EDCRO – 200

COAXIAL RESONATOR OSCILLATORS

EXTERNAL REFERENCE

APPLICATION

- Commercial
- Military
- Airborne
- Space
- Missile Guidance
- Cable TV Links (CATV)
- Satellite Communications
- Local Area Networks (LAN)
- Global Positioning Systems (GPS)
- Transmitters & Receivers
- Up / Down Converters
- Test Equipment
- Digital Radios
- Point to Point Relays
- LMDS

ISO 9001:2008 REGISTERED FIRM

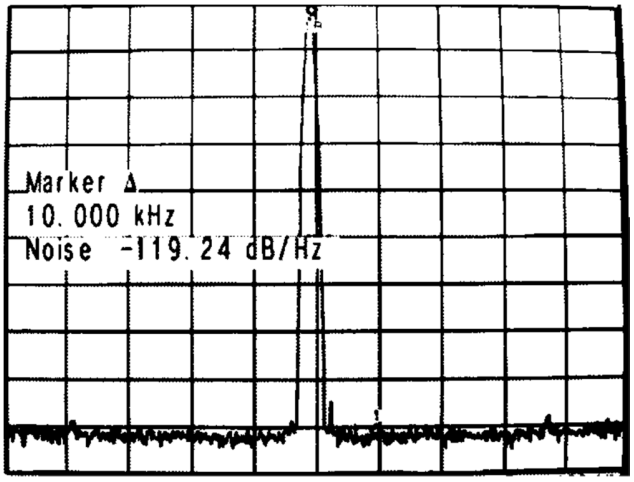
DESCRIPTION

EDCRO-200 is a stable ceramic based, sampling phase locked oscillator.

FEATURES

- Low Cost
- External Reference
- Military/Commercial Applications
- Low Phase Noise
- 400 MHz to 4 GHz
- Spurious: -70 dBc standard
- Stability and “close-in” Phase Noise dependent on reference

TYPICAL PHASE NOISE GRAPH OF 960MHz UNIT



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TYPICAL PERFORMANCE CHARACTERISTICS

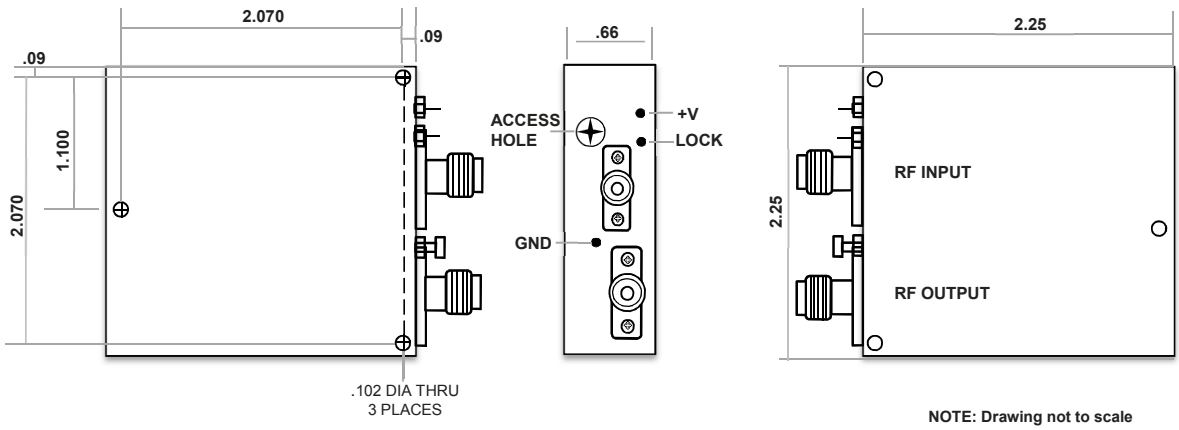
Electrical Performance @ 25°C

PARAMETER	SYMBOL	MINIMUM	TYPICAL	MAXIMUM	UNITS
Output Frequency	F_o	400		4000	MHz
Output Power	Po	+12	+13	+15	dBm
Input Frequency (sub-multiple of output)	F_o	50		100	MHz
Input Power	Po	0	+3	+6	dBm
Operating Temperature	Top	0		50	°C
Supply Voltage	Vcc		+15		V
Supply Current (no load)	Icc			175	mA
Frequency Stability, 0° to 50°C	FSTAB		Reference Dependent		ppm
Input VSWR	VSWRi			2.0:1	
Output VSWR	$VSWR_o$			2.0:1	
Spurious Signals			70	60	dBc
Harmonics			25		dBc
Lock Voltage	VL		+5		VDC
Unlock Voltage	VU		0		VDC

TYPICAL SINGLE SIDEBAND PHASE NOISE

(dBc/Hz)

Offset from Carrier	10 KHz	100 KHz	I MHz	10 MHz
Phase Noise	Reference Dependent	125 dBc	150 dBc	160 dBc



NOTE: Drawing not to scale

OUTLINE DRAWING

EDCRO – 300

COAXIAL RESONATOR OSCILLATORS

INTERNAL REFERENCE

APPLICATION

- Commercial
- Military
- Airborne
- Space
- Missile Guidance
- Cable TV Links (CATV)
- Satellite Communications
- Local Area Networks (LAN)
- Global Positioning Systems (GPS)
- Transmitters & Receivers
- Up / Down Converters
- Test Equipment
- Digital Radios
- Point to Point Relays
- LMDS

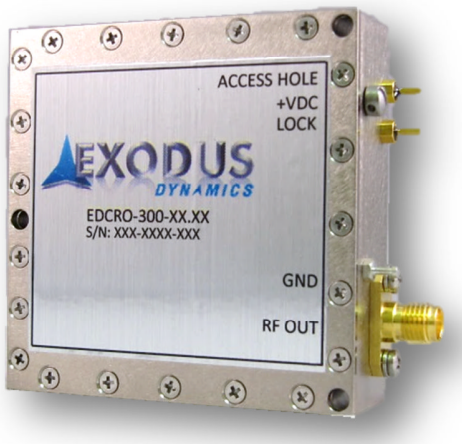
ISO 9001:2008 REGISTERED FIRM

DESCRIPTION

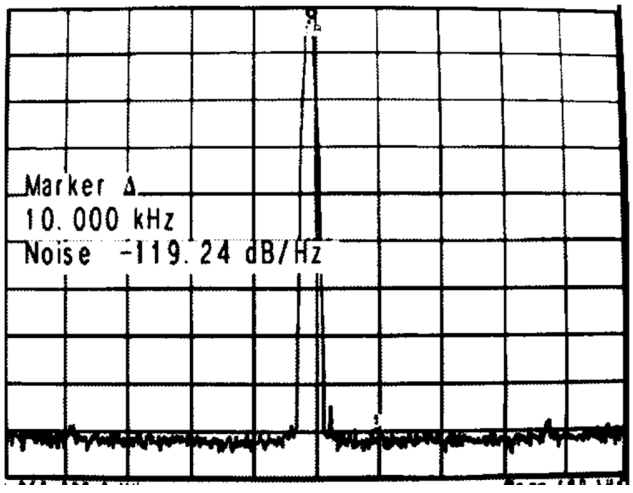
EDCRO-300 is a stable ceramic based, sampling phase locked oscillator.

FEATURES

- Low Cost
- Military/Commercial Applications
- Low Phase Noise
- Internal Reference
- 400 MHz to 4 GHz
- Spurious: -70 dBc standard
- Stability: ±20 ppm standard, ±2 ppm optional



TYPICAL PHASE NOISE PLOT OF 960MHz UNIT



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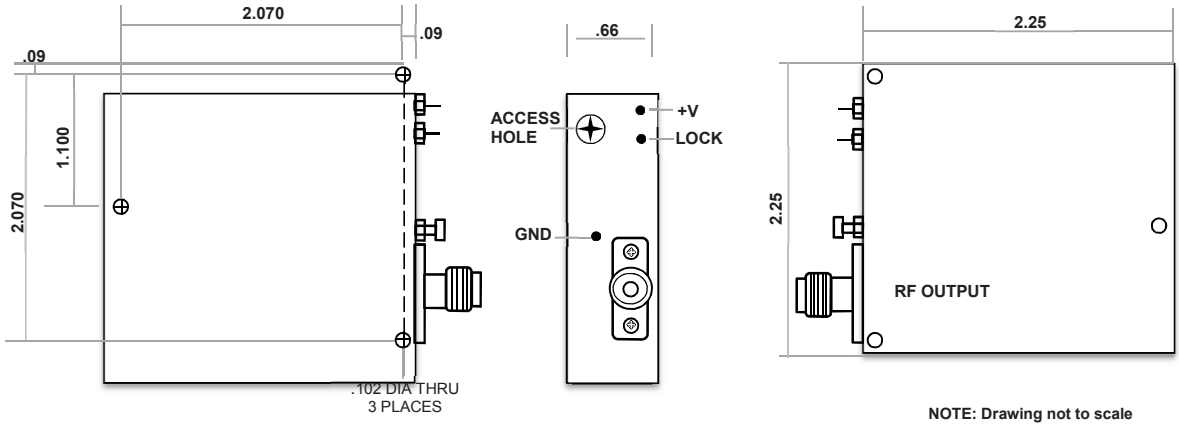
TYPICAL PERFORMANCE CHARACTERISTICS
Electrical Performance @ 25°C

PARAMETER	SYMBOL	MINIMUM	TYPICAL	MAXIMUM	UNITS
Output Frequency (Fixed)	F_o	400		4000	MHz
Output Power	Po	+12	+13	+15	dBm
Operating Temperature	Top	0		50	C°
Supply Voltage	Vcc		+15		V
Supply Current (no load)	Icc			200	mA
Frequency Stability, 0°- 50° C	FSTAB		+17	± 20	Ppm
Output VSWR	$VSWR_o$			2.0:1	
Spurious Signals			70	60	dBc
Harmonics			25		dBc
Lock Voltage	VL		+5		VDC
Unlock Voltage	VU		0		VDC

TYPICAL SINGLE SIDEBAND PHASE NOISE
(dBc/Hz)

Offset from Carrier	10 KHz	100 KHz	I MHz	10 MHz
Phase Noise	-115 dBc	-125 dBc	-150 dBc	-160 dBc

OUTLINE DRAWING

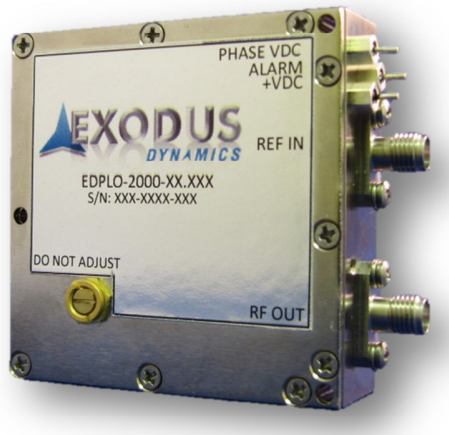


NOTE: Drawing not to scale

PRECISE | ULTRA LOW NOISE | RUGGED | RELIABLE | 2 YEAR WARRANTY

EDPLO – 2000

EXTERNALLY PHASE LOCKED | 30-200 MHZ INPUT



FEATURES

- Dielectric Resonator Technology
- Internal Voltage Regulator
- Phase Lock Indicator Alarm
- Ultra Low Phase Noise
- MIC And SMT Fabrication
- Ultra Low Microphonics
- Low Power Consumption
- Up To +25dBm Output Power
- Available From 1 – 40 GHz
- Operating Range -50° to +105°C
- Vibration/Shock Upgrade
- RoHS Compliant

APPLICATION

Commercial

Military

Airborne

Space

Missile Guidance

Cable TV Links (CATV)

Satellite Communications

Local Area Networks (LAN)

Global Positioning Systems (GPS)

Transmitters & Receivers

Traffic Sign Post

Test Equipment

Digital Radios

Point to Point Relay

LMDS

ISO 9001:2008 REGISTERED FIRM

DESCRIPTION

EDPLO-2000 series Phase Locked Dielectric Resonator Oscillator (PLDRO) utilizes advanced MIC and SMT technology to generate crystal stability at microwave and mm-wave frequencies up to 40 GHz. The low profile and rugged construction provide excellent durability against harsh environmental conditions such as Shock/ Vibration, Temperature and Humidity.

EDPLO-2000 series oscillator is designed using an ultra-low noise amplifier with series feedback at source and Dielectric Resonator at the gate. High gain, low noise devices are biased and matched precisely to ensure minimum phase noise. The device is carefully matched for maximum power, minimum phase noise and Voltage Standing Wave Ratio (VSWR). The oscillator is compensated for maximum temperature stability, optimum negative resistance and lowest phase noise possible.

EDPLO-2000 series oscillator is buffered by cascaded low noise driver and power amplifiers for minimum load pulling, maximum isolation and power. Transistor devices, and all chip components, are directly attached to gold plated Kovar carriers to minimize shear effect and maximize device heat transfer. Kovar carriers are mounted to the chassis to provide an efficient thermal junction and a stable structure for reduction of microphonics. To ensure oscillator stability over the full temperature range, the tuning elements are precisely designed and positioned to compensate for temperature drift by a factor of three.

EDPLO-2000 series proprietary Phase lock loop circuitry is designed and fabricated using SMT Technology. The input reference frequency is multiplied and sampled to the output frequency to produce compensating voltage to correct any frequency drift due to temperature variations. A Hi-Frequency Wein-Bridge Oscillator is integrated to provide the necessary sweep voltage to an ultra Hi-Q tuning varactor diode for the purpose of compensation and phase locking. The unique construction of phase lock loop sub-assembly provides excellent temperature stability and minimum solder joints for maximum reliability.

EDPLO-2000 series is internally voltage regulated to avoid reverse bias, frequency pushing, bias modulation and voltage transients. A phase lock indicator alarm of TTL type is provided as a feature. The EDPLO-2000 series are externally locked to customer supplied reference, ranging 30-200 MHz, and factory tuned to specified output frequency. Mechanical frequency adjustment is provided for optimum phase voltage setting.

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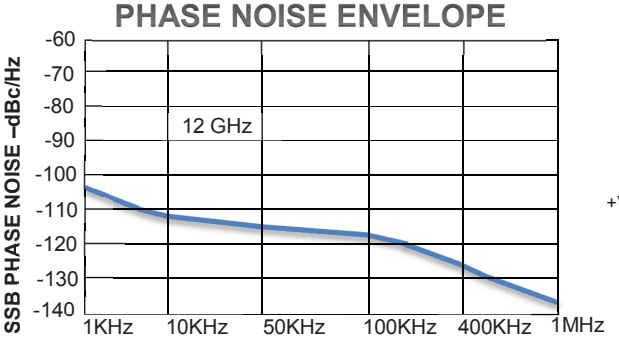
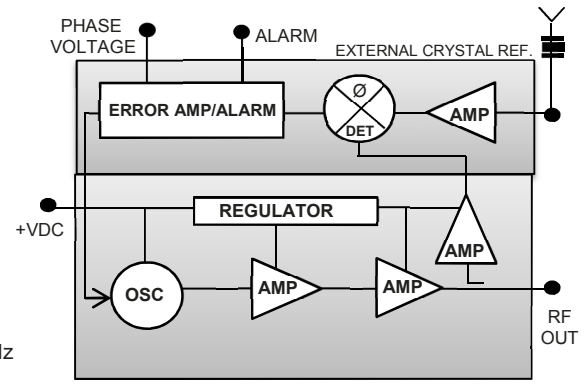
SPECIFICATIONS

Model Number	EDPLO-2000-XX.XX (Where XX.XX is freq. in GHz)
Single Frequency	1 to 40 GHz
Mechanical Tuning Range	100 MHz
Electrical Tuning	N/A
Power Output	+13 dBm, up to +25 dBm Optional
Load VSWR, Maximum	2.0 : 1.0
Power Requirements	+12, +15 VDC, 220 mA
Reference Input Frequency	30 to 200 MHz
Reference Power Input	0 dBm
Reference Power Input Range	-6 to +10 dBm
Frequency Stability	Same as Reference
Phase Noise	Reference Noise + 20 Log(N)+3dB
Spurious	-80 dBc
Harmonics	-25 dBc
Alarm	TTL
Operating Temperature	-55° to +105°C Optional; 0° to 50° Standard
Storage Temperature	-55° to +125°C
Connectors	SMA Female or 2.92 mm
Size	2.25" x 2.25" x .67"
Finish	Nickel

PHASE NOISE ENVELOPE

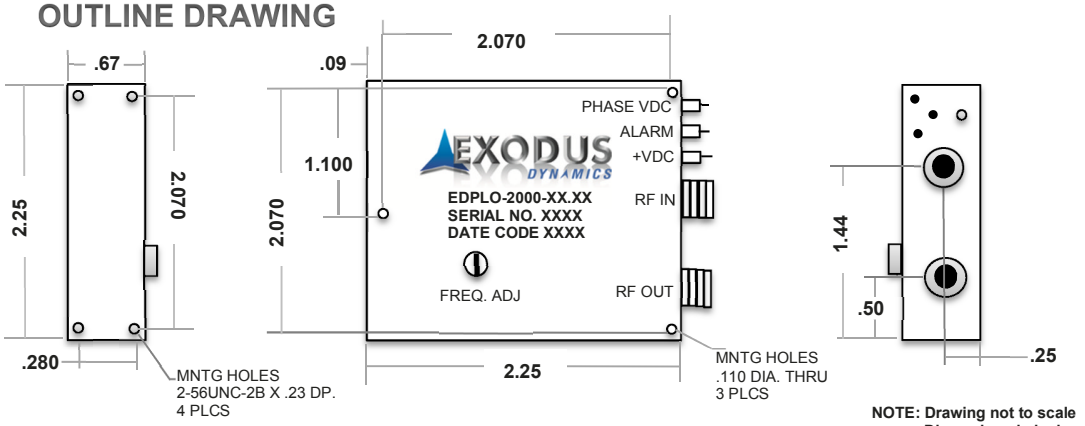


OFFSET FREQUENCY FROM THE CARRIER



BLOCK DIAGRAM

OUTLINE DRAWING



NOTE: Drawing not to scale
Dimensions in inches

PRECISE | ULTRA LOW NOISE | RUGGED | RELIABLE | 2 YEAR WARRANTY

EDPLO – 3000

INTERNALLY REFERENCED

FEATURES

- Dielectric Resonator Technology
- Internal Crystal Oscillator Reference
- Phase Lock Indicator Alarm
- Ultra Low Phase Noise
- MIC and SMT Fabrication
- Ultra Low Microphonics
- Low Power Consumption
- Up To +25 dBm Output Power
- Available From 1 – 40 GHz
- Operating Range -55° to +105°C
- Vibration/ Shock Upgrade
- RoHS Compliant

APPLICATION

Commercial

Military

Airborne

Space

Missile Guidance

Cable TV Links (CATV)

Satellite Communications

Local Area Networks (LAN)

Global Positioning Systems (GPS)

Up / Down Converters

Transmitters & Receivers

Traffic Sign Post

Test Equipment

Digital Radios

Point to Point Relay

LMDS

ISO 9001:2008 REGISTERED FIRM

DESCRIPTION

EDPLO-3000 series Phase Locked Dielectric Resonator Oscillator (PLDRO) utilizes advanced MIC and SMT technology to generate crystal stability at microwave and mm-wave bands up to 40 GHz. The low profile and rugged construction provide excellent durability against harsh environmental conditions such as Shock/ Vibration, Temperature and Humidity.

EDPLO-3000 series oscillator is designed using an ultra-low noise amplifier with series feedback at source and Dielectric Resonator at the gate. High gain, low noise devices are biased and matched precisely to ensure minimum phase noise. The device is carefully matched for maximum power, minimum phase noise and Voltage Standing Wave Ratio (VSWR). The oscillator is compensated for maximum temperature stability, optimum negative resistance and lowest phase noise possible.

EDPLO-3000 series oscillator is buffered by cascaded low noise driver and power amplifiers for minimum load pulling, maximum isolation and power. Transistor devices, and all chip components, are directly attached to gold plated Kovar carriers to minimize shear effect and maximize device heat transfer. Kovar carriers are mounted to the chassis to provide an efficient thermal junction and a stable structure for reduction of microphonics. To ensure oscillator stability over the full temperature range, the tuning elements are precisely designed and positioned to compensate for temperature drift by a factor of three.

EDPLO-3000 series proprietary Phase Lock Loop and Crystal Reference circuitry is designed and fabricated using SMT Technology. The input reference frequency is multiplied and sampled to the output frequency to produce compensating voltage to correct any frequency drift due to temperature variations. A Hi-Frequency Wein-Bridge Oscillator is integrated to provide the necessary sweep voltage to an ultra Hi-Q tuning varactor diode for the purpose of compensation and phase locking. The unique construction of phase lock loop sub-assembly provides excellent temperature stability and minimum solder joints for maximum reliability.

EDPLO-3000 series is internally voltage regulated to avoid reverse bias, frequency pushing, bias modulation and voltage transients. A phase lock indicator alarm of TTL type is provided as a feature. The EDPLO-3000 series are internally reference locked and factory tuned to specified frequency. Mechanical frequency adjustment is provided for optimum phase voltage setting. Buffered Reference Monitor and adjustment are standard features of this Hi-Tech oscillator. The unit may also be externally locked to a reference crystal oscillator.

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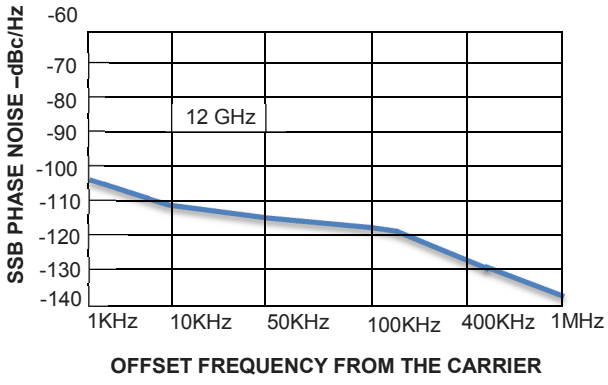
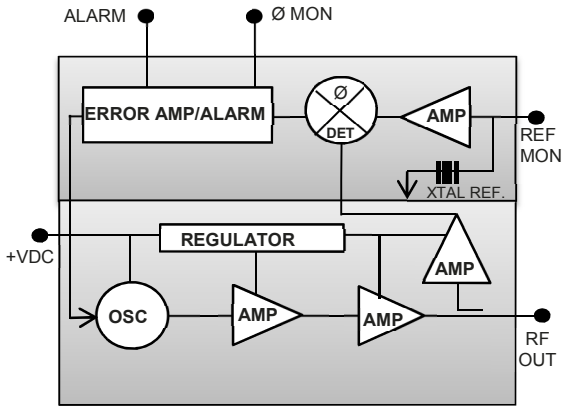
SPECIFICATIONS

Model Number	EDPLO-3000-XX.XX (Where XX.XX is freq. in GHz)
Single Frequency	1 to 40 GHz
Mechanical Tuning Range	100 MHz
Power Output	+13 dBm, up to +25 dBm Optional
Load VSWR, Maximum	2.0 : 1.0
Power Requirements	+12, +15 VDC, 300 mA
Reference Frequency	50 to 150 MHz
Frequency Stability	+/- 5 PPM @ 0° to 50°C, +/- .5 PPM Optional
Phase Noise	See Phase Noise Envelope (Fig A)
Spurious	-80 dBc
Harmonics	-25 dBc
Alarm	TTL
Operating Temperature	-55° to +105°C Optional, 0-50°C Standard
Storage Temperature	-55° to +125°C
Connectors	SMA Female or 2.92 mm
Size	2.25" x 2.25" x 1.25"
Finish	Nickel

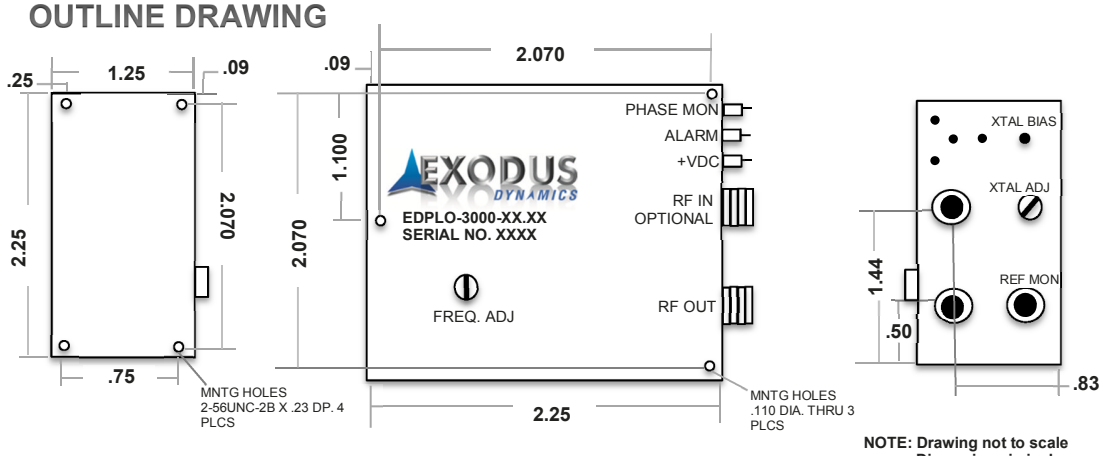
PHASE NOISE ENVELOPE





BLOCK DIAGRAM

OUTLINE DRAWING



NOTE: Drawing not to scale
Dimensions in inches

PRECISE | ULTRA LOW NOISE | RUGGED | RELIABLE | 2 YEAR WARRANTY

EDPLO – 4000

EXTERNALLY PHASE LOCKED | 5 OR 10 MHZ INPUT

APPLICATION

- Commercial
- Military
- Airborne
- Space
- Missile Guidance
- Cable TV Links (CATV)
- Satellite Communications
- Local Area Networks (LAN)
- Global Positioning Systems (GPS)
- Up / Down Converters
- Transmitters & Receivers
- Traffic Sign Post
- Test Equipment
- Digital Radios
- Point to Point
- LMDS

ISO 9001:2008 REGISTERED FIRM

FEATURES

- Dielectric Resonator Technology
- External Reference 5 or 10 MHz
- Phase Lock Indicator Alarm
- Ultra Low Phase Noise
- MIC and SMT Fabrication
- Ultra Low Microphonics
- Low Power Consumption
- Up To +25 dBm Output Power
- Available From 1 – 40 GHz
- Operating Range -55° to +105°C
- Vibration/Shock Upgrade
- RoHS Compliant

DESCRIPTION

EDPLO-4000 series Phase Locked Dielectric Resonator Oscillator (PLDRO) utilizes advanced MIC and SMT technology to generate crystal stability at microwave and mm-wave bands up to 40 GHz. The low profile and rugged construction provide excellent durability against harsh environmental conditions due to Shock/Vibration, Temperature and Humidity.

EDPLO-4000 series oscillator is designed using an ultra-low noise amplifier with series feedback at source and Dielectric Resonator at the gate. High gain, low noise GaAs FETs/BJTs are biased precisely to ensure minimum phase noise. The device is carefully matched for maximum power, minimum phase noise and Voltage Standing Wave Ratio (VSWR). The oscillator is compensated for maximum temperature stability, optimum negative resistance and lowest phase noise possible.

EDPLO-4000 series oscillator is buffered by cascaded low-noise driver and power amplifiers for minimum load pulling, maximum isolation and power. Transistor devices, and all chip components, are directly attached to gold plated Kovar carriers to minimize shear effect and maximize device heat transfer. Kovar carriers are mounted to the chassis to provide an efficient thermal junction and a stable structure for reduction of microphonics. To ensure oscillator stability over the full temperature range, the tuning elements are precisely designed and positioned to compensate for temperature drift by a factor of three.

EDPLO-4000 series proprietary Phase lock loop and Internal Multiplier circuitry uses Surface Mount Technology. The reference frequency is multiplied and sampled to output frequency. Produced error voltage due to frequency drift is sensed by a Wein-Bridge Oscillator to provide the necessary sweep voltage to an ultra Hi-Q tuning varactor diode for the purpose of compensation and phase locking. The unique construction of phase lock loop sub-assembly provides excellent temperature stability and minimum solder joints for maximum reliability.

EDPLO-4000 series is internally voltage regulated to avoid reverse bias, frequency pushing, bias modulation and voltage transients. A phase lock indicator alarm of TTL type is provided as a feature. The EDPLO-4000 series are externally locked and factory tuned to specified frequency. Mechanical frequency adjustment is provided for optimum phase voltage setting. Buffered Reference Monitor and adjustment are standard features of this Hi-Tech oscillator.

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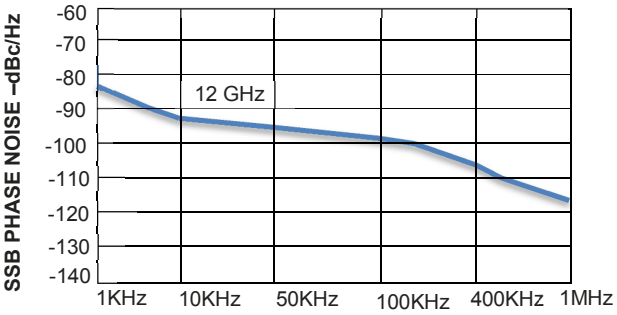
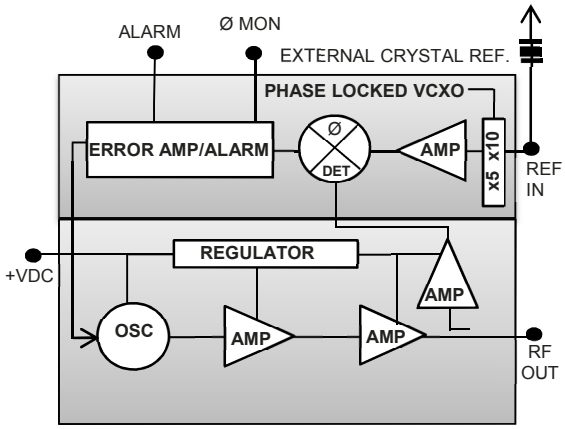
SPECIFICATIONS

Model Number	EDPLO-4000-XX.XX (Where XX.XX is freq. in GHz)
Single Frequency	1 to 40 GHz
Mechanical Tuning Range	100 MHz
Power Output	+13 dBm, up to +25 dBm Optional
Load VSWR, Maximum	2.0 : 1.0
Power Requirements	+12, +15 VDC, 400 mA
Reference Input Frequency	10 MHz or 5 MHz Optional
Reference Power Input	0 +/- 6 dBm
Frequency Stability	Same as Reference
Phase Noise	Reference Noise +20 Log(N) +3db
Spurious	-80 dBc
Harmonics	-25 dBc
Alarm	TTL
Operating Temperature	-55° to +105°C Optional
Storage Temperature	-55° to +120°C
Connectors	SMA Female or 2.92 mm
Size	2.25" x 2.25" x 1.25"
Finish	Nickel

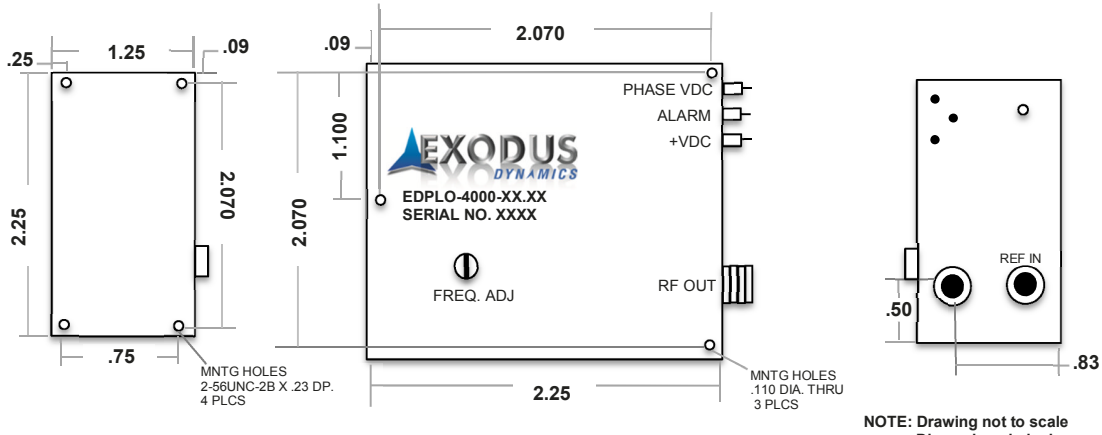
PHASE NOISE ENVELOPE





BLOCK DIAGRAM

OUTLINE DRAWING



NOTE: Drawing not to scale
Dimensions in inches

EDRO – 1000

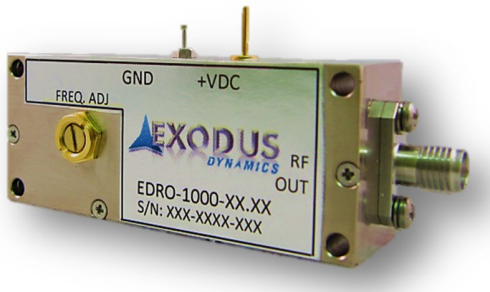
FREE RUNNING DIELECTRIC RESONATOR OSCILLATOR

ULTRA LOW NOISE MICROWAVE SIGNAL SOURCES

APPLICATION

- Commercial
- Military
- Airborne
- Space
- Missile Guidance
- Cable TV Links (CATV)
- Satellite Communications
- Local Area Networks (LAN)
- Global Positioning Systems (GPS)
- Transmitters & Receivers
- Up / Down Converters
- Test Equipment
- Digital Radios
- Point to Point Relays
- LMDS

ISO 9001:2008 REGISTERED FIRM



FEATURES

- Dielectric Resonator Technology
- Internal Voltage Regulator
- 100 MHz Bandwidth
- Ultra Low Phase Noise
- MIC Fabrication
- Ultra Low Microphonics
- Low Power Consumption
- Up To +25dBm Output Power
- Available From 1 – 40 GHz
- Operating Range -55° to +105°C
- Vibration/Shock Upgrade
- RoHS Compliant

DESCRIPTION

EDRO-1000 series Dielectric Resonator Oscillator (DRO) utilizes advanced MIC and MMIC technology to generate precise, reliable and ultra-low noise frequency at microwave and mm-wave bands up to 40GHz. The uni-package is designed to mechanically withstand harsh environmental conditions due to Shock/ Vibration, Temperature and Humidity.

EDRO-1000 series oscillator is designed using an ultra-low noise amplifier with series feedback at source and Dielectric Resonator at the gate. High gain, low-noise devices are biased and matched precisely to ensure minimum phase noise. The devices are carefully matched for maximum power, minimum phase-noise and Voltage Standing Wave Ratio (VSWR). The oscillator is compensated for maximum temperature stability, optimum negative resistance and lowest phase noise possible.

EDRO-1000 series oscillator is buffered by cascaded low-noise driver and power amplifiers for minimum load pulling, maximum isolation and power. Transister devices, and all chip components, are directly attached to gold plated Kovar carriers to minimize shear effect and maximize device heat transfer. Kovar carriers are mounted to the chassis to provide an efficient thermal junction and a stable structure for reduction of microphonics. To ensure oscillator stability over the full temperature range, high-Q low dielectric constant resonators are selected with proper temperature coefficient to compensate for frequency drift.

EDRO-1000 series is internally voltage regulated to avoid reverse bias, frequency pushing, bias modulation and voltage transients. Mechanical frequency adjustments are provided for desired frequency setting within the bandwidth.

EDRO-1000 series provide several advantages over other microwave signal source, such as Gunn Gravity

CHARACTERISTC	CRYSTAL MULIPLIER CHAIN	GUNN CAVITY OSCILLATOR	EDRO-1000 SERIES
Reliability	GOOD	FAIR	EXCELLENT
Efficiency	LOW	LOW	HIGH
Temperature Range	GOOD	POOR	EXCELLENT
Power Variation	HIGH	HIGH	LOW
FM Noise	VERRY GOOD	EXCELLENT	EXCELLENT
Frequency Stability	EXCELLENT	GOOD	VERY GOOD
Environmental Stability	FAIR	FAIR	EXCELLENT
Size	LARGE	MEDIUM	SMALL

Table 1

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SPECIFICATIONS

Model Number	EDRO-1000-XX.XX (Where XX.XX is freq. in GHz)
Single Frequency	1 to 40 GHz
Mechanical Tuning Range	100 MHz
Electrical Tuning	Optional
Power Output	+13 dBm, up to +25 dBm Optional
Load VSWR, Maximum	2.0 : 1.0
Power Requirements	+15, +12, +10 VDC, 90-110 mA
Power Variation	+/- 0.5 dBm
Pushing	1 ppm Max. @ ±1V
Pulling (12dB Return Loss)	+/- 90ppm Max.
Frequency Stability	3 ppm/ °C
Phase Noise	See Phase Noise Envelope (Fig. A)
Spurious	-85 dBc
Harmonics	-25 dBc
Operating Temperature	-55° to +105°C Optional; 0° to 70° Standard
Storage Temperature	-55° to +125°C
Connectors	SMA Female, 2.40 mm, 2.92 mm
Size	2.25" x .92" x .67"
Finish	Nickel

TYPICAL PHASE NOISE AT 12 GHz

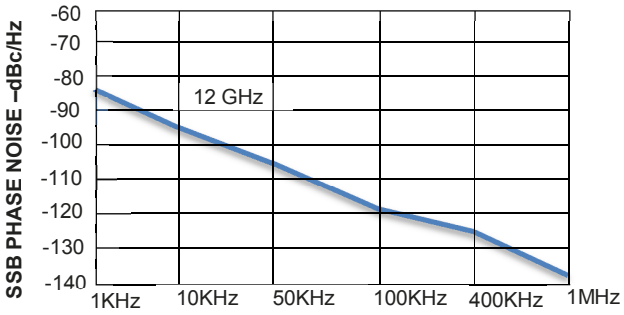
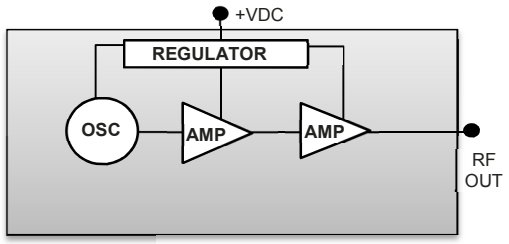
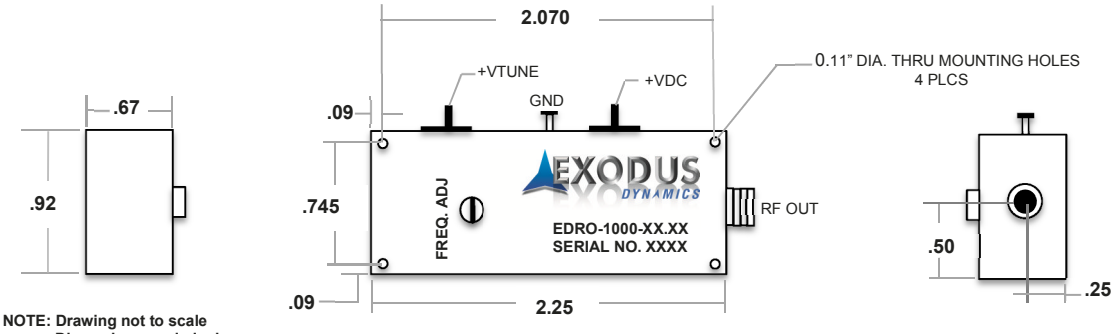


FIGURE A



BLOCK DIAGRAM

OUTLINE DRAWING



NOTE: Drawing not to scale
Dimensions are in inches

EDXO – 500

OVENIZED CRYSTAL OSCILLATOR

APPLICATION

- Commercial
- Military
- Airborne
- Space
- Missile Guidance
- Cable TV Links (CATV)
- Satellite Communications
- Local Area Networks (LAN)
- Global Positioning Systems (GPS)
- Transmitters & Receivers
- Up / Down Converters
- Test Equipment
- Digital Radios
- Point to Point Relays
- LMDS

ISO 9001:2008 REGISTERED FIRM

Exodus Dynamics' Ovenized Crystal Oscillators provide high stability (0.1 ppm) in the range of 70 to 120 MHz.

Built to withstand harsh environments, the EDXO-500 provides a low noise reference input complementing our DRO line.

These units feature high stability, fast warm-up, low power requirements, rugged military type housings and fast delivery.

GENERAL SPECIFICATIONS

Output Frequency Range	**70 MHz to 120 MHz**
Output Level	**+3 dBm into 50 ohms**
Output Waveform	**Sine-wave**
Phase Noise	**-150 dBc/Hz @ 10KHz**
Harmonic Distortion	**-15 dBc**
Load	**50 ohms**
Input Supply Voltage	**+12 VDC <800 mA 1st 3 sec <230 mA next 60 sec 130 mA after warm-up**
Warm-up Time	**<1.5 minutes from +25°C for frequency accuracy to be within ±1x10^{-7} of prior frequency after 24 hours off-time**
Storage Temperature	**-55°C to +85°C**

OPERATING TEMPERATURE

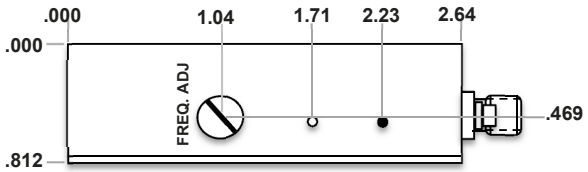
MODEL NUMBER	TEMP RANGE (°C)	STABILITY (ppm)
EDXO-500-01-X	+15°C to 35°C	±0.1
EDXO-500-05-X	0°C to +75°C	±0.5
EDXO-500-50-X	-40°C to +75°C	±5

x = Frequency in MHz

"Engineering the Dynamics of Technology"

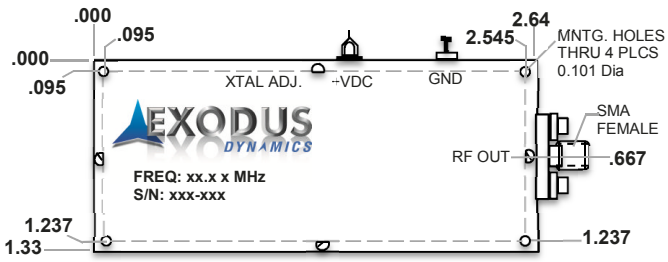
FREQUENCY STABILITY AS A FUNCTION OF:

Temperature	< ± 0.5 ppm over 0°C to +50°C ambient
Input Voltage	< ± $3x10^{-9}$ for a ±10% change in input supply
Load	< ±$1x10^{-8}$ for a ±10% change in load
Time Domain	Short-term 1 second <$3x10^{-11}$
Aging	Medium-term 24 hours < ±10^{-9} after 72 hours on-time Long-term <$5x10^{-8}$ First Year <$2x10^{-8}$ Second Year <$1.5x10^{-8}$ Worst Case



NOTE: Drawing not to scale

ORIENTATION



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