



X99 SERIES DUAL CONVERSION SYNTHESIZED SATCOM FREQUENCY CONVERTERS



STANDARD FEATURES

- Amplitude slope adjust
- RS422, RS485 and 10/100 Base-T Ethernet
- Serial output for GNU 1:N Redundancy Switchover units
- Three monitor and control ports:
- RF and IF monitor ports
- Automatic switching to external 5/10 MHz reference
- Electronic adjustment of internal reference frequency
- Low intermodulation distortion
- Phase noise IESS-308/309 compliant
- 30 dB level control
- Independent input level control (upconverters only)
- External alarm input
- Elapsed time and event log after power turn on
- CE mark

OPTIONS

- 140 MHz IF frequency
- Switchable 70/140 MHz IF frequencies
- Reference clean-up loop and improved frequency stability
- Optimized phase noise
- 50 ohm IF impedance

The GeoSync Microwave Converters are designed to simultaneously provide high performance, high reliability and high value, and are available for operation in either C-, Ku-or DBS-band

The low phase noise and excellent dynamic range of these converters enable them to carry almost any type of analog or digital communications signals.

Multiple remote connections and a robust protocol provide strong M&C support.

UPCONVERTERS

Model Number	RF Frequency (GHz)
UTR-9953-6-1K	5.725-6.725
UTR-9956-7-1K	12.75-14.50
UTR-9956-6-1K	13.75-14.80
UTR-9957-2-1K	17.3-18.4

DOWNCONVERTERS

Model Number	RF Frequency (GHz)
DTR-9901-1-1K	3.4-4.2
DTR-9908-6-1K	10.7-12.75

SPECIFICATIONS	UPCONVERTER	DOWNCONVERTER
Type	Dual conversion	
Frequency Step Size	1 kHz	
Frequency Sense	No inversion	

INPUT CHARACTERISTICS

Frequency	70 ±20 MHz (140 ±40 MHz, Option 1-1)	Refer to model number table
Impedance	75 ohms (50 Ohms option 1-15)	50 ohms
Return Loss	20 dB minimum	20 dB minimum
Signal Monitor	-20 dBc nominal	
Input Level (Non-damage)	15 dBm maximum	

OUTPUT CHARACTERISTICS

Frequency	Refer to model number table	70 ±20 MHz (140 ±40 MHz, Option 1-1)
Impedance	50 ohms	75 ohms (50 ohms option 1-15)
Return Loss	20 dB minimum	20 dB minimum
Signal Monitor	-20 dBc nominal	
Power Output (1 dB Compression)- C- and S-band	16 dBm minimum/17 dBm typical	
X-, Ku- and DBS-band	10 dBm minimum/12 dBm typical	16 dBm minimum/17 dBm typical

TRANSFER CHARACTERISTICS

Gain	31 to 34 dB at 23°C	44 to 48 dB at 23°C
Level Control	30 dB in 0.2 dB steps	
Input Level Control	20 dB in 0.2 dB steps	N/A
Level Stability	±0.25 dB/day maximum at constant temperature ±0.5 dB typical from 0 to 50°C	
Amplitude Response	0.5 dB peak-to-peak/40 MHz maximum, 70 MHz IF 0.75 dB peak-to-peak/80 MHz maximum, 140 MHz IF (Option 1-1)	
Gain Slope	0.03 dB/MHz typical, 0.05 dB/MHz maximum (10 MHz minimum)	
Slope Adjust	±3 dB typical in 0.2 dB steps	
Noise Figure at Minimum Attenuation	N/A	11 dB maximum
Noise Power Density	-125 dBm/Hz maximum	N/A
Image Rejection	N/A	80 dB minimum
Group Delay (70 ±18 MHz)		
Linear	0.03 ns/MHz maximum	
Parabolic	0.01 ns/MHz ² maximum	
Ripple	1 ns peak-to-peak maximum	
Group Delay (140 ±36 MHz)-		
Linear	0.025 ns/MHz maximum	
Parabolic	0.0035 ns/MHz ² maximum	
Ripple	1 ns peak-to-peak maximum	

TRANSFER CHARACTERISTICS*(Continued)*-

	UPCONVERTER	DOWNCONVERTER
Third Order Intermodulation Distortion (Two tones each at 0 dBm output)-		
C-band and S-band	55 dBc minimum (+27.5 dBm IP3)	60 dBc minimum (+30 dBm IP3)
Ku-band and DBS-band	45 dBc minimum (+22.5 dBm IP3)	60 dBc minimum (+30 dBm IP3)
AM/PM Conversion	0.1°/dB maximum to 0 dBm output	
Spurious Outputs (Inband)-		
Signal Related	65 dBc up to 0 dBm output	
Signal Independent	-75 dBm maximum	
LO Leakage at RF	-75 dBm maximum	-80 dBm maximum
Frequency Stability	$\pm 2 \times 10^{-8}$, 0 to 50°C	
Frequency Aging	5 x 10 ⁻⁹ /day, after 24 hours on time	
Frequency Accuracy	Same as Frequency Reference	
External Reference	5 or 10 MHz, +4 ±3 dBm Automatic switch to the internal reference if the external reference level falls below +1 dBm nominal	
Upconverter Mute	80 dB minimum	N/A

PHASE NOISE

	Frequency Offset maximum/typical (dBc/Hz)						
RF BAND	10 Hz	100 Hz	1 kHz	10 kHz	100 kHz	300 kHz	1 MHz
C-BAND	-63/-69	-80/-85	-95/-97	-97/-100	-97/-104	-97/-106	-115/-123
Ku-BAND	-50/-71	-66/-85	-87/-93	-91/-96	-93/-96	-93/-104	-111/-122
DBS-BAND	-50/-70	-66/-83	-87/-90	-90/-93	-93/-96	-93/-101	-111/-120
Required maximum reference							
10 MHz	-120	-145	-160	-160			

Note: 40 Hz nominal loop bandwidth on 10 MHz oscillator provides 24 dB typical spurious rejection at 100 Hz offset, 44 dB typical at 1 KHz.

Add 6 dB for 5 MHz reference.

REMOTE CONTROLS

Serial Interface	RS485/RS422
Ethernet Interface	10/100Base-T Ethernet interface providing:
	-HTTP-based web server
	-SNMP1.0 configuration (Geosync MIB file, new driver required)
	-Alarm reporting via SNMP Trap
	-Telnet Access
	-Password protection

INDICATOR and ALARMS

Remote Mode	Green LED (front panel)
Alarm	Red LED (front panel)
Summary Alarm	Contact closure/open for DC voltage and local oscillator

OPTIONS (CONTINUED)

76-1. 140 MHz IF frequency

76-2. Selectable 70 MHz and 140 MHz IF frequencies.

One IF connector provided (BNC female).

Selection of IF frequency is available over the remote bus.

76-3 Reference clean-up loop and improved frequency stability

Reference oscillator acts as a 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

Frequency stability: $\pm 2 \times 10^{-9}$, 0 to 50°C

Frequency aging: 1×10^{-9} per day after 24 hours operation preceded by 10 days of operation

76-15 50 ohm IF impedance

NRF. Type N female RF connector (RF monitor remains SMA female)

PRIMARY POWER REQUIREMENTS

Voltage..... 100-240 VAC, operational 90-250 VAC

Frequency..... 47-63 Hz

Consumption..... 40W typical

PHYSICAL

Weight 10 pounds (4.5kg) nominal without rack slides

14 pounds (6.4kg) nominal with rack slides

Chassis Dimensions 19" x 1.75" panel height x 20" maximum
(RSM2 switch module slot in rear of chassis)

Connectors-

RF SMA female (N optional)

IF BNC female

RF Monitor SMA female

IF Monitor BNC female

External Reference BNC female

Summary Alarm DE-9P

Remote Interface DE-9S for RS485, RS422

RJ-45 female for Ethernet

Primary Power IEC-60320-C13/C14

Redundancy Interface DE-9P

ENVIRONMENTAL

Operating-

Ambient Temperature 0 to 50°C

Relative Humidity Up to 95% at 30°C

Altitude Up to 10,000 feet

Non-operating-

Ambient Temperature -50 to 70°C

Relative Humidity Up to 95% at 40°C

Altitude Up to 40,000 feet

Shock and Vibration Normal handling by commercial carriers

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GS_76, Rev A NOV 2020

