

9000 Series Communication Converters

Single Conversion Crystal Oscillator Reference



This series of single-conversion converters operates in the standard L and S communication bands.

Input Frequency (GHz)	Output Frequency (GHz)	Model Number
Upconverters		
-	0.95 - 1.75	U-9068-1
-	2.2 - 2.3	U-9069
Downconverters		
0.95 - 1.75	-	D-9020-3
1.5 - 1.8	-	D-9020-2
2.2 - 2.3	-	D-9020

Features

- Single conversion with phase-locked oscillator
- Low intermodulation distortion
- No spectral inversion
- Low phase noise
- Status monitors
- Summary alarm
- Remote mute via contact closure (upconverters only)
- Gain control, 30 dB
- IF signal monitor
- Automatic switching to external 5/10 MHz reference

Options

- Output amplifier for increased dynamic range (upconverters)
- Higher frequency stability reference
- Fully redundant operation
- RF signal monitor
- Increased RF/IF gain (downconverters)

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2.2 - 2.3	-	D-9020

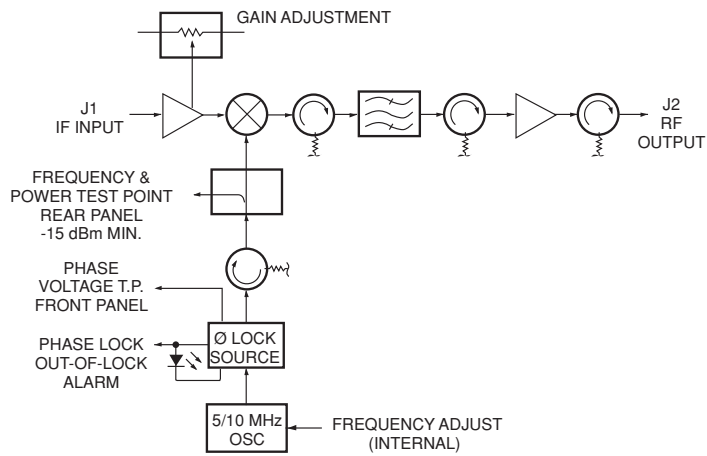
Note: Frequency of operation must be specified at time of order. The operational bandwidth of the unit is 40 MHz (80 MHz optional). Downconverter example, if model number D-9020 is ordered with a 2.295 GHz frequency of operation, the operating bandwidth will be 2.295 GHz $\pm$ 20 MHz (or 2.295 GHz $\pm$ 40 MHz with Option 4). There is no frequency tuning in this series of converters. Upconverter example, if model number U-9068-1 is ordered with a 1.425 GHz frequency of operation, the operating bandwidth will be 1.425 GHz $\pm$ 20 MHz (or 1.425 GHz $\pm$ 40 MHz with Option 4). There is no frequency tuning in this series of converters.

Specifications	Upconverters	Downconverters
Type	Single conversion	
Tunability	None	
Frequency sense	No inversion	
Input characteristics		
Frequency	70 $\pm$ 20 MHz (140 $\pm$ 40 MHz, Option 4)	Refer to model number table
Impedance	75 ohms (50 ohms, Option 15)	50 ohms
Return loss	26 dB minimum (20 dB minimum, 140 $\pm$ 40 MHz)	18 dB minimum
Output characteristics		
Frequency	Refer to model number table	70 $\pm$ 20 MHz (140 $\pm$ 40 MHz, Option 4)
Impedance	50 ohms	75 ohms (50 ohms, Option 15)
Return loss	18 dB minimum	26 dB minimum (20 dB minimum, 140 $\pm$ 40 MHz)
Power output (1 dB compression)	-5 dBm nominal (up to +10 dBm with optional output amplifiers, refer to options)	+15 dBm typical, +10 dBm minimum
Transfer characteristics		
Noise figure	N/A	15 dB maximum
Gain	11 dB nominal (at minimum attenuation)	30 dB nominal (higher gain optional)
Image rejection	70 dB minimum	
Level stability	$\pm$ 0.25 dB/day maximum at constant temperature	
Bandwidth (0.5 dB)	40 MHz minimum (25°C $\pm$ 10°C), 10 MHz minimum (0 to 50°C)	
(0.75 dB)	80 MHz minimum (25°C $\pm$ 10°C, Option 4)	
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	0.02 dB/MHz maximum
LO radiation	-60 dBm maximum (output)	-60 dBm maximum (input)
Gain adjustment	30 dB minimum, continuously variable	
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 minimum	N/A
Automatic reference option	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.	

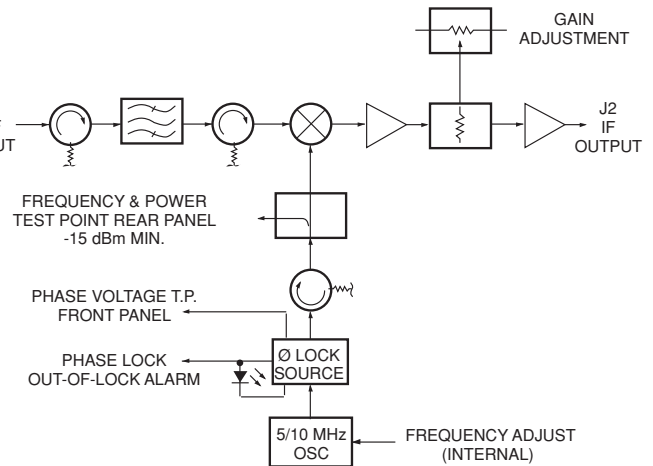
Note: Local oscillator frequency is 70 MHz below output carrier frequency (upconverter only).

Representative Block Diagrams

Upconverter



Downconverter



Options

- High performance phase noise (dBc/Hz) (maximum/typical).

LO Frequency	Offset [Hz]					
	10	100	1K	10K	100/300K	1M
Below 2.0 GHz, Level (dBc/Hz)	-67	-97	-117	-125	-125	-145
Above 2.0 GHz, Level (dBc/Hz)	-54	-78	-108	-116	-119	-136
External Reference	-120	-150	-160	-160	-160	-160

- RF Signal monitor.
- 140 MHz IF frequency.
Return loss (140 ±40 MHz): 20 dB minimum
- Higher frequency stability reference.
 - $\pm 5 \times 10^{-9}$, 0 to 50°C,
1 x 10⁻⁹/day typical (fixed temperature after 24 hour on time).
 - $\pm 2 \times 10^{-9}$, 0 to 50°C,
1 x 10⁻⁹/day typical (fixed temperature after 24 hour on time).
- Increased output power (upconverters).
 - +5 dBm minimum power output (1 dB compression).
 - +10 dBm minimum power output (1 dB compression).
- 50 ohm IF impedance.
- Higher gain option (downconverters).
 - 40 dB RF/IF gain.
 - 50 dB RF/IF gain.

Notes: Missing option numbers are not applicable for this product.

General Specifications

Primary Power Requirements

Voltage.....	90–250 VAC
Frequency.....	47–63 Hz
Power consumption	25 W typical

Summary Alarm

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

Physical

Weight.....	25 pounds nominal
Overall dimensions	19" x 1.75" panel height x 22" maximum (chassis depth 20")
Rear panel connectors	
RF	N female
IF	BNC female
External reference input	BNC female
Summary alarm	DE-9P
Redundancy alarm	DE-9P
Test points.....	LO frequency/power monitor (SMA female), LO phase-lock voltage (jack), DC voltage (jack)
Remote mute (upconverters only)	DE-9P

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

