

# 9800 SERIES FREQUENCY CONVERTERS



## SINGLE BAND, SYNTHESIZED FREQUENCY UP- AND DOWNCONVERTERS FOR ALL SATCOM BANDS, L THROUGH Ka, AND TT&C APPLICATIONS



### FEATURES

- 1 kHz step size precise frequency selection
- Superior to IESS-308/IESS-309 phase noise
- Phase noise suppression of external reference
- Supports expandable NSU 1:N switchover series (D-323)
- Amplitude slope adjust
- Three monitor and control ports:
  1. RS-485/RS-422 remote interface (J6A) changes to RS-232 with Option 17C
  2. RS-485/RS-422 control interface (J7) is provided for use the NSU redundancy system (D-323) or as an alternative interface
  3. 10/100 Base-T Ethernet interface (J6B) HTTP based web server, SNMP 1.0 configuration, Telnet access, Firmware can be remotely updated over, Ethernet
- RF, IF and LO monitor ports
- Automatic locking to external 5/10 MHz reference and electronic frequency adjust of internal reference frequency
- Reference phase lock with memory and slew rate of 0.06 ppm/sec
- Low intermodulation distortion
- 64 programmable memory locations
- 30 dB level control
- External alarm input via contact closure
- Date and time-stamped event log
- AC power supply with power factor correction
- CE mark

### OPTIONS

- Higher stability reference
- Remote RS232
- 140 MHz IF frequency
- Higher gain (downconverter)
- Selectable 70/140 MHz IF frequency
- 50 ohms IF impedance
- Selectable 50/75 ohm IF impedance
- Multiple IF outputs (downconverter)
- Group delay equalization
- LO level alarm
- Smaller frequency step size 100 Hz/200 Hz
- 45 dB level control
- Type "N" IF or RF connector
- Type "TNC" RF connector
- Fiber optic RF-band interface
- 9400 series backwards compatibility
- Ultra-low phase noise with reference suppression
- Rear panel "U" link to bypass internal reference

L3 Narda-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.

The frequency converters include an internal tracking reference that will adjust to track the external reference with a controlled slew rate. The internal reference has memory and will maintain its last position relative to the external with the removal or loss of the external reference. Frequency will not jump upon connecting to or loss of external reference.

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.



# 9800 SERIES FREQUENCY CONVERTERS

SPECIFICATIONS	UPCONVERTER	DOWNCONVERTER
Type	Dual conversion	Dual conversion
Frequency step size	1 kHz	1 kHz
Frequency sense	No inversion	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), 18 dB minimum (Option 14)	20 dB minimum 17 dB minimum (27 GHz to 31 GHz)
Signal monitor	-20 dBc nominal	-20 dBc nominal (above 17.7 GHz, optional) 14 dB minimum (above 40 GHz)
LO leakage	N/A	-80 dBm maximum
Input level (nondamage)	+15 dBm maximum	+15 dBm maximum
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 (17 dB from 27 GHz to 31 GHz), 14 dB minimum (above 40 GHz)	26 dB minimum (70 ±20 MHz), 20 dB minimum (140 ±40 MHz), 18 dB minimum (Option 14)
Signal monitor	-20 dBc nominal (above 17.7 GHz, optional)	-20 dBc nominal
LO leakage	-75 dBm maximum	N/A
Power output (P1 dB)	+15 dBm minimum, +5 dBm minimum (above 40 GHz)	+20 dBm minimum
Transfer characteristics		
Gain	30 dB to 35 dB at 23 °C	55 dB to 61 dB at 23 °C (Option 16C)
Noise figure at minimum attenuation	15 dB maximum, 18 dB from 22 GHz to 31 GHz, 25 dB maximum (above 40 GHz)	12 dB maximum, 15 dB above 22 GHz
Image rejection	80 dB minimum	80 dB minimum
Level stability	±0.25 dB/day maximum at constant temperature ±0.5 dB typical from 0 °C to 50 °C	
Amplitude response	±0.25/±20 MHz; ±0.2/±18 MHz	
70 ±20 MHz	±0.25/±20 MHz; ±0.2/±18 MHz	
140 ±40 MHz	0.75 dB/±36 MHz	
Group delay (70 ±18 MHz)		
Linear	0.03 ns/MHz maximum	
Parabolic	0.01 ns/MHz <sup>2</sup> maximum	
Ripple	1 ns peak-to-peak maximum	
Group delay (140 ±36 MHz)		
Linear	0.025 ns/MHz maximum	
Parabolic	0.0035 ns/MHz <sup>2</sup> maximum	
Ripple	1 ns peak-to-peak maximum	
Intermodulation distortion (third order) two signals each at 0 dBm output	54 dBc minimum (+27 dBm IP3 pt.), 50 dBc minimum from 22 GHz to 31 GHz (+25 dBm IP3 pt.), 30 dBc minimum above 40 GHz (+15 dBm IP3 pt.)	60 dBc minimum (+30 dBm IP3 pt.)
AM/PM conversion	0.03 °/dB maximum to 0 dBm output	
Gain slope		
70 ±20 MHz	0.03 dB/MHz maximum (10 MHz maximum)	
140 ±40 MHz	0.05 dB/MHz maximum (10 MHz maximum)	
Spurious outputs	65 dBc up to 0 dBm output, 60 dBc from 22 GHz to 31 GHz, 60 dBc up to -5 dBm output above 40 GHz	
Signal related		
Signal independent	-70 dBm maximum, -65 dBm maximum (above 40 GHz)	-75 dBm maximum, -65 dBm maximum (Option 16C)

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



SPECIFICATIONS	UPCONVERTER	DOWNCONVERTER
Gain adjustment	30 dB in 0.2 dB steps	30 dB in 0.2 dB steps
Internal reference characteristics (see Option 10 and Note 1)	$\pm 2 \times 10^{-8}$ , 0 °C to 50 °C (higher stability options available, see Option 10) $\pm 5 \times 10^{-9}$ /day typical (fixed temperature after 24 hour on time)	
Upconverter mute	60 dB minimum	N/A
External reference input characteristics	5 MHz or 10 MHz, +4 $\pm 3$ dBm, Unit will automatically switch to internal reference with loss of external reference	
Phase noise	See chart	See chart
Primary power	100 VAC to 240 VAC (-10%, +6%), operational 90 VAC to 265 VAC, 47 Hz to 63 Hz 60 W typical	
Amplitude slope adjust	$\pm 3$ dB typical in 0.2 dB steps	$\pm 3$ dB typical in 0.2 dB steps
Noise power density	-124 dBm/Hz maximum, -121 dBm/Hz maximum above 22 GHz	N/A
Remote interface	RS-485/RS-422: 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.

## UPCONVERTERS

RF FREQUENCY (GHz)	MODEL NUMBER
<b>STANDARD FREQUENCY BAND</b>	
0.95 to 1.75	U-9848-1-1K
1.5 to 1.8	U-9848-2-1K
2 to 2.4	U-9848-4-1K
2.0 to 2.5	U-9848-7-1K
5.725 to 6.725	U-9853-6-1K
5.85 to 7.05	U-9853-7-1K
6.4 to 6.8	U-9853-7-1K
6.7 to 7.1	U-9853-2-1K
7.9 to 8.4	U-9854-1K
8.0 to 8.5	U-9854-1-1K
12.75 to 13.25	U-9855-2-1K
12.75 to 14.5	U-9856-7-1K
13.75 to 14.8	U-9856-6-1K
17.3 to 18.4	U-9857-2-1K
27.5 to 30	U-9858-5-1K
27.5 to 31	U-9858-3-1K
28.3 to 30	U-9858-4-1K
27 to 30	U-9858-5-1K
43.5 to 45.5	U-9859-4-1K
<b>REVERSE FREQUENCY BAND</b>	
3.4 to 4.2	U-9801R-1-1K
4.5 to 4.8	U-9802R-2-1K
7.25 to 7.75	U-9805R-1K
10.7 to 12.75	U-9808R-6-1K
17.7 to 21.2	U-9813R-4-1K
18.3 to 20.2	U-9813R-5-1K
19.2 to 20.2	U-9813R-2-1K
<b>TT&amp;C BAND (GHz)</b>	
2.02 to 2.12	U-9848-5-1K
2.2 to 2.3	U-9848-6-1K

## DOWNCONVERTERS

RF FREQUENCY (GHz)	MODEL NUMBER
<b>STANDARD FREQUENCY BAND</b>	
0.95 to 1.75	D-9800-3-1K
1.5 to 1.8	D-9800-2-1K
2 to 2.4	D-9800-6-1K
2.0 to 2.5	D-9800-9-1K
3.4 to 4.2	D-9801-1-1K
4.5 to 4.8	D-9802-2-1K
7.25 to 7.75	D-9805-1K
8 to 8.5	D-9805-1-1K
10.7 to 12.75	D-9808-6-1K
17.7 to 19.7	D-9813-6-1K
17.7 to 21.2	D-9813-4-1K
18.3 to 20.2	D-9813-5-1K
<b>REVERSE FREQUENCY BAND</b>	
5.725 to 6.725	D-9853R-6-1K
6.4 to 6.8	D-9853R-7-1K
6.7 to 7.1	D-9853R-2-1K
7.9 to 8.4	D-9854R-1K
12.75 to 13.25	D-9855R-2-1K
12.75 to 14.5	D-9856R-7-1K
13.75 to 14.8	D-9856R-6-1K
17.3 to 18.4	D-9857R-2-1K
27.5 to 31	D-9858R-3-1K
28.3 to 30	D-9858R-4-1K
27 to 30	D-9858R-5-1K
<b>TT&amp;C BAND (GHz)</b>	
2.02 to 2.12	D-9800-7-1K
2.2 to 2.3	D-9800-8-1K

# 9800 SERIES FREQUENCY CONVERTERS

## PHYSICAL

Weight..... 15 lb. [6.9 kg] nominal  
 Chassis dimensions ..... 19" [482.6 mm] x 1.75" [44.45 mm]  
 panel height x 20" [508 mm]  
 maximum

## Connectors

RF.....SMA female (2.92 mm above 26 GHz)  
 RF monitor.....SMA female (above 17.7 GHz optional)  
 IF and IF monitor.....BNC female  
 LO monitors.....SMA female  
 Alarm .....DE-9P  
 External reference .....BNC female  
 Remote interface.....DE-9S for RS-485, RS-422 and  
 RS-232, RJ-45 female for Ethernet  
 Primary power input ....IEC-320  
 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

### Nonoperating

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

## PHASE NOISE SPECIFICATIONS STANDARD

MODEL NUMBER	10	100	1 K	10 K	100 K	300 K	1 M
U-9848-1-1K	-57	-77	-92	-97	-99	-99	-117
U-9848-(2,4,5,6,7)-1K	-60	-78	-88	-96	-96	-96	-117
U-9853-(2,6,7)1K	-57	-77	-90	-97	-99	-99	-117
U-9854-1K, U-9854-1-1K	-57	-77	-90	-97	-99	-99	-117
U-9855-2-1K	-51	-69	-87	-91	-93	-93	-111
U-9856-6-1K	-50	-66	-87	-91	-93	-93	-111
U-9856-7-1K, U-9857-2-1K	-50	-66	-85	-90	-93	-93	-111
U-9858-(2,3,4,5)-1K	-49	-63	-69	-79	-91	-91	-109
U-9859-4-1K	-35	-56	-80	-82	-86	-90	-108
D-9800-3-1K	-57	-77	-92	-97	-99	-99	-117
D-9800-(2,6,7,8,9)-1K	-60	-78	-88	-96	-96	-96	-117
D-9801-1-1K, D-9802-2-1K	-57	-77	-93	-97	-99	-99	-117
D-9805-1K, D-9805-1-1K	-57	-77	-92	-97	-99	-99	-117
D-9808-6-1K	-51	-69	-87	-91	-93	-93	-111
D-9813-4-1K, D-9813-5-1K, D-9813-6-1K	-49	-63	-69	-79	-91	-91	-109

## REVERSE FREQUENCY CONVERTERS

U-9801R-1-1K, U-9802R-2-1K	-57	-77	-93	-97	-99	-99	-117
U-9805R-1K	-57	-77	-92	-97	-99	-99	-117
U-9808R-6-1K	-51	-69	-87	-91	-93	-93	-111
U-9813R-4-1K, U-9813R-5-1K, U-9813R-2-1K	-49	-63	-69	-79	-91	-91	-109
D-9853R-6-1K, D-9853R-2-1K	-57	-77	-90	-97	-99	-99	-117
D-9854R-1K	-57	-77	-90	-97	-99	-99	-117
D-9855R-2-1K	-51	-69	-87	-91	-93	-93	-111
D-9856R-6-1K	-50	-66	-87	-91	-93	-93	-111
D-9856R-7-1K	-50	-66	-85	-90	-93	-93	-111
D-9857R-2-1K	-50	-65	-85	-90	-93	-93	-111
D-9858R-2-1K, D-9858R-3-1K, D-9858R-4-1K	-49	-63	-69	-79	-91	-91	-109

### Maximum external reference to achieve above phase noise with 10 MHz reference

	1 K	10 K	100 K	300 K	1 M
Systems without Option 31, 10E, 10F, 10G or 10H	-160	-160	-160	-160	-160
Systems with Option 10E, 10F, 10G or 10H	-140	-140	-140	-140	-140

Note: For 5 MHz reference decrease phase noise by 6 dB.



<b>PHASE NOISE SPECIFICATIONS</b>	<b>OPTION 31 - ULTRA-LOW PHASE NOISE</b>								<b>Offset [Hz]</b>
<b>MODEL NUMBER</b>	<b>1 M</b>	<b>10</b>	<b>100</b>	<b>1 K</b>	<b>10 K</b>	<b>100 K</b>	<b>300 K</b>	<b>1 M</b>	
U-9848-1-1K	-117	-60	-80	-96	-100	-101	-101	-122	Maximum Phase Noise (dBc/Hz) (1 Hz bandwidth) Straight line curve defined by the points in the table
U-9848-(2,4,5,6,7)-1K	-117	-65	-86	-100	-102	-105	-107	-125	
U-9853-(2,6,7)1K	-117	-65	-85	-96	-99	-100	-100	-120	
U-9854-1K, U-9854-1-1K	-117	-62	-82	-96	-98	-100	-100	-120	
U-9855-2-1K	-111	-60	-79	-91	-93	-95	-95	-118	
U-9856-6-1K	-111	-59	-75	-91	-93	-95	-95	-118	
U-9856-7-1K, U-9857-2-1K	-111	-59	-75	-90	-92	-95	-95	-118	
U-9858-(2,3,4,5)-1K	-109	-56	-71	-84	-86	-91	-91	-113	
U-9859-4-1K	-108	-45	-64	-83	-85	-88	-90	-111	
D-9800-3-1K	-117	-60	-80	-96	-100	-101	-101	-122	
D-9800-(2,6,7,8,9)-1K	-117	-65	-86	-100	-102	-105	-107	-125	
D-9801-1-1K, D-9802-2-1K	-117	-65	-85	-96	-99	-100	-100	-120	
D-9805-1K, D-9805-1-1K	-117	-60	-80	-96	-100	-101	-101	-122	
D-9808-6-1K	-111	-60	-79	-91	-93	-95	-95	-118	
D-9813-4-1K, D-9813-5-1K, D-9813-6-1K	-109	-56	-71	-84	-86	-91	-91	-113	

<b>REVERSE FREQUENCY CONVERTERS</b>									
U-9801R-1-1K, U-9802R-2-1K	-117	-65	-85	-96	-99	-100	-100	-120	
U-9805R-1K	-117	-60	-80	-96	-100	-101	-101	-122	
U-9808R-6-1K	-111	-60	-79	-91	-93	-95	-95	-118	
U-9813R-4-1K, U-9813R-5-1K, U-9813R-2-1K	-109	-56	-71	-84	-86	-91	-91	-113	
D-9853R-6-1K, D-9853R-2-1K	-117	-65	-85	-96	-99	-100	-100	-120	
D-9854R-1K	-117	-62	-82	-96	-98	-100	-100	-120	
D-9855R-2-1K	-111	-60	-79	91	-93	-95	-95	-118	
D-9856R-6-1K	-111	-59	-75	-91	-93	-95	-95	-118	
D-9856R-7-1K	-111	-59	-75	-90	-92	-95	-95	-118	
D-9857R-2-1K	-111	-59	-75	-90	-92	-95	-95	-118	
D-9858R-2-1K, D-9858R-3-1K, D-9858R-4-1K	-109	-56	-71	-84	-86	-91	-91	-113	

<b>Maximum External Reference To Achieve Above Phase Noise with 10 MHz Reference</b>					
	<b>1K</b>	<b>10K</b>	<b>100K</b>	<b>300K</b>	<b>1M</b>
Systems without Option 31, 10E, 10F, 10G or 10H	-160	-160	-160	-160	-160
Systems with Option 10E, 10F, 10G or 10H	-140	-140	-140	-140	-140

Note: For 5 MHz reference decrease phase noise by 6 dB.

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## OPTIONS

Missing option numbers are not applicable for this product.

1. 45 dB level control.
4. 140 MHz IF frequency.
5. Group delay equalization. 1 ns p-p maximum/70  $\pm$ 18 MHz IF output. 2 ns p-p maximum/140  $\pm$ 36 MHz IF output.
8. LO level detect. Summary alarm is generated for loss of power in any of the required local oscillators.
10. Higher frequency stability reference.
  - C.  $\pm 2 \times 10^{-9}$ , 0 °C to 50 °C, 1  $\times 10^{-9}$ /day typical (fixed temperature after 24 hour on time).
  - E.  $\pm 5 \times 10^{-9}$ , 0 °C to 50 °C, 1  $\times 10^{-9}$ /day typical (fixed temperature after 24 hour on time). See Note 1 below.
  - F.  $\pm 2 \times 10^{-9}$ , 0 °C to 50 °C, 1  $\times 10^{-9}$ /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  $\pm$ 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:  $\pm 5 \times 10^{-8}$ , 0 °C to 50 °C, 1  $\times 10^{-9}$ /day typical (fixed temperature after 72 hour on time). 5  $\times 10^{-8}$ /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:  $\pm 2 \times 10^{-9}$ , 0 °C to 50 °C, 1  $\times 10^{-9}$ /day typical (fixed temperature after 72 hour on time). 5  $\times 10^{-8}$ /year typical
14. Front panel selectable 50/75 ohm IF impedance (If return loss 18 dB).
15. 50 ohm IF impedance.
- 16C. Higher gain (downconverters): 55 dB to 61 dB gain.
  17. Remote control.
    - C. RS-232 remote interface.
18. Multiple IF output module (downconverter only; not compatible with NSUN, or Option 14).
  - 4. Four IF outputs.
  - 8. Eight IF outputs.

Output 1 dB compression point: +10 dBm.

Intermodulation distortion at 0 dBm output: 40 dBc minimum (+20 dBm IP3).
19. RF-Band fiber optic interface (available 0.95 GHz to 18 GHz; not compatible with NSU).
  - A. Upconverter output transmitter. Fiber: 9/125 (single mode fiber), Wavelength: 1540 nm to 1560 nm, Optical power in fiber: 4 mW typical, Connector: FC/APC
  - B. Downconverter input receiver. Fiber: 9/125 (single mode fiber), Wavelength: 1300 nm to 1560 nm nominal, Connector: FC/APC
20. Selectable 70 MHz and 140 MHz IF frequencies. One IF connector provided at rear panel (BNC female).

Selection of IF frequency is available from the front panel and over the remote bus.



## OPTIONS (CONT.)

Missing option numbers are not applicable for this product.

- 23B. An internal 10 MHz reference is provided. The internal 10 MHz reference is brought out of and back into the rear panel with a “U” link coaxial cable (SMA connectors). This allows, after “U” link removal, insertion of an external 10 MHz reference input (+4 ±3 dBm)
30. 9400 compatible.
- Remote command set compatible with RSU product line.
- Redundancy status and summary alarm status on separate 9-pin ‘D’ connectors per 9400 series.
- Chassis 2 RU rack-mountable with rear panel power switch.
- Downconverter gain: 30 dB minimum (higher gain options available see below),  
 $P_{Out}$  1 dB +10 dBm minimum, noise figure 12 dB maximum.
- Options 16A. 40 dB minimum gain,  $P_{Out}$  1 dB +20 dBm minimum
- Options 16C. 50 dB minimum gain,  $P_{Out}$  1 dB +20 dBm minimum
- Upconverter gain: 20 dB minimum (higher gain options available see below),  
 $P_{Out}$  1 dB +5 dBm minimum, noise figure 25 dB maximum.
- Options 11B. 30 dB minimum gain,  $P_{Out}$  1 dB +10 dBm minimum, noise figure 25 dB maximum
- Dedicated RS-422/RS-485 remote (J10).
- Ethernet remote (J6B).
- RS-422/RS-485 or RS-232 (J6A).
- Supports expandable NSU 1:N Switchover Series (D-323).
- “N” RF connectors below 10 GHz.
- Electrical specifications per datasheet (D-148).
- Consult factory for front panel and display operations.
- 31A. Ultra-low phase noise (See Phase Noise Specifications chart). Included with Options 10G and 23B (internal reference U-link, see Option 23B for more details). An external 10 MHz reference may be applied to the U-link. Higher frequency stability available with Option 31B.
- 31B. Ultra-low phase noise (See Phase Noise Specifications chart). Included with Options 10H and 23B (internal reference U-link, see Option 23B for more details). An external 10 MHz reference may be applied to the U-link.
- 31C. 5 MHz reference only (no internal provided) at +4 ±3 dBm. With no reference suppression there is direct reference multiplication inside 100 kHz. See below for calculation of required external reference phase noise (for Option 31C or 31D).
- 31D. 10 MHz reference only (no internal provided) at +4 ±3 dBm. With no reference suppression there is direct reference multiplication inside 100 kHz. See below for calculation of required external reference phase noise (for Option 31C or 31D). Formula for calculation of external reference only (Option 31C or 31D):  
External reference phase noise required to meet the ultra phase noise system characteristics.  
(U-20 log (M) -3) dBc/Hz.  
Where U is the ultra phase noise characteristic at a specific frequency offset for a specific model and M is the multiplication factor of the reference frequency (5 MHz or 10 MHz) divided into the operational RF frequency ( $F_O$ ) of the model selected.  
 $M = F_O$  (MHz)/10 (MHz) or  $F_O$  (MHz)/5 (MHz)  
33.9600/9700 compatible phase noise.
33. 9600/9700 compatible phase noise.

# 9800 SERIES FREQUENCY CONVERTERS

## OPTIONS (CONT.)

Missing option numbers are not applicable for this product.

TNCIF. Type TNC female IF connector and IF monitor.

NRF. Type N female RF connector (Note: Monitor remains SMA female). RF return loss: 18 dB, 9 GHz to 15 GHz, (N/A above 15 GHz).

TNCRF. Type TNC female RF connector (Note: Monitor remains SMA female). RF return loss: 18 dB, 9 GHz to 15 GHz, (N/A above 15 GHz).

Notes: For literature describing local control (front panel) and remote control (bus 0 protocols), refer to L3 Narda-MITEQ Technical Note 25T063. Protocols are backwards compatible with Technical Notes 25T010 and 25T009.

## 9800 SERIES CONVERTER REAR VIEW PANELS



The material presented in this datasheet was current at the time of publication. L3 Narda-MITEQ's continuing product improvement program makes it necessary to reserve the right to change our mechanical and electrical specifications without notice. If either of these parameters is critical, please contact the factory to verify that the information is current.

This material consists of L3 Narda-MITEQ general capabilities information and does not contain controlled technical data as defined within the International Traffic in Arms (ITAR) Part 120.10 or Export Administration Regulations (EAR) Part 734.7-11.  
D-325H/01.03.17

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