



9000 SERIES

COMMUNICATION CONVERTERS

Single Conversion Crystal Oscillator Reference



This series of single-conversion converters operates in the standard communication bands. Crystal oscillator options offer a wide range of frequency stabilities.

OPTIONS

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

FEATURES

- **Single conversion with phase-locked mechanically tunable 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**

UPCONVERTERS

Model Number	Output Frequency (GHz)	Phase Noise Characteristic
U-9068-1	0.95–1.75	A
U-9069	2.2–2.3	A
U-9071	3.625–4.2	B
U-9073	5.85–6.425	B
U-9073-2	6.7–7.1	C
U-9074	7.9–8.4	C
U-9075	11.7–12.2	D
U-9075-1	12.2–12.75	D
U-9076-1	12.75–13.25	D
U-9076	14.0–14.5	E

Note: Frequency of operation must be specified at time of order. The operational bandwidth of the unit is 40 MHz (80 MHz optional). For example, if model number U-9076 is ordered with a 14.25 GHz frequency of operation, the operating bandwidth will be 14.25 GHz \pm 20 MHz (or 14.25 GHz \pm 40 MHz with Option 4). There is no frequency tuning in this series of converters.

GENERAL SPECIFICATIONS

Type	Single conversion
Tunability.....	None
Frequency sense	No inversion
Input characteristics	
Frequency	70 \pm 20 MHz (140 \pm 40 MHz, Option 4)
Impedance	75 ohms (50 ohms, Option 15)
Return loss	26 dB minimum
Output characteristics	
Frequency	Refer to model number and table
Impedance	50 ohms
Return loss	18 dB minimum
Power output (1 dB compr.)	-5 dBm nominal (up to +10 dBm with optional output amplifiers, refer to options)
Transfer characteristics	
Gain	11 dB nominal (at minimum attenuation)
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
AM/PM conversion.....	0.1°/dB maximum to -15 dBm output
Gain slope	0.02 dB/MHz maximum
LO radiation.....	-60 dBm maximum (output)
Gain adjustment.....	30 dB minimum, continuously variable
Frequency stability	\pm 1 \times 10 ⁻⁷ , 0 to 50°C (higher stability options available) 1 \times 10 ⁻⁸ /day typical (fixed temperature)
Upconverter mute.....	60 dB minimum

Note: Local oscillator frequency is 70 MHz below output carrier frequency.

DOWNCONVERTERS

Model Number	Input Frequency (GHz)	Phase Noise Characteristic
D-9020-3	0.95–1.75	A
D-9020-2	1.5–1.8	A
D-9020	2.2–2.3	A
D-9022	3.625–4.2	B
D-9022-2	4.5–4.8	B
D-9024	5.85–6.425	B
D-9025	7.25–7.75	C
D-9026	7.9–8.5	C
D-9028-2	10.7–11.7	D
D-9029	11.7–12.2	D
D-9030	12.2–12.75	D
D-9031	14.0–14.5	E

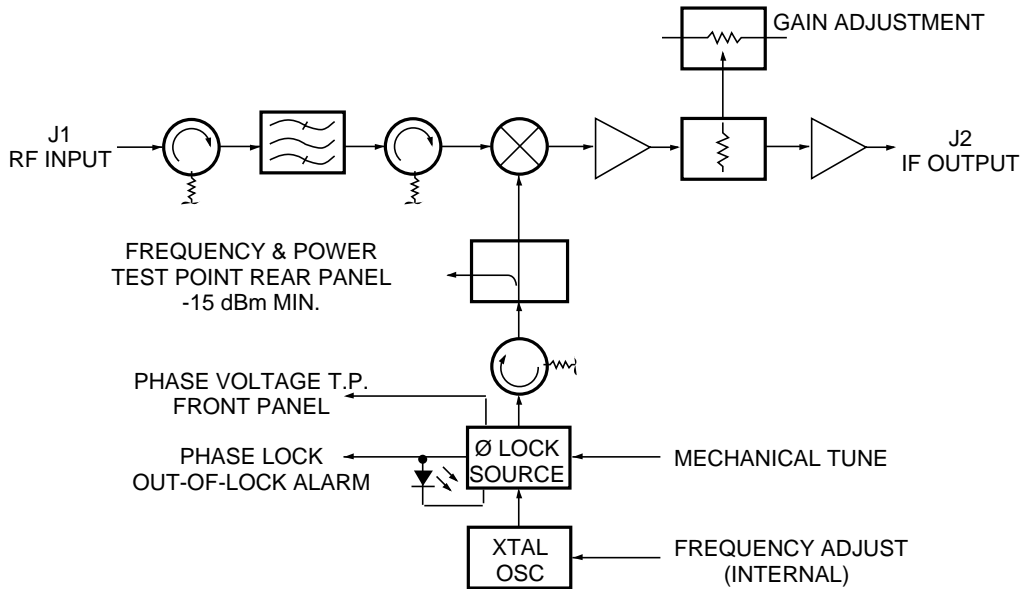
Note: Frequency of operation must be specified at time of order. The operational bandwidth of the unit is 40 MHz (80 MHz optional). For example, if model number D-9029 is ordered with an 11.95 GHz frequency of operation, the operating bandwidth will be 11.95 GHz \pm 20 MHz (or 11.95 GHz \pm 40 MHz with Option 4). There is no frequency tuning in this series of converters.

GENERAL SPECIFICATIONS

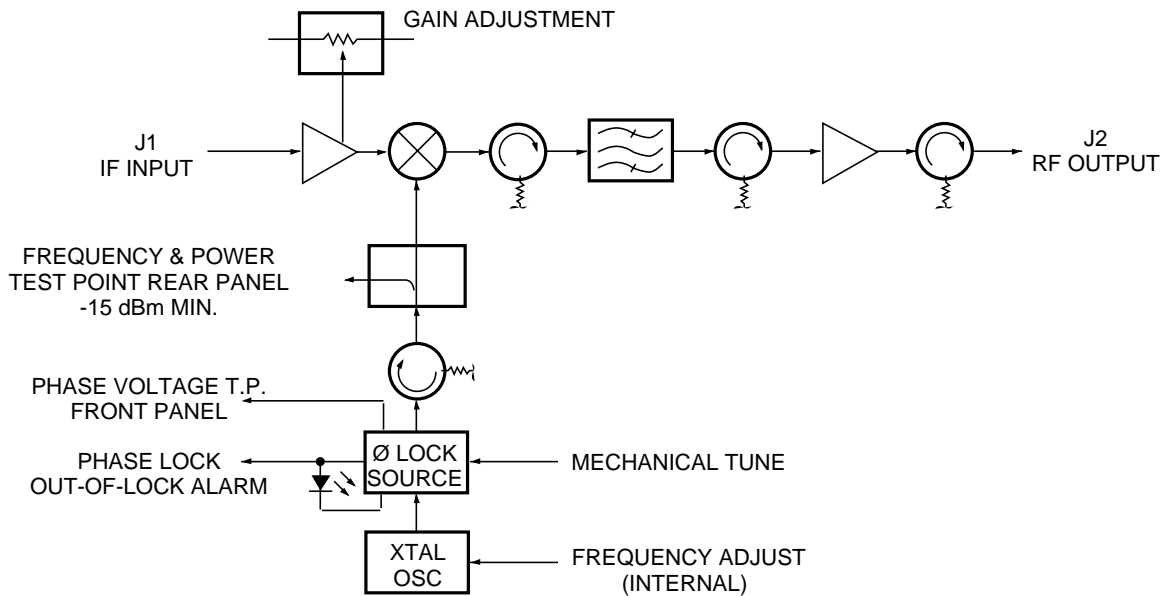
Type	Single conversion
Tunability	None
Frequency sense	No inversion
Input characteristics	
Frequency	Refer to model number and table
Impedance	50 ohms
Return loss	18 dB minimum
Output characteristics	
Frequency	70 \pm 20 MHz (140 \pm 40 MHz Option 4)
Impedance	75 ohms (50 ohms, Option 15)
Return loss	26 dB minimum
Power output (1 dB compr.)	+15 dBm typical, +10 dBm minimum
Transfer characteristics	
Noise figure	15 dB maximum
Gain	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)	With two -10 dBm output signals, 60 dBc minimum
AM/PM conversion	0.1°/dB maximum to +5 dBm output
Gain slope	0.02 dB/MHz maximum
LO radiation	-60 dBm maximum (input)
Gain adjustment	30 dB minimum, continuously variable
Frequency stability	\pm 1 x 10 ⁻⁷ , 0 to 50°C (higher stability options available) 1 x 10 ⁻⁸ /day typical (fixed temperature)

TYPICAL BLOCK DIAGRAMS

DOWNCONVERTER



UPCONVERTER

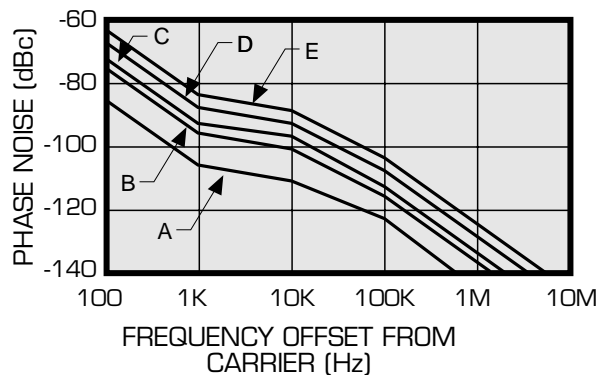


OPTIONS

2. **A.** RF Signal monitor.
4. 140 MHz IF frequency.
5. Higher frequency stability reference (0 to 50°C).
 - A.** $\pm 1 \times 10^{-8}$, 0 to 50°C.
2 x 10⁻⁹/day typical (fixed temperature).
6. Redundant operation. Refer to separate data sheet for switchover unit with local/remote and auto/manual control features.
11. Increased output power (upconverters).
 - A.** +5 dBm minimum power output (1 dB compression).
 - B.** +10 dBm minimum power output (1 dB compression).
15. 50 ohm IF impedance.
16. Higher gain option (downconverters).
 - A.** 40 dB RF/IF gain.
 - C.** 50 dB RF/IF gain.

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

**TYPICAL
PHASE NOISE CHARACTERISTICS
(1.0 Hz BANDWIDTH)**



COMMUNICATION CONVERTERS

PRIMARY POWER REQUIREMENTS

Voltage	90-250 VAC
Frequency	47-63 Hz
Power consumption	80 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 19" maximum (chassis depth 20")
Rear panel connectors	
RF	N female below RF of 10 GHz, SMA female above RF of 10 GHz
IF	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	Standard operating bandwidth of ± 5 MHz minimum, 0 to 50°C, ± 20 MHz minimum, 25°C ± 10 °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



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