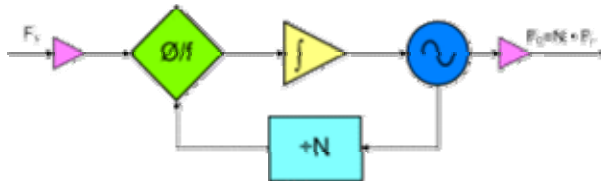


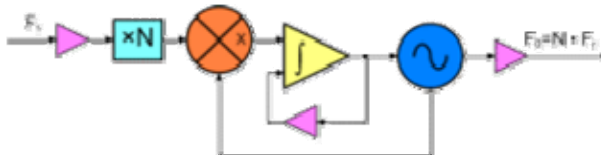
Standard Phase-Locked Oscillator Products (Basic product description)

Luff Research offers phase-locked oscillators (PLO) that span the 10 MHz to 24 GHz frequency range. In most general implementation PLO's are realized in one of the four architectures show below:

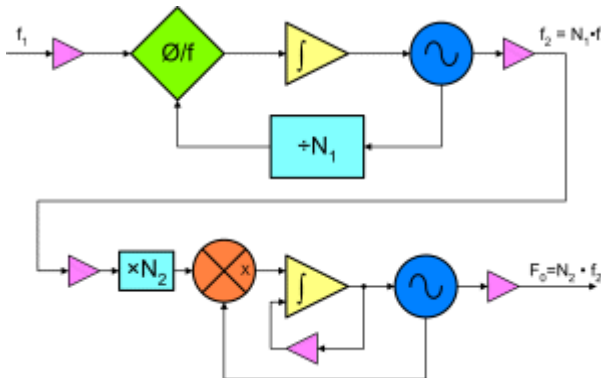
- **Phase-locked oscillators with digital dividers:**



- **Phase-locked oscillators with a harmonic multiplier:**



- **Dual loop phase-locked oscillators:**

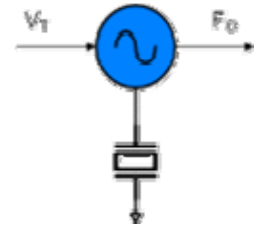


The implementation of a specific PLO depends on its specific set of requirements. These usually are; available reference (or no reference when an internal reference is required), the desired output frequency, the desired phase noise, output power level, etc.

The output frequency required will determine the selection of the appropriate fundamental oscillator to be used in the PLO.

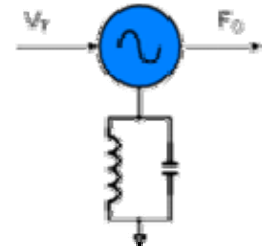
● **PLXO** - Crystal Oscillators 10 to 300 MHz frequency range

- Very Stable
- The best available phase noise
- Moderate cost



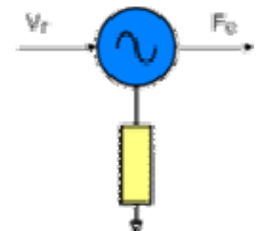
● **PLLCO** - LC Oscillators 10 MHz to 500 MHz frequency range

- Moderate Stability
- Phase noise 10-20 db greater than either the DRO or CRO
- Very low cost



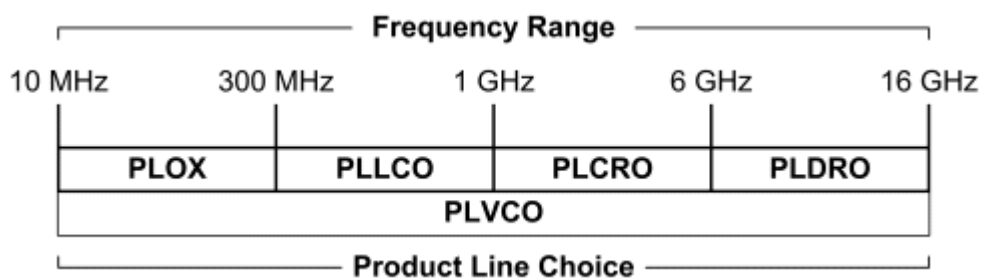
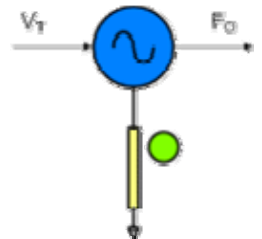
● **PLCRO** - Ceramic Resonator Oscillators 500 to 6000 MHz frequency range

- Very Stable
- Excellent phase noise
- Low cost



● **PLDRO** - Dielectric Resonator Oscillators 5 to 12 GHz frequency range

- Very stable
- Excellent phase noise
- Moderate cost



We have extensive experience with all aspects of phase-locked oscillator design and manufacture.

Phase-Locked Crystal Oscillator (PLXO)

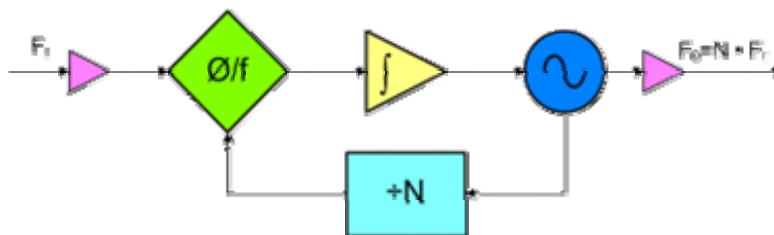
Features

- Output frequencies up to 150 MHz (300 MHz with doubler)
- Excellent phase noise
- Typical resolution 100 kHz
- Internal or external reference frequency
- Small size (2.25" x 2.25" x 0.66")
- Low cost

Model PLOX:



Block Diagram



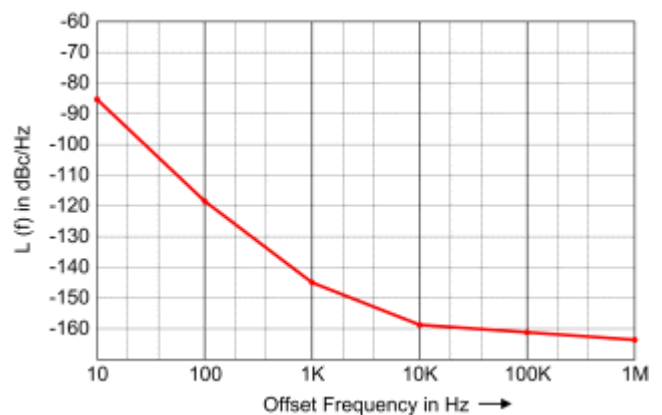
Description

Model PLOX is a line of very low phase noise, phase-locked crystal oscillators. These units have been designed for a wide variety of demanding applications in communications and radar systems.

PLXO Key Specifications

Output Frequency:	up to 150 MHz
with doubler:	up to 300 MHz
Spurious:	-70 dBc
Harmonics (typ):	-40 dBc
Output Power (min.):	+13 dBm
Output Power Variation:	2 dB
External Reference:	1 to 20 MHz (0 dBm \pm 3 dB)
or Internal Reference:	\pm 1 PPM (-10°C to +70°C)
Alarm:	Open Collector
Power Requirements:	+5VDC
Size:	2.25" x 2.25" x 0.66"

Typical Phase Noise (100 MHz)



Specific Product Data Sheets (PDF)

- 100 MHz PLO - 10 MHz external reference. Model: [PLOX0100-10](#)
- Custom switchable crystal oscillators. Model: [FSC-034-1](#)

Phase-Locked High-Q LC Oscillator (PLLCO)

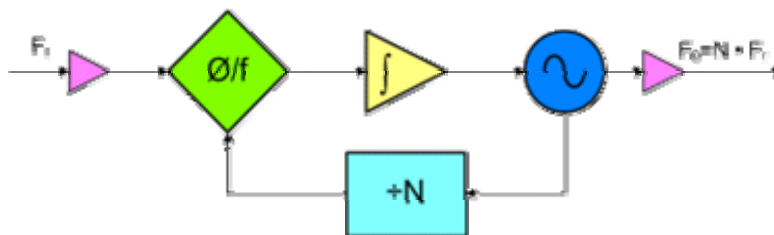
Features

- Output frequencies up to 500 MHz
- Good phase noise
- Typical resolution 100 kHz
- Internal or external reference frequency
- Small size (2.25" x 2.25" x 0.66")
- Low cost

Model PLOD:



Block Diagram

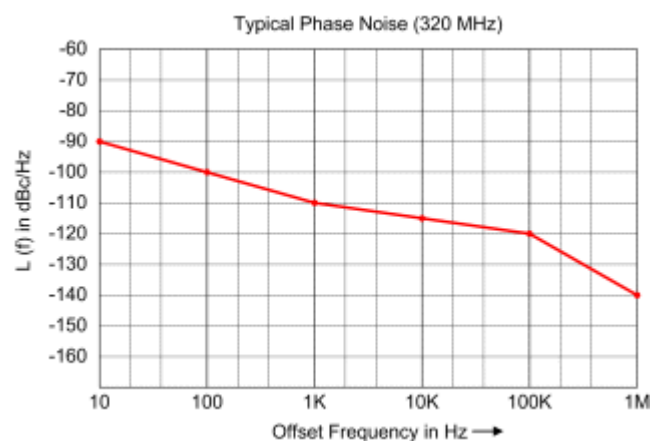


Description

For requirements where the desired output frequencies are relatively low and the PLLCO can't be implemented practically, we offer our PLLCO line of products. These are phase-locked oscillators that use a high-Q LC resonator or a transmission line resonator. These units are very versatile and can be customized in many ways to fulfill a desired LO requirement for communications or instrumentation. Packaged in our standard housing these units yield excellent performance and value.

PLLCO Key Specifications

Output Frequency:	up to 500 MHz
Spurious:	-70 dBc
Harmonics (typ):	-40 dBc
Output Power (min.):	+13 dBm
Output Power Variation:	2 dB
External Reference:	1 to 20 MHz (0 dBm \pm 3 dB)
or Internal Reference:	\pm 1 PPM (-10°C to +70°C)
Alarm:	Open Collector
Power Requirements:	+5VDC
Size:	2.25" x 2.25" x 0.66"



Specific Product Data Sheets (PDF)

- 320 MHz PLO - 10 MHz external reference input - Model: [PLOD0320-10](#)

Phase-Locked Ceramic Resonator Oscillator (PLCRO)

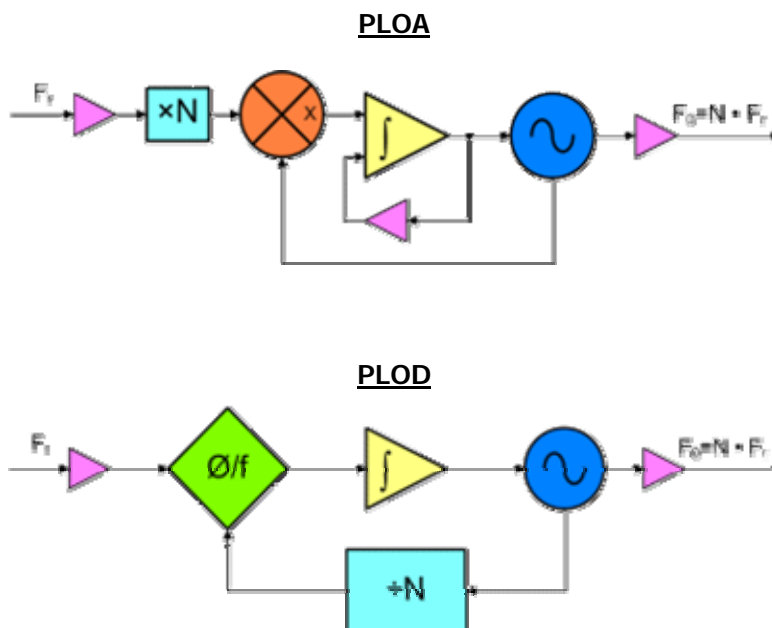
Features

- Output frequencies from 500 to 6000 MHz
- Very low phase noise
- Full industrial temperature range -45° to $+85^{\circ}\text{C}$
- Dual isolated output option
- Internal or external frequency reference
- Small size (2.25" x 2.25" x 0.66")
- Low cost

Model PLOA or PLOD:



Block Diagram



Description

This is a line of fixed frequency phase-locked oscillators that use a high-Q ceramic resonator oscillator and either analog sampling phase detector techniques (Luff model PLOA) or digital techniques (Luff model PLOD) to establish phase lock to the reference.

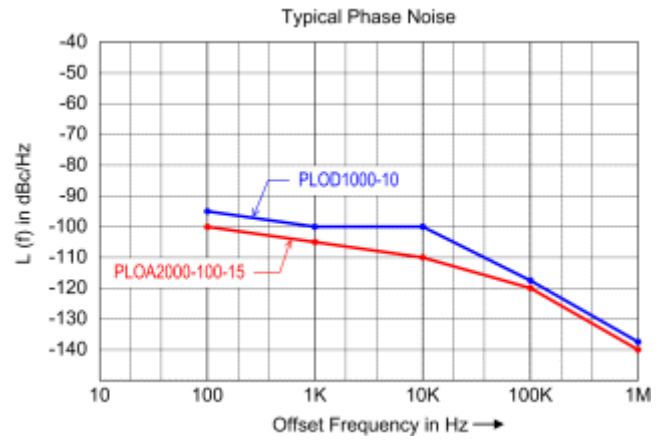
The PLOA configuration is used when the best possible spectral quality is needed. The PLOA configuration has the limitation that the output frequency must be an integer factor of the input frequency.

The PLOD has a much more flexible frequency plan, however, the phase noise of the PLOD is not as low as that of the PLOA.

Both units are housed in a rugged low profile assembly and employ our unique manufacturing techniques that result in units of excellent value.

PLCRO Key Specifications

Output Frequency: from 500 MHz to 6 GHz
 Spurious: -70 dBc
 Harmonics (typ): -40 dBc
 Output Power (min.): +13 dBm
 Output Power Variation: 2 dB
 External Reference: 1 to 200 MHz (0 dBm \pm 3 dB)
 or Internal Reference: \pm 1 PPM (-10°C to +70°C)
 Alarm: Open Collector
 Power Requirements: +5VDC (PLOD)
 +12 or +15VDC (PLOA)
 Size: 2.25" x 2.25" x 0.66"



● **Specific Product Data Sheets (PDF)**

- 2000 MHz Analog PLO - 100 MHz external reference input - +12 volt operation - Model: [PLOA2000/100/15](#)
- 1000 MHz Digital PLO - 10 MHz external reference input - Model: [PLOD1000-10](#)

NEW! 10 MHz Reference Input Phase-Locked Dielectric Resonator Oscillator

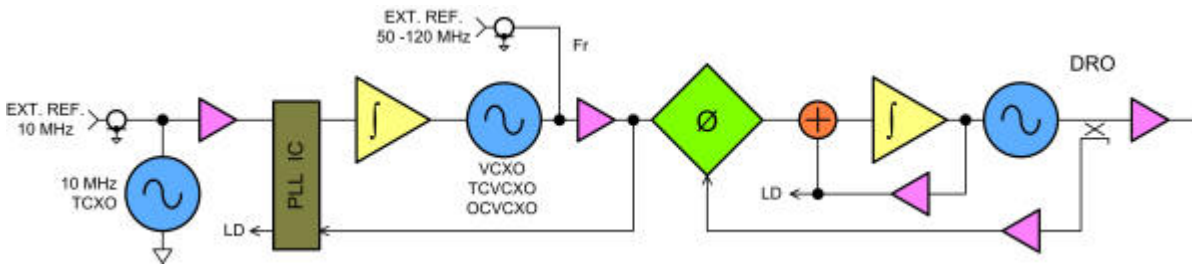
Features

- Output frequencies from 8 to 16 GHz
- Reference Input - External 10 MHz or 50-120 MHz / Internal TCXO or OCXO
- Low Power Design +5VDC
- Load and drive insensitive
- Low Cost

Model PLDRO:



Block Diagram

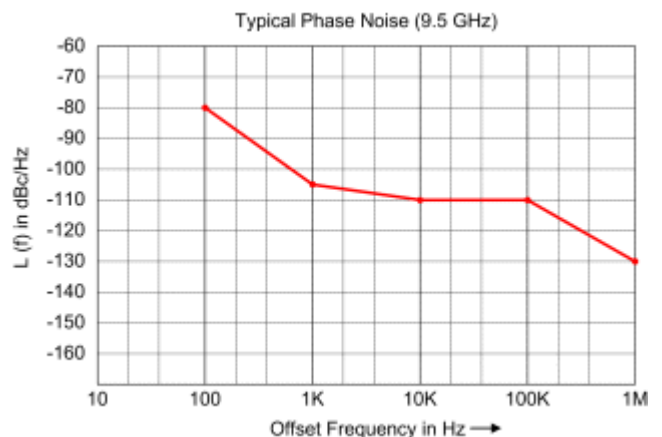


Description

This new PLDRO design incorporates many highly desirable features in a rugged low cost unit. This unit can be configured to operate with a reference frequency from one of the following sources: (1) external 10 MHz; (2) external input frequency in the 50 - 120 MHz range or (3) internal TCXO or OCXO. Another unique feature of this unit is its low power consumption and +5VDC operation. This highly reliable unit is thoroughly burned in and tested, guaranteeing the highest performance available.

PLDRO Key Specifications

Output Frequency:	8 - 16 GHz
Output Resolution:	$N \cdot F_r$ where N is an Integer
Spurious:	-70 dBc
Harmonics (typ):	-30 dBc
Output Power (min.):	+13 dBm
Output Power Variation:	3 dB
External Reference:	10 MHz or 50 - 120 MHz
Or Internal Reference:	± 10 PPM (option A) ± 1 PPM (option B) ± 0.1 PPM (option C)
Alarm:	Open Collector
Power Requirements:	+5.0VDC @ 400mA
Temperature Range:	-10° to +70°C
Size:	2.25" x 2.25" x 0.80"



Specific Product Data Sheets (PDF)

- 15 GHz PLDRO - 10 MHz external reference input - Model: [PLDRO-15000-10](#)