolic	0.01 ns/MHz^2 maximum (15°C to 50°C)	
Ripple	1 ns peak-to-peak maximum	
Group delay (140 ± 36 MHz)		
Linear	0.025 ns/MHz maximum (15°C to 50°C)	
Parabolic	0.0035 ns/MHz^2 maximum (15°C to 50°C)	
Ripple	1 ns peak-to-peak maximum	
Intermodulation distortion (third order)	Two signals each at 0 dBm output,	
C-band	55 dBc minimum (+27.5 dBm OIP3 pt.)	60 dBc minimum (+30 dBm OIP3 pt.)
Ku-band	45 dBc minimum (+22.5 dBm OIP3 pt.)	60 dBc minimum (+30 dBm OIP3 pt.)
AM/PM conversion	0.1°/dB maximum to 0 dBm output	
Gain slope	0.03 dB/MHz typical, 0.05 dB/MHz maximum (10 MHz minimum)	
Frequency stability	±2 x 10^{-8}, 0°C to 50°C (higher stability options available), ±5 x 10^{-9}/day typical (fixed temperature after 24 hour on time)	
Frequency accuracy	C-band: ±10 Hz, Ku-band: <1 Hz, maximum using external reference, DBS-band: <1 Hz	
Spurious outputs		
Signal related	65 dBc up to 0 dBm output	
Signal independent	–80 dBm maximum	
LO leakage at RF port	–75 dBm maximum	–80 dB maximum
Gain adjustment	30 dB in 0.2 dB steps	
Upconverter mute	80 dB minimum	N/A
External reference	5 or 10 MHz, +4 ± 3 dBm Unit will automatically switch to internal reference if external reference level falls below +1 dBm nominal	
Phase noise	See chart	
Remote interface	RS485/RS422: 2 ports user selectable each port (1 port with Option 17C) Ethernet interface: HTTP based web server, SNMP 1.0 configuration, Alarm reporting via SNMP trap, Telnet access, Password protection	

Note: All specifications guaranteed at maximum gain unless otherwise noted.

The MITEQ frequency converters are designed for advanced satellite communication systems and are available for a wide variety of frequency plans. Phase noise, amplitude flatness and spurious outputs have been optimized to provide the user with a transparent frequency conversion for all video and data applications.

A strong feature set of monitor and control functions supports powerful local and remote control. Among the features are control of frequency, attenuation and 64 memory locations for each converter where various setups can be stored and recalled.

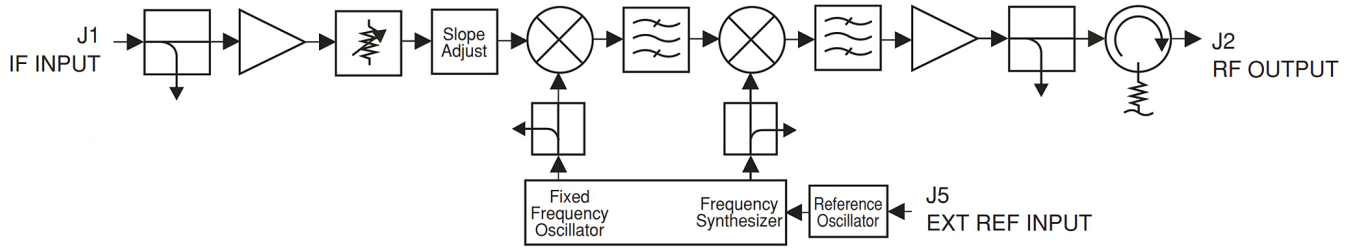
A continuously updated log of time-stamped records of activity is also provided.

UPCONVERTERS	
RF FREQUENCY (GHz)	MODEL NUMBERS
5.725 – 6.725	U-9953-6-1K
12.75 – 14.5	U-9956-7-1K
13.75 – 14.8	U-9956-6-1K
17.3 – 18.4	U-9957-2-1K

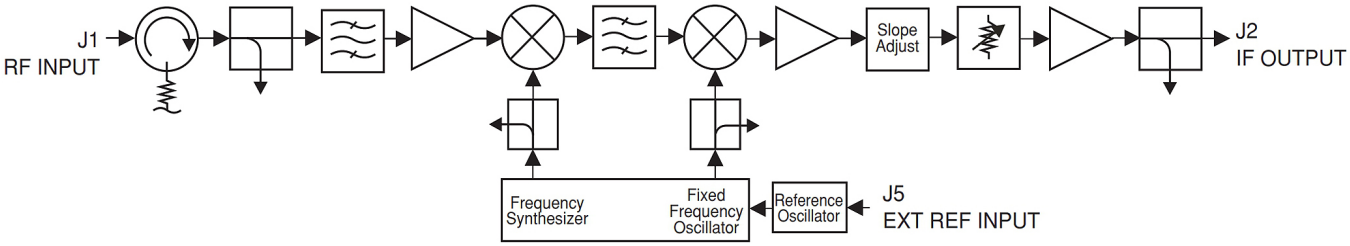
DOWNCONVERTERS	
RF FREQUENCY (GHz)	MODEL NUMBERS
3.4 – 4.2	D-9901-1-1K
10.7 – 12.75	D-9908-6-1K

REPRESENTATIVE BLOCK DIAGRAM

UPCONVERTER



DOWNCONVERTER



PHASE NOISE SPECIFICATIONS – OFFSET (Hz)

1. Phase noise (–dBc/Hz) (maximum/typical with internal reference).

UPCONVERTERS							
Model	**10**	**100**	**1K**	**10K**	**100K**	**300K**	**1M**
U-9953-6-1K	63/69	80/85	95/97	97/100	97/104	97/106	115/123
U-9956-6-1K	50/71	66/85	87/93	91/96	93/98	93/104	111/122
U-9956-7-1K	50/70	66/84	85/93	90/95	93/96	93/102	111/122
U-9957-2-1K	50/70	66/83	85/91	90/93	93/96	93/101	111/120
DOWNCONVERTERS							
Model	**10**	**100**	**1K**	**10K**	**100K**	**300K**	**1M**
D-9901-1-1K	63/69	80/83	95/97	97/99	97/106	97/106	115/123
D-9908-6-1K	51/68	69/82	87/92	91/96	93/97	93/106	111/122
Maximum External Reference to Achieve Above Phase Noise with 10 MHz Reference (dBc/Hz)							
	10	**100**	**1K**	**10K**	**100K**	**300K**	**1M**
Systems without Option 31, 10E, 10F, 10G or 10H	120	150	160	160	160	160	160
Systems with Option 10E, 10F, 10G or 10H	95	130	140	140	140	140	140

OPTIONS

4.	140 MHz IF frequency.
10.	Higher frequency stability reference.
C.	±2 x 10^{-9}, 0°C to 50°C, 1 x 10^{-9}/day typical (fixed temperature after 24 hour on time).
E.	±5 x 10^{-9}, 0°C to 50°C, 1 x 10^{-9}/day typical (fixed temperature after 24 hour on time). See Note 1 below.
F.	±2 x 10^{-9}, 0°C to 50°C, 1 x 10^{-9}/day typical (fixed temperature after 24 hour on time). See Note 1 below.
NOTE 1:	Analog reference Phase Lock: External 5 or 10 MHz at +4 ± 3 dBm. If external reference is below +1 dBm nominal, the converter will automatically lock to the internal reference. Reference oscillator acts as an analog phase lock with a 0.1 Hz nominal loop bandwidth. Typical loop suppression of the external reference is as follows: 28 dB at 1 Hz offset; 65 dB at 10 Hz offset and 100 dB at 100 Hz offset.
G.	Self calibrating tracking reference with controlled slew rate. Internal reference tracks external reference and uses external reference to correct for aging of the internal reference. The internal reference changes frequency at a maximum rate of 0.06 ppm/second. When external reference is lost, the reference frequency is held at the previous value. Frequency stability on internal reference: ±5 x 10^{-8}, 0°C to 50°C, 1 x 10^{-9}/day typical (fixed temperature after 72 hour on time). 5 x 10^{-8}/year typical.
H.	Self calibrating tracking reference with controlled slew rate. Internal reference tracks external reference and uses external reference to correct for aging of the internal reference. The internal reference changes frequency at a maximum rate of 0.06 ppm/second. When external reference is lost, the reference frequency is held at the previous value. Frequency stability on internal reference: ±2 x 10^{-9}, 0°C to 50°C, 1 x 10^{-9}/day typical (fixed temperature after 72 hour on time). 5 x 10^{-8}/year typical.
15.	50 ohm IF impedance.
17.	Remote control.
C.	RS232 remote interface.
NRF.	Type N-female RF connector (Note: Monitor remains SMA female). RF return loss: 18 dB.
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 25T063. Protocols are backwards compatible with Technical Notes 25T010 and 25T009.

KEY FEATURES

- Supports expandable NSU 1:N Switchover Series (D-323)
- Amplitude slope adjust
- Three monitor and control ports:
  1. RS485/RS422 remote interface (J6A) changes to RS232 with Option 17C
  2. RS485/RS422 control interface (J7) is provided for use with NSU redundancy system (D-323) or as an alternative interface
  3. 10/100Base-T Ethernet interface (J6B)
- RF, IF and LO monitor ports
- Automatic switching to external 5/10 MHz reference and electronic adjust of internal reference frequency
- Low intermodulation distortion
- Better than IESS-308/309 compliant phase noise
- 64 programmable memory locations
- 30 dB level control
- External alarm input via contact closure
- Date and time-stamped event log
- CE Mark

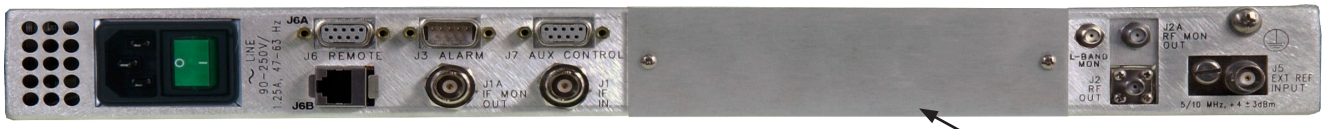
OPTIONS

- Higher Stability Reference
- Remote RS232
- 140 MHz IF Frequency
- 50 ohm IF Impedance
- Type “N” RF Connector

GENERAL SPECIFICATIONS

PRIMARY POWER REQUIREMENTS	
Voltage	100-240 VAC (–10%, +6%)
Frequency	47 – 63 Hz
Consumption	55 W typical, 65 W maximum
PHYSICAL	
Weight	12 pounds (5.4 kg) nominal
Chassis Dimensions	19” [482.6mm] x 175” [44.45mm] panel height x 22” [560mm] maximum (including connectors)
Connectors	
RF	SMA female (N female, Option NRF)
RF Monitor	SMA female
IF	BNC female
IF Monitor	BNC female
LO Monitors	SMA female
Alarm	DE-9P
External Reference	BNC female
Remote Interface	DE-9S for RS485, RS422 and RS232, RJ-45 female for Ethernet
Primary Power Input	IEC-320
Auxiliary Control Interface	DE-9S
ENVIRONMENTAL	
Operating	
Ambient Temperature	0°C to +50°C
Relative Humidity	Up to 95% at 30°C
Atmospheric Pressure	Up to 10,000 feet
Non-Operating	
Ambient Temperature	–50°C 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

TYPICAL REAR PANEL VIEW



RSM Switch Module Location
(see D323 for more information)

narda MITEQ
435 Moreland Road
Hauppauge, NY 11788
t 631.231.1700 | f 631.231.1711
componentsnm@nardamiteq.com