

2015 Product Catalog



**Where Real Quality Counts
WE ARE THERE**



WORLD LEADER IN MICROWAVE AND MM-WAVE COMPONENTS

www.microwave-dynamics.com



Microwave Dynamics (MD) **2015 Product Catalog** features our complete range of standard RF, Microwave and MM-Wave products. In addition to standard products, MD also does custom parts and custom sub-assemblies. If there is anything you need that you don't see here, contact us with your full specifications and our engineers will work with you to find the best solution.

MD has been a leader in the microwave industry since 1993. With applications on land, sea, air and space, MD products are designed to perform under extreme environmental conditions, such as intense shock vibration and high temperature variance. Designs are geared to maximize stability and minimize noise. We take pride in our excellent customer service and rapid turnaround R&D for customized sub-assemblies. We also offer 48 hour expedited delivery on most of our standard catalog products.

Please visit our website at www.microwave-dynamics.com for additional product information or contact us directly at info@microwave-dynamics.com or 949-679-7788.

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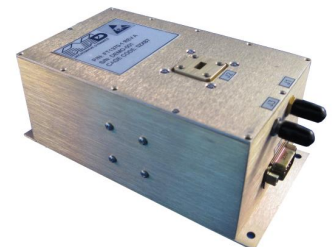
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Space

- AURA/MLS Satellite (2004 – now)
- COMSAT
- Uplink / Downlink
- Ku / K / Ka bands
- mmW applications
- Extremely high-reliability parts, assembly processes, and quality tests (acceleration, temperature, shock, etc.)



Defense / Military

- Sole-source supplier for F-22 Raptor
- U-2 Planes
- UAVs
- Radars
- Missile Guidance
- Rockets
- Navy Communications
- Air Force Simulations
- Target Deterrent Simulators
- Frequency Jammers
- Frequency Converters
- Point to Point Relays
- Satellites



Commercial

- | | |
|---|--|
| <ul style="list-style-type: none">• Satellite Communications• Cable TV Links• Local Area Networks• Global Positioning Systems (GPS)• Test Equipment• Point to Point Links• Up/Down Converters | <ul style="list-style-type: none">• Transmitter & Receivers• Low Power Radar Test Transmitters• Digital Radios• Fiber Optics• X-Band & K-Band Radiometer• Test Beacons & Doppler Transceivers• Transceiver |
|---|--|

OSCILLATORS



Product features

Oscillators

MD dielectric resonator oscillators are available from 1-50 GHz with up to +25 dBm output power. Optional operating temperature range from -55 to +105 deg C is available. Features include: internal voltage regulator, low phase noise, MIC fabrication, 150 MHz bandwidth, low microphonics and low power consumption.

Models: DRO-1000, DRO-1500, DRO-1070, PLO-2000, PLO-2070, PLO-3000, PLO-3070, PLO-4000, PLO-4070, OCXO-200, TCXO-100, PLO-5000, TCDRO-1060, MDS (Synthesizer)

Datasheet

[DRO-1000](#) *Free Running DRO*



[DRO-1500](#) **NEW** *Mini DRO*



[PLO-2000](#) *Ext Ref 100 MHz*



[PLO-3000](#) *Int Reference*



[PLO-4000](#) *Ext Ref 10 MHz*



[OCXO-200](#) *Ovenized Crystal*



[TCXO-100](#) *Temp Comp Crystal*



[TCDRO-1060](#) **NEW** *Temp Comp Oscillator*



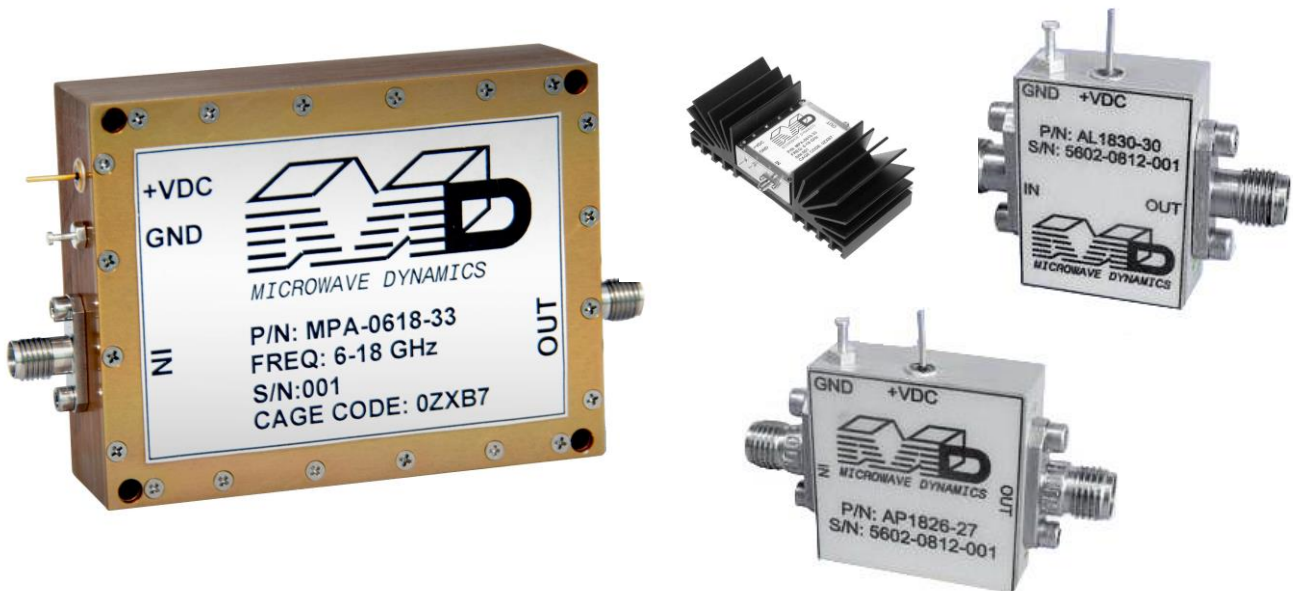
[PLO-5000](#) **NEW** *Int/Ext Ref Oscillator*



[Synthesizer](#) **NEW**



AMPLIFIERS



Product features

Amplifiers

MD offers high power, medium power and low noise amplifiers from 2 to 46 GHz.

Models: APXXXX, ALXXXX, AGXXXX, MPA

Datasheet

[LNA Gen Purpose](#)



[LNA Mw Millimeter](#)



[Military Amp](#)



[Med Power Amp](#)



[High Power Amp](#)



[High Power 20 W](#)



UP / DOWN CONVERTERS



Product features

Up and Down Converters

MD offers upconverters, downconverters, and our new product line. The LO-MIX Series which is an up or down converter with an LO inside one compact package.

Models: AUCXXXX, ADCXXXX, LO-MIX100, LO-MIX101, LO-MIX200, LO-MIX201, LO-MIX300, LO-MIX301, LO-MIX400, LO-MIX401

Datasheet

[Up Converter](#)



[Down Converter](#)



[LO-MIX](#)  Mixer with LO inside



MULTIPLIERS



Product features

Multipliers

MD offers X2, X3 and X4 multipliers with power output up to +20 dBm and high harmonic isolation (50 dBc minimum; 60-65 typical). MD multipliers offer low VSWR (2.5:1 max), with connector options 2.92 mm, 2.4 mm or 1.85 mm.

Models: A2X, A3X, A4X

Datasheet

[Inline Mult](#)



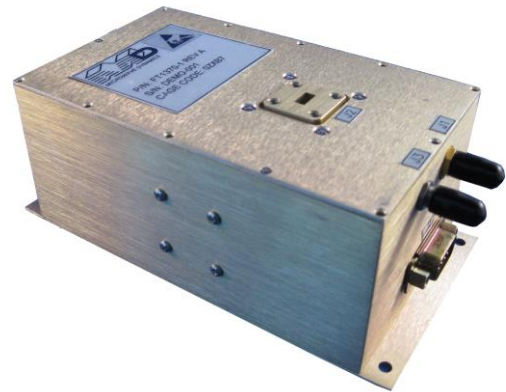
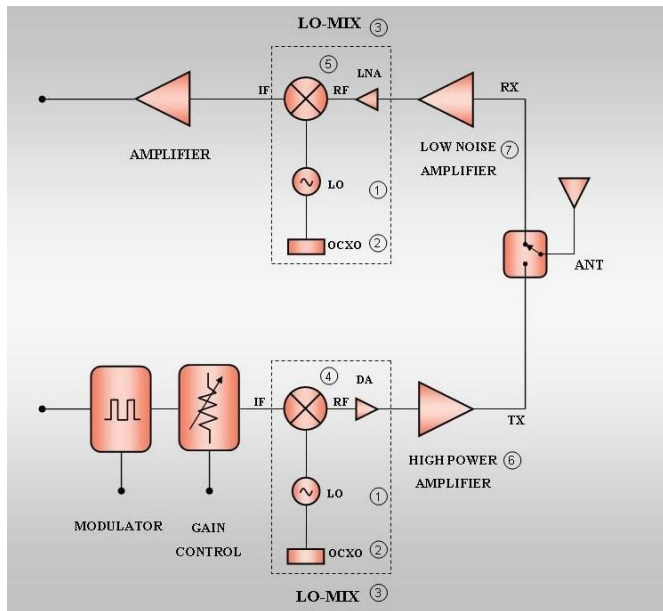
[Frequency Mult-1](#)



[Frequency Mult-2](#)



SUB-ASSEMBLIES



Product features

Sub-Assemblies

MD offers rapid turnaround R & D for customized products designed to meet unique customer requirements for microwave components and subsystems. MD excels in customization with our innovative designs, high-precision engineering, and hands-on technical support throughout the life of the project. A typical transceiver using all MD products, packaged to meet customer requirements, is available.

Models: ASSY-XXXX-XX or Custom

Datasheet

[Transceiver](#)



[Flight Hardware](#)



SPACE QUALIFIED PARTS



Product features

Space Qualified / Hi-Reliability Parts

Datasheet

Space Hardware



Capabilities

Models

- Oscillators, Amplifiers, Up/Down-converters, Custom sub-assemblies

Screening

- Element of Evaluation, Group A,B,C and D
- Assembly and 100% Screening
- Qualification Testing

Testing

- Acceptance Test

Program Management

AS9100:2008 Qualified Quality System

AURA Satellite

In 2004, MD supplied space qualified microwave oscillators PLO-2000 (at 10.7 GHz, 14.95 GHz and 15.96 GHz) to support one of the four measuring instruments, the Microwave Limb Sounder (MLS) on the AURA Satellite. MLS was spearheaded by JPL and is used to measure radiation in the GHz and THz frequency ranges (millimeter and sub-millimeter wavelengths) to remotely sense atmospheric data.

AURA Satellite is still in orbit and celebrated its 10 year anniversary last year in 2014. The PLDRO's and system are still functioning well, far beyond the expected life-span of five years.

ABOUT US

- Incorporated in 1993
- 100% U.S. Made
- SBA Small Business Certified
- ITAR Certified
- Hybrid/discrete assembly
- Full test & measurement systems
- 10,000 ft² facility
- 10k & 100k lab
- Solo Source Military and Space Supplier
- 48 Hour Delivery on STD catalog items
- Full Documentation Control & Quality Assurance Systems
- ISO 9001:2008 and EN/JISQ/AS9100:2009 CERTIFIED (March 2013)
- Rapid turnaround R&D and excellent customer service on customized products
- Design, engineering & manufacturing in a non-segregated U.S. facility





CONTACT US

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- WEBSITE: <http://microwave-dynamics.com/>
- RFQ: <http://microwave-dynamics.com/request-a-quote/>
- ADDRESS: 16541 Scientific Way/ Irvine, CA 92618

Request a Quote

48 HOUR DELIVERY

- SHORT LEAD TIME for non-standard (non-STD) and custom products
- **48 HOUR SHIPPING:** Shipping for standard (STD) products, free-running DRO, external ref phase locked DRO and certain internal ref DRO's. Whether you have a customer changing frequency just before shipment or a failure of some kind, check with us on our 48 hour shipment.
- **RESTRICTIONS:** Offer applies to Microwave Dynamics' Free-Running DRO's and PLDRO's with an output frequency divisible by 100 MHz. The customer, in most cases, must accept Microwave Dynamics' standard specs. Quantities will generally be limited to the 1-4 piece range.
- **CONTACT US** regarding larger quantities. Credit must be previously established or order prepaid. Although every effort will be made to ship within 48 hours (working days), Microwave Dynamics will not be held liable for delays beyond our control. 48 hour time period will begin the day after the order is placed.

DATASHEETS

The following pages contain MD Datasheets for all standard product. Please inquire for any further information on our products and/or if your requirements are not met by those set forth in the datasheets. Engineering will review your specs and let you know if we can provide a solution. For high quality copies of our datasheets, please download each individually from our website at <http://microwave-dynamics.com/product/>.



THE DIELECTRIC RESONATOR OSCILLATOR

A HIGHLY STABLE CLASS
OF MICROWAVE SIGNAL SOURCES



FEATURES

- DIELECTRIC RESONATOR
- INTERNAL VOLTAGE REGULATOR
- 150 MHz BAND WIDTH
- LOW PHASE NOISE
- MIC FABRICATION
- LOW MICROPHONICS
- LOW POWER CONSUMPTION
- UP TO +25dBm OUTPUT POWER
- AVAILABLE FROM 1-50GHz
- OPERATING RANGE -55° TO +105°C

APPLICATION

- SATELLITE COMMUNICATIONS
- CABLE TV LINKS (CATV)
- LOCAL AREA NETWORKS (LAN)
- GLOBAL POSITIONING SYSTEMS (GPS)
- TEST EQUIPMENT
- UP / DOWN CONVERTERS
- LMDS
- TRANSMITTER & RECEIVERS
- DIGITAL RADIOS
- MISSILE GUIDANCE
- POINT TO POINT
- MILITARY, SPACE, COMMERCIAL

DESCRIPTION

DRO-1000 series Dielectric Resonator Oscillator (DRO) utilizes state-of-the-art MIC to provide a highly stable, reliable and efficient signal source at microwave frequencies up to 50 GHz. The low profile and rugged construction provide excellent durability against harsh environmental conditions.

DRO-1000 series oscillator is designed using FET or BJT amplifier with series feedback at source and Dielectric Resonator at the gate. High gain, low-noise FETs/BJTs are biased positively or negatively at the gate 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 matched for maximum temperature stability and optimum negative resistance.

DRO-1000 series oscillator is buffered by cascaded low-noise driver and power amplifiers for minimum load pulling, maximum isolation and power. FET/BJT devices are directly attached to gold plated Kovar carriers to minimize heat effect and maximize heat sinking. 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 chosen with proper temperature coefficient to compensate for frequency drift. Where extreme stability is required, a miniature heater can be provided to ensure constant temperature and minimum drift.

DRO-1000 series provide several advantages over other microwave signal sources, such as Gunn Cavity Oscillators and Crystal Multiplier Chains. Table 1 offers a brief summary comparison of the other sources.

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

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

Table 1

SPECIFICATION

Model Number	DRO-1000-XX.XX (Where XX.XX is freq.in GHz)
Single Frequency	1.00 to 50.00 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, +10VDC, 90mA
Power Variation	+/-0.5dBm
Pushing	2 ppm/V Max.
Pulling (12 dB Return Loss)	+/- 90 ppm Max.
Frequency Stability	4 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 50° Standard
Storage Temperature	-55° to +125°C
Connectors	SMA Female
Size	2.25" x .93" x .67"
Finish	Nickel

PHASE NOISE ENVELOPE

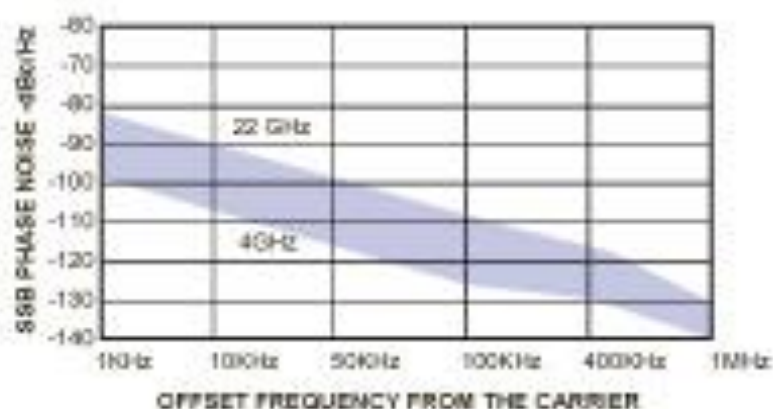
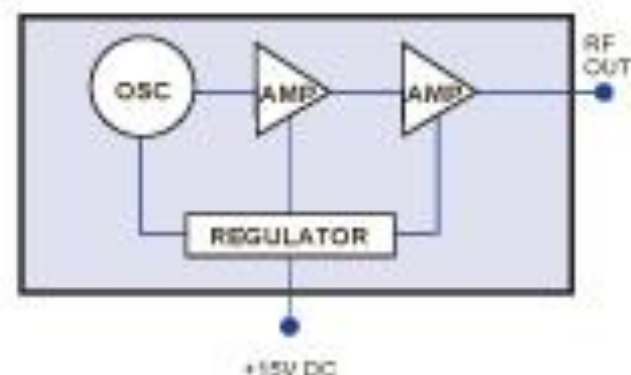
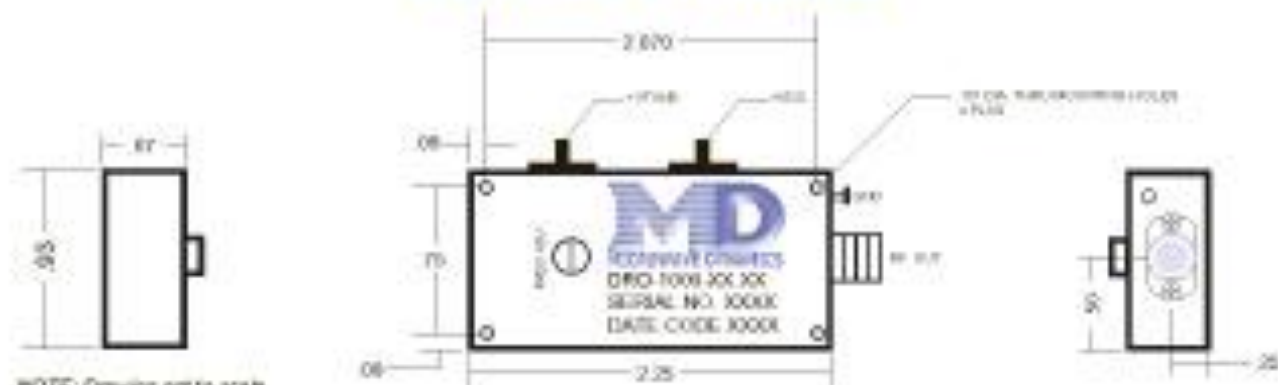


FIGURE A

BLOCK DIAGRAM



OUTLINE DRAWING



THE MINI-DRO

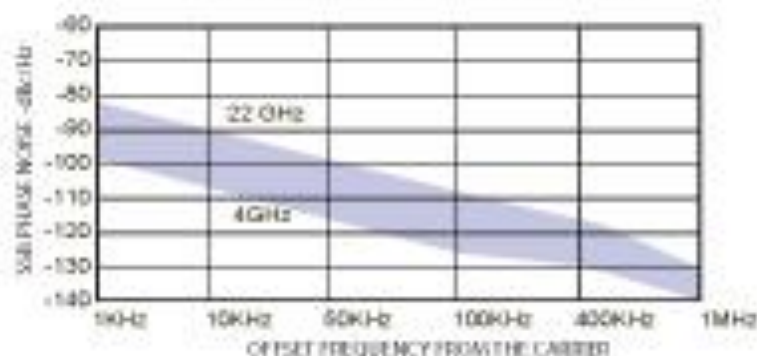
1.2" x 1.2" x .660" PACKAGE



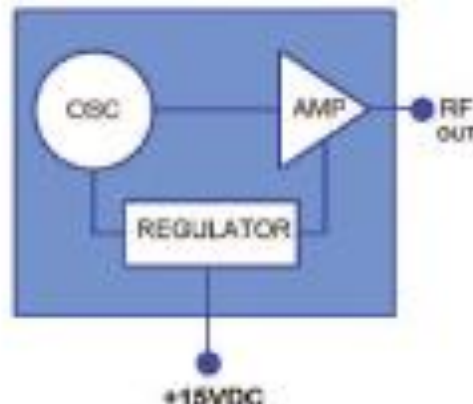
SPECIFICATIONS

Model Number	DRO-1500-XX.XX (Where XX.XX is freq.in GHz)
Single Frequency	8.00 to 18.00 GHz
Mechanical Tuning Range	50 MHz
Electrical Tuning	Not Available
Power Output	+13 dBm, up to +18 dBm Optional
Load VSWR, Maximum	2.0 :1.0
Power Requirements	+15, +12, +8VDC @90mA, max
Power Variation	+/- 0.5dBm
Pushing	10ppm/V Max.
Pulling (12 dB Return Loss)	+/- 90 ppm Max
Frequency Stability	4 ppm / °C
Phase Noise	See Phase Noise Envelope (Fig.A)
Spurious	-85 dBc
Harmonics	-25 dBc
Operating Temperature	0° to 50° Standard; -55° to +105°C Optional
Storage Temperature	-55° to +125°C
Connectors	SMA Female
Size	1.2" x 1.2" x .660"
Finish	Nickel

PHASE NOISE ENVELOPE



BLOCK DIAGRAM



OUTLINE DRAWING



NOTE: Drawing not to scale

MICROWAVE DYNAMICS, 16541 Scientific Way, Irvine, CA 92618

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Web Page: <http://www.microwave-dynamics.com> Email: info@microwave-dynamics.com



P
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Precise
Low-Noise
Durable
Reliable
Outperforming



FEATURES

- DIELECTRIC RESONATOR
- INTERNAL VOLTAGE REGULATOR
- PHASE LOCK INDICATOR ALARM
- LOW PHASE NOISE
- MIC AND SMT FABRICATION
- LOW MICROPHONICS
- LOW POWER CONSUMPTION
- UPTO +25dBm OUTPUT POWER
- AVAILABLE FROM 1-50GHz
- OPERATING RANGE -50° TO +105°C

APPLICATION

- SATELLITE COMMUNICATIONS
- CABLE TV LINKS (CATV)
- LOCAL AREA NETWORKS (LAN)
- GLOBAL POSITIONING SYSTEMS (GPS)
- TEST EQUIPMENT
- POINT TO POINT
- TRAFFIC SIGN POST
- LMDS
- TRANSMITTER & RECEIVERS
- DIGITAL RADIOS
- MISSILE GUIDANCE
- MILITARY, SPACE, COMMERCIAL

DESCRIPTION

PLO-2000 series Phase Locked Dielectric Resonator Oscillator (PLDRO) utilizes state-of-the-art MIC and SMT to provide crystal stability at microwave frequencies up to 50 GHz. The low profile and rugged construction provide excellent durability against harsh environmental conditions.

PLO-2000 series oscillator is designed using FET or BJT amplifier with series feedback at source and Dielectric Resonator at the gate. High gain, low-noise FETs/BJTs are biased positively or negatively at the gate to ensure minimum phase-noise. The device is carefully matched for maximum power, minimum phase-noise and Voltage standing-Ratio (VSWR). The oscillator is matched for maximum temperature stability and optimum negative resistance.

PLO-2000 series oscillator is buffered by cascaded low-noise driver and power amplifiers for minimum load pulling, maximum isolation and power. FET/BJT devices are directly attached to gold plated Kovar carriers to minimize shear effect and maximize heat sinking. 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.

PLO-2000 series proprietary Phase lock loop circuitry is surface mounted on thick film Alumina substrate. The reference frequency is multiplied and sampled to output frequency. Produced error voltage due to frequency drift is sensed by a Wien-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.

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

SPECIFICATIONS

Model Number	PLO-2000-XX.XX (Where XX.XX is freq. in GHz)
Single Frequency	1.00 to 50.00 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, 220 mA
Reference Input Frequency	50 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	-50° to +105°C. Optional; 0° to 50° Standard
Storage Temperature	-55° to +125°C
Connectors	SMA-Female or 2.9 mm-Female
Size	2.25" x2.25" x.67"
Finish	Nickel

PHASE NOISE ENVELOPE

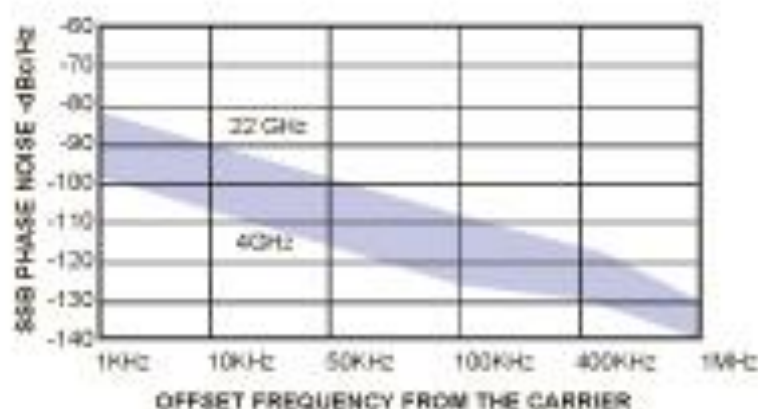
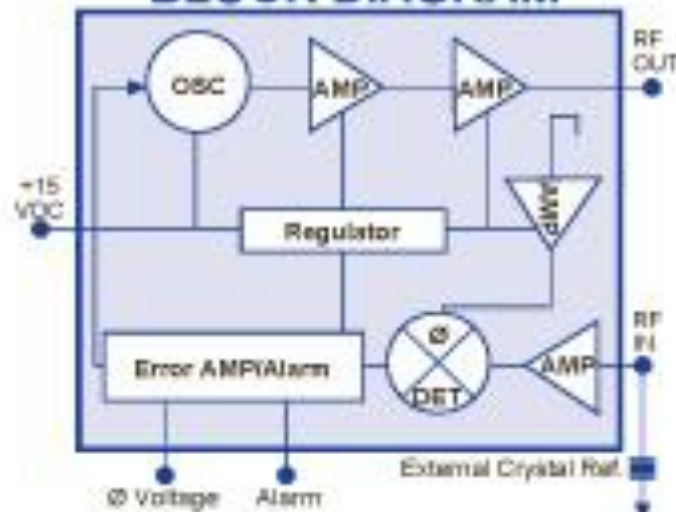
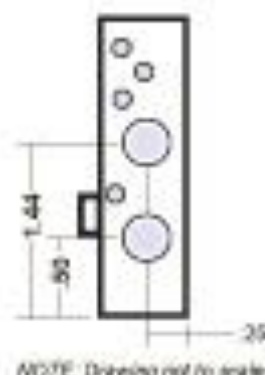
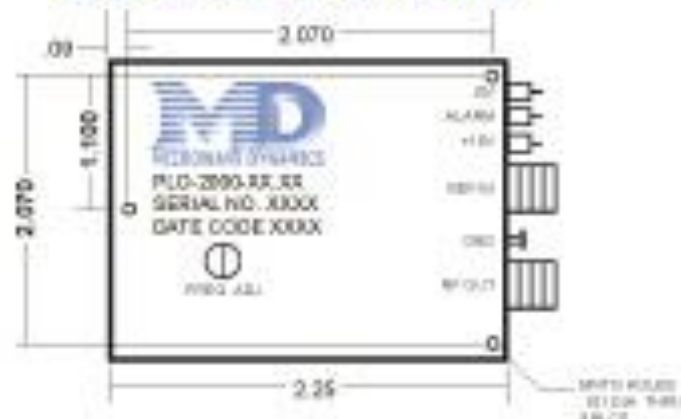


FIGURE A

BLOCK DIAGRAM



OUTLINE DRAWING



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3
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Precise

Low-Noise

Durable

Reliable

Outperforming



FEATURES

- DIELECTRIC RESONATOR
- INTERNAL CRYSTAL OSCILLATOR REFERENCE
- PHASE LOCK INDICATOR ALARM
- LOW PHASE NOISE
- MIC AND SMT FABRICATION
- LOW MICROPHONICS
- LOW POWER CONSUMPTION
- UP TO +25dBm OUTPUT POWER
- AVAILABLE FROM 1-50GHz
- OPERATING RANGE -50° TO +105°C

APPLICATION

- SATELLITE COMMUNICATIONS
- CABLE TV LINKS (CATV)
- LOCAL AREA NETWORKS (LAN)
- GLOBAL POSITIONING SYSTEMS (GPS)
- TEST EQUIPMENT
- POINT TO POINT
- UP/DOWN CONVERTERS
- LMDS
- TRANSMITTER & RECEIVERS
- DIGITAL RADIOS
- MISSILE GUIDANCE
- MILITARY, SPACE, COMMERCIAL

DESCRIPTION

PLO-3000 series Phase Locked Dielectric Resonator Oscillator (PLDRO) utilizes state-of-the-art MIC and SMT to provide crystal stability at microwave frequencies up to 50 GHz. The low profile and rugged construction provide excellent durability against harsh environmental conditions.

PLO-3000 series oscillator is designed using FET or BJT amplifier with series feed back at source and Dielectric Resonator at the gate. High gain, low-noise FETs/BJTs are biased positively or negatively at the gate 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 matched for maximum temperature stability and optimum negative resistance.

PLO-3000 series oscillator is buffered by cascaded low-noise driver and power amplifiers for minimum load pulling, maximum isolation and power. FET/BJT devices are directly attached to gold plated Kovar carriers to minimize shear effect and maximize heat sinking. 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.

PLO-3000 series proprietary Phase lock loop and Crystal Reference circuitry uses Surface Mount Technology. The reference frequency is multiplied and sampled to out put 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.

PLO-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 PLO-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 be externally locked to a reference.

SPECIFICATIONS

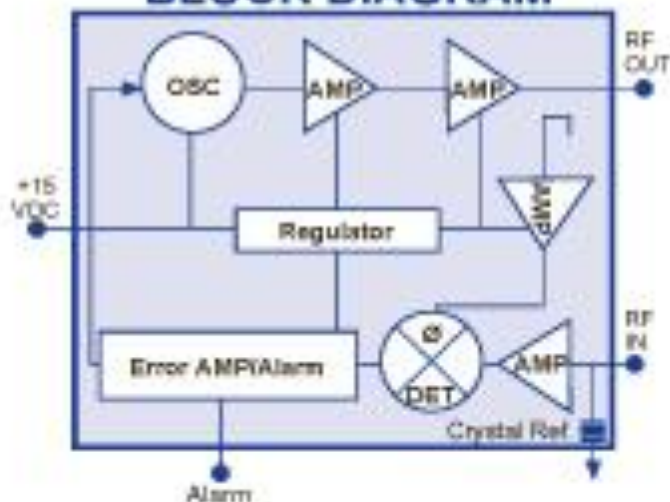
Model Number	PLD-3000-XX.XX (Where XX.XX is freq. in GHz)
Single Frequency	1.00 to 50.00 GHz
Mechanical Tuning Range	100 MHz
Power Output	+13 dBm up to +25 dBm Optional
Load VSWR, Maximum	2.0 : 1.0
Power Requirements	+12, +15 VDC, 300 mA
Reference Frequency	50 to 150 MHz
Frequency Stability	+/- 5 PPM @ 0° to 50°C, +/- .5 ppm
Phase Noise	Optional See Phase Noise Envelope(Fig.A)
Spurious	-80 dBc
Harmonics	-25 dBc
Alarm	TTL
Operating Temperature	-55° to +105°C Optional
Storage Temperature	-55° to +125°C
Connectors	SMA- Female or 2.9 mm- Female
Size	2.25" x 2.25" x 1.25"
Finish	Nickel

PHASE NOISE ENVELOPE

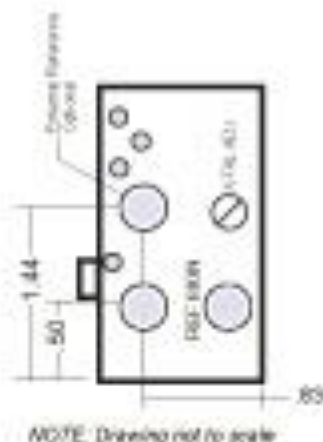
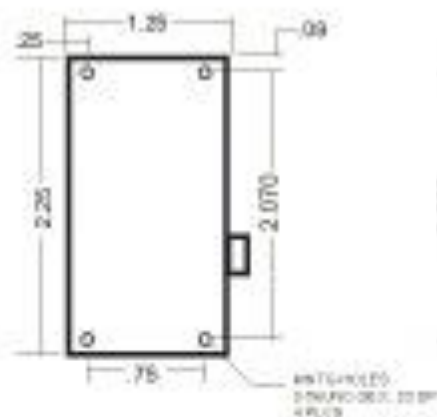


FIGURE A

BLOCK DIAGRAM



OUTLINE DRAWING





Precise
Low-Noise
Durable
Reliable
Outperforming



FEATURES

- DIELECTRIC RESONATOR
- INTERNAL CRYSTAL OSCILLATOR REFERENCE
- PHASE LOCK INDICATOR ALARM
- LOW PHASE NOISE
- MIC AND SMT FABRICATION
- LOW MICRO PHONICS
- LOW POWER CONSUMPTION
- UP TO +25 dBm OUTPUT POWER
- AVAILABLE FROM 1 - 50 GHz
- OPERATING RANGE -50° TO +105° C

APPLICATION

- SATELLITE COMMUNICATIONS
- CABLE TV LINKS (CATV)
- LOCAL AREA NETWORKS (LAN)
- GLOBAL POSITIONING SYSTEMS (GPS)
- TEST EQUIPMENT
- POINT TO POINT
- UP/DOWN CONVERTERS
- LMDS
- TRANSMITTER & RECEIVERS
- DIGITAL RADIOS
- MISSILE GUIDANCE
- MILITARY, SPACE, COMMERCIAL

DESCRIPTION

PLO-4000 series Phase Locked Dielectric Resonator or Oscillator (PLDRO) utilizes state-of-the-art MiC and SMT to provide crystal stability at microwave frequencies up to 50 GHz. The low profile and rugged construction provide excellent durability against harsh environmental conditions.

PLO-4000 series oscillator is designed using FET or BJT amplifier with series feed back at source and Dielectric Resonator at the gate. High gain, low-noise FETs/BJTs are biased positively or negatively at the gate 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 matched for maximum temperature stability and optimum negative resistance.

PLO-4000 series oscillator is buffered by cascaded low-noise driver and power amplifiers for minimum load pulling, maximum isolation and power. FET/BJT devices are directly attached to gold plated Kovar carriers to minimize shear effect and maximize heat sinking. 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.

PLO-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 H-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.

PLO-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 PLO-4000 series are externally 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 be externally locked to a reference.

SPECIFICATIONS

Model Number	PLD-4000-XX.XX (Where XX.XX is freq. in GHz)
Single Frequency	1.00 to 50.00 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, 220 mA
Reference Input Frequency	10MHz or 5MHz Optional
Reference Power Input	0 dBm
Reference Power Input Range	-6 to +10 dBm
Frequency Stability	Same as Reference
Phase Noise	See Phase Noise Envelope (Fig. A)
Spurious	-80 dBc
Harmonics	-25 dBc
Alarm	TTL
Operating Temperature	-20° to +75°C Optional
Storage Temperature	-55° to +100°C
Connectors	SMA- Female or 2.9 mm-Female
Size	2.25" x 2.25" x 1.25"
Finish	Nickel

PHASE NOISE ENVELOPE

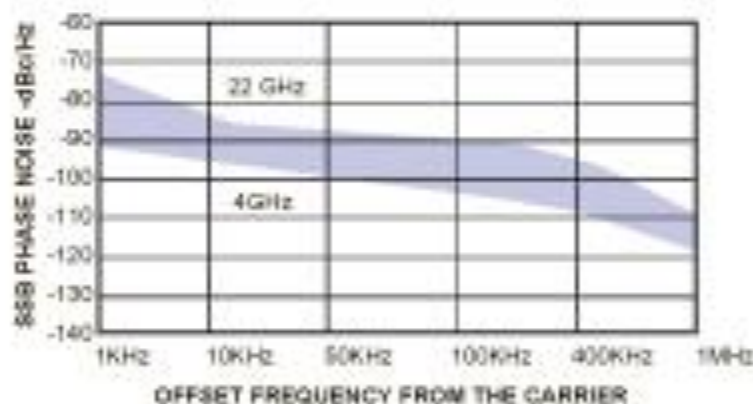
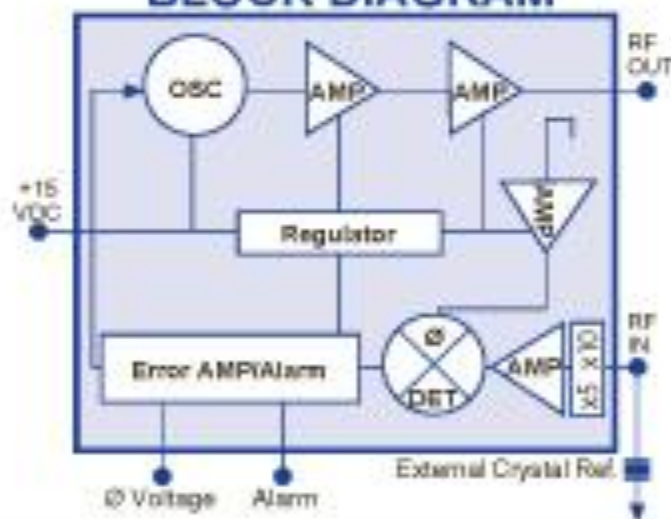
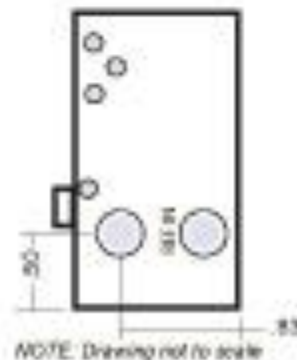


FIGURE A

BLOCK DIAGRAM



OUTLINE DRAWING





OCXO-200

Ovenized Crystal Oscillator

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

Built to the same high standards as our Dielectric Resonator Oscillators, these OCXOs provide an excellent 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 Specifications¹

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	+12VDC <800 mA 1st 3 sec <230 mA next 60 sec 130 mA after warmup
Warm-up Time	<1.5 minutes from +25°C for frequency accuracy to be within $\pm 1 \times 10^{-7}$ of prior frequency after 24 hours off-time
storage temperature	-55°C to +85°C
Operating Temperature:	

Model Number	Temp Range (°C)	Stability (ppm)
OCXO-200K	+ 15°C to 35°C	±0.1
OCXO-200L	0°C to + 50°C	±0.5
OCXO-200M	-40°C to + 75°C	±5

Part No. DCXD-200y-xx.xxv

 γ = Temperature Range

x = Frequency

Microwave Dynamics

16541 Scientific Way

Irvine, CA 92618

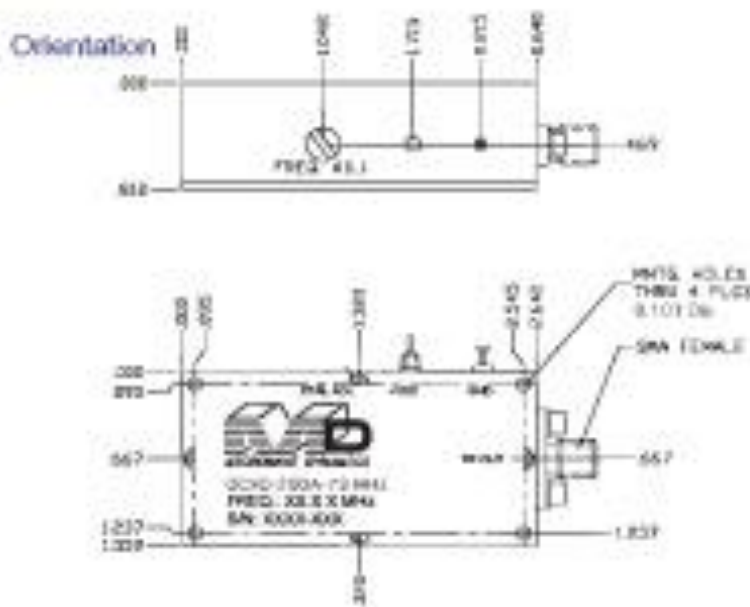
Tel 949-679-7788 Fax 949-679-7748

email: info@microwave-dynamics.com

web www.microwave-dynamics.com

Frequency Stability as a Function of:

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





TCXO-100

Low Cost Temperature Compensated Crystal Oscillator

Microwave Dynamics' Crystal Oscillators provide stability of ± 3 ppm at frequency of 100 MHz. Parts are available at low cost and fast delivery.

Built to the same high standards as our Dielectric Resonator Oscillators, these TCXOs provide an excellent 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	100 MHz (90-110 MHz)
Output Level	+3 dBm (+10 dBm option)
Output Waveform	Sine-wave
Phase Noise	-155 dBc/Hz @ 10KHz
Harmonic Distortion	<-15 dbc
Load	50 ohms
Input Supply Voltage	+12VDC <100 mA
Frequency Adjustment (Mechanical)	± 3 ppm

Dual or triple output is available (optional)

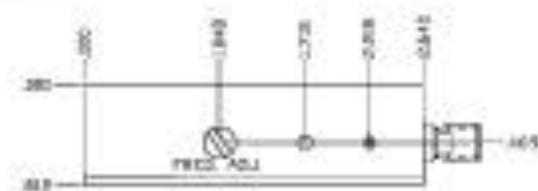
Storage Temperature	-55°C to +85°C
Operating Temperature	0°C to +50°C

Stability (ppm)	Temp Range (°C)
± 3 ppm	0°C to +50°C
± 1.5 ppm	+15°C to +50°C
± 8 ppm	-10°C to +85°C

Frequency Stability as a Function of

Temperature	± 3 ppm over 0° C +50°C ambient
Input Voltage	$\pm 3 \times 10^{-8}$ for a $\pm 10\%$ change in input supply
Load	$\pm 1 \times 10^{-8}$ for a $\pm 10\%$ change in load
Time Domain	Short-term 1 Second $< 3 \times 10^{-11}$
Aging	$\pm 1 \times 10^{-6}$ / year

Orientation



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MICROWAVE DYNAMICS

TCDRO-1060

TEMPERATURE COMPENSATED
OSCILLATOR (TCDRO)



FEATURES

- * DIELECTRIC RESONATOR
- * FREQ STABILITY BETTER THAN 0.1 PPM/°C
- * INTERNAL VOLTAGE REGULATOR
- * LOW PHASE NOISE
- * MIC FABRICATION
- * LOW MICROPHONICS
- * UP TO +25 dBm OUTPUT POWER
- * AVAILABLE FROM 1-40 GHz
- * OPERATING RANGE: -40°C TO +85°C

APPLICATION

- * SATELLITE COMMUNICATIONS
- * CABLE TV LINKS (CATV)
- * LOCAL AREA NETWORKS (LAN)
- * GLOBAL POSITIONING SYSTEMS (GPS)
- * TEST EQUIPMENT
- * POINT TO POINT
- * UP/DOWN CONVERTERS
- * TRANSMITTER & RECEIVERS
- * DIGITAL RADIOS
- * MISSILE GUIDANCE
- * SPACE, MILITARY, COMMERCIAL

DESCRIPTION

TCDRO-1060 Temperature compensated Dielectric Resonator Oscillator (TCDRO) utilizes state-of-the art MIC and SMT to provide high stability at microwave frequencies up to 40 GHz. The low profile and rugged construction provide excellent durability against harsh environmental conditions.

TCDRO-1060 oscillator is designed using FET or BJT amplifier with series feed back at source and Dielectric Resonator at the gate. High gain, low-noise FETs/BJTs are biased positively or negatively at the gate 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 matched for maximum temperature stability and optimum negative resistance.

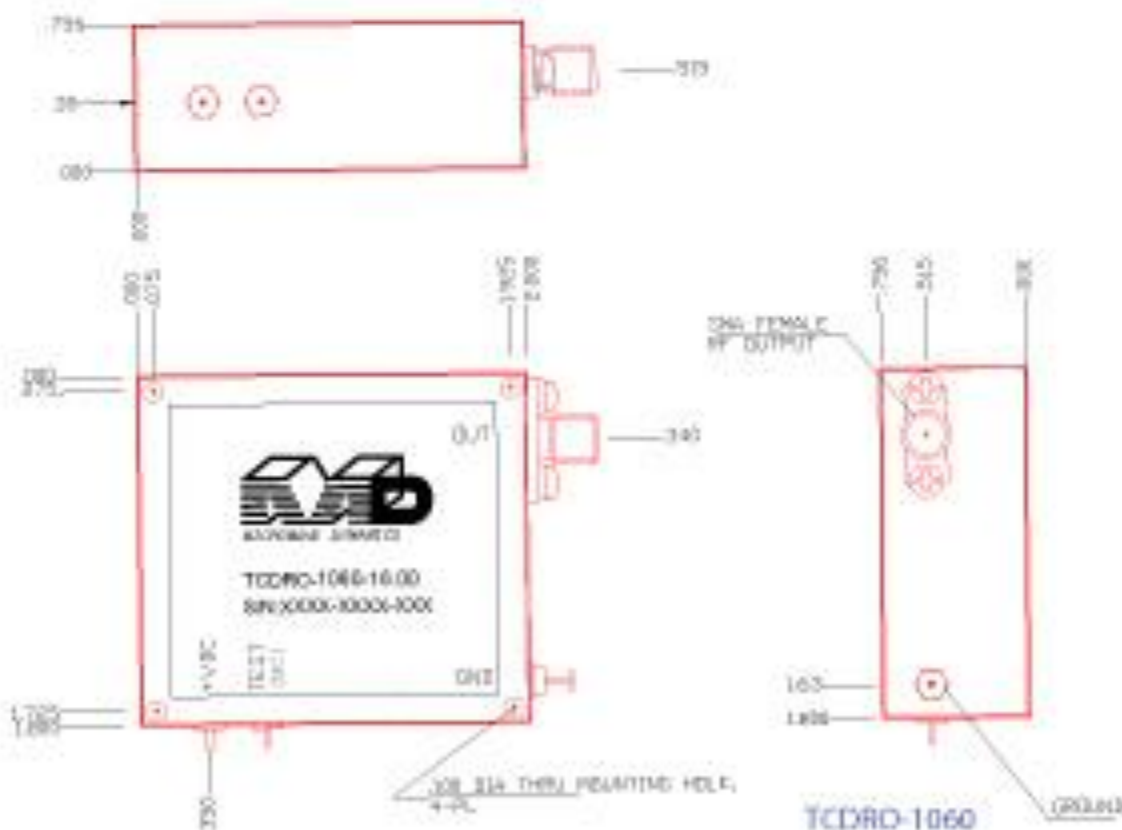
TCDRO-1060 oscillator is buffered by cascaded low-noise driver and power amplifiers for minimum load pulling, maximum isolation and power. FET/BJT devices are directly attached to gold plated Kovar carriers to minimize shear effect and maximize heat sinking. Kovar carriers are mounted to the chassis to provide an efficient thermal junction and a stable structure for reduction of microphonics. Temperature compensating circuit is added to ensure the frequency stability over temperature range. Frequency pushing and pulling is negligible.

TCDRO-1060 series is internally voltage regulated to avoid reverse bias, frequency pushing, bias modulation and voltage transients.

SPECIFICATIONS

Model Number	TCDRO-1060-XX.XX (Where XX.XX is freq in GHz)
Single Frequency	1.00 to 40.00 GHz
Power Output	+13 dBm, up to + 25 dBm Optional
Load VSWR, Maximum	2.0: 1.0
Power Requirements	+12VDC or +15 VDC @ 200 mA (TYP)
Pushing	Less than 1 KHz/V, +/- 4V
Pulling	Less than 1 KHz @ 1.5:1
Power Variation	+/- 2 dBm
Frequency Stability	0.1 ppm/°C
Phase Noise	-85 dBc/Hz @ 10 KHz (TYP)
Spurious	-75 dBc
Harmonics	-25 dBc
Operating Temperature	0°C to 50°C Standard; -40°C to +85°C Optional
Storage Temperature	-55°C to 125°C
Connectors	SMA-Female or 2.92 mm-Female
Size	2.0" x 1.8" x .75"
Finish	Nickel

OUTLINE DRAWING



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PLO-5000 / 5200 Series

*A COMPACT PLDRO WITH OPTION OF
INTERNAL OR EXTERNAL REFERENCE*



PLO-5000

FEATURES

- * DIELECTRIC RESONATOR
- * INTERNAL / EXTERNAL REFERENCE
- * INTERNAL REFERENCE: PLO-5000 SERIES
- * EXTERNAL REFERENCE: PLO-5200 SERIES
- * LOW MICROPHONICS
- * UP TO +25 dBm OUTPUT POWER
- * AVAILABLE FROM 1-40 GHz
- * OPERATING RANGE: -40°C TO +85°C

APPLICATION

- * SATELLITE COMMUNICATIONS
- * CABLE TV LINKS (CATV)
- * LOCAL AREA NETWORKS (LAN)
- * GLOBAL POSITIONING SYSTEMS (GPS)
- * TEST EQUIPMENT
- * POINT TO POINT
- * UP/DOWN CONVERTERS
- * TRANSMITTER & RECEIVERS
- * DIGITAL RADIOS
- * MISSILE GUIDANCE
- * SPACE, MILITARY, COMMERCIAL

DESCRIPTION

PLO-5000 Series Phase Locked Dielectric Resonator Oscillator (PLDRO) utilizes state-of-the art MIC and SMT to provide crystal stability at microwave frequencies up to 40 GHz. The low profile and rugged construction provide excellent durability against harsh environmental conditions.

PLO-5000 oscillator is designed using FET or BJT amplifier with series feed back at source and Dielectric Resonator at the gate. High gain, low-noise FETs/BJTs are biased positively or negatively at the gate 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 matched for maximum temperature stability and optimum negative resistance.

PLO-5000 oscillator is buffered by cascaded low-noise driver and power amplifiers for minimum load pulling, maximum isolation and power. FET/BJT devices are directly attached to gold plated Kovar carriers to minimize shear effect and maximize heat sinking. 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.

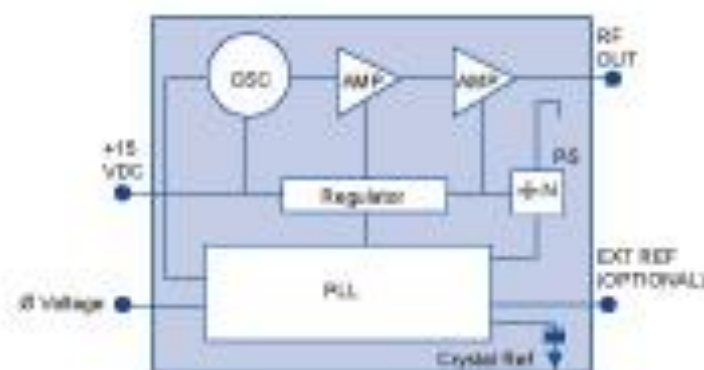
PLO-5000 series uses PLL chip which provides a variety of options. The Reference frequency up to 250 MHz with enhanced frequency resolution; integer-N and fractional-N capability. The oscillator goes up to 20 GHz fundamental frequency; frequencies with 20 to 40 GHz are accomplished with a multiplier and driver amplifier.

PLO-5000 series is internally voltage regulated to avoid reverse bias, frequency pushing, bias modulation and voltage transients. The PLO-5000 series are internally reference locked and factory tuned to specified frequency. Mechanical frequency adjustment is provided for optimum phase voltage setting.

SPECIFICATIONS

Model Number	PLO-5000-XX.XX Internal Reference (Where XX.XX is freq in GHz)
Model Number	PLO-5200-XX.XX External Reference (Where XX.XX is freq in GHz)
Single Frequency	1.00 to 40.00 GHz
Mechanical Tuning Range	100 MHz
Power Output	+13 dBm, up to +25 dBm Optional
Load VSWR, Maximum	2.0: 1.0
Power Requirements	+12VDC or +15 VDC @ 200 mA
Reference Frequency (PLO-5200)	Any value up to 250 MHz
Frequency Stability	+/- 1 ppm @ 0°C to 50°C; +/- 2.5 ppm @ -30°C to 75°C (TYP)
Phase Noise	-85 dBc/Hz @ 10 KHz (TYP)
Spurious	-80 dBc (Fractional N is higher)
Harmonics	-25 dBc
Operating Temperature	0°C to 50°C Standard; -40°C to 85°C Optional
Storage Temperature	-55°C to 125°C
Connectors	SMA-Female or 2.92mm-Female
Size	2.25" x 2.25" .67"
Finish	Nickel

BLOCK DIAGRAM



OUTLINE DRAWING



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PROGRAMMABLE SYNTHESIZER

MDS Series



The MDS Series are fixed frequency synthesizers or user programmable frequency synthesizers. The units have internal or external reference. Output frequency is available from 100 MHz to 6 GHz fundamental, which can be expanded up to 24 GHz with external multiplier. The unit is designed for rugged, low cost applications. Fine frequency step size is also available.

FEATURES

- PROGRAMMABLE
- INTERNAL VOLTAGE REGULATOR
- PHASE LOCK INDICATOR ALARM
- LOW PHASE NOISE
- LOW COST
- FINE RESOLUTION / STEP SIZE
- LOW POWER CONSUMPTION
- +10 dBm OUTPUT POWER
- AVAILABLE FROM 100 MHz - 24 GHz
- COMPACT DESIGN 2.25"x2.25"x.67"

SPECIFICATIONS

Model Number	MDS-XXX-N-XXXX (see chart below)
Frequency	100 MHz to 6 GHz, up to 24 GHz with X4
Power Output	+10 dBm
Power Requirements	+ 8 VDC min, +15 VDC, 150-250mA, TYP(depends on model)
Reference Input Frequency / Power	10 - 100 MHz / 0 dBm
Phase Noise	-90 dBc/Hz @ 10 KHz (for 5.8 GHz)
Spurious / Harmonics	-40 dBc / - 15 dBc
Operating Temperature	0 to 50 °C Standard; -40 to + 85 °C Optional
Size / Connectors	2.25" x 2.25" x .67" / SMA Female

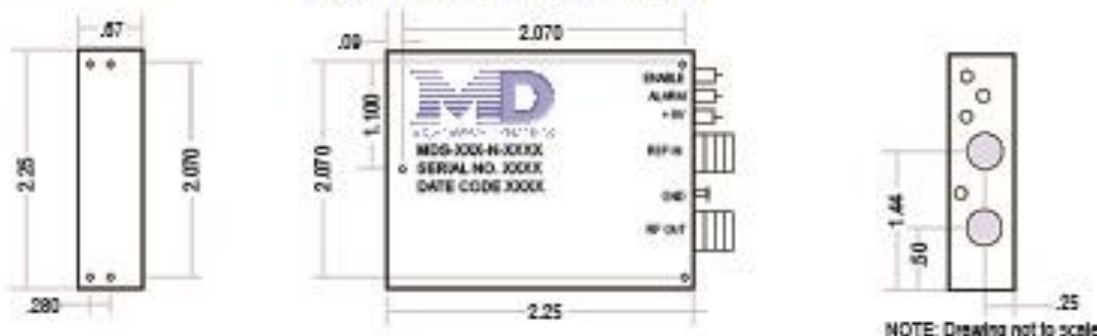
MODELS

Model Number	Reference Type	Frequency	Programming Features
MDS-300-N-XXXX	Internal Reference	Single XXXX	None
MDS-301-N-XXYY	Internal Reference	Range XXYY	USB Programmable
MDS-302-N-XXYY	Internal Reference	Range XXYY	USB Programmable with Flash Memory
MDS-400-N-XXXX	External Reference	Single XXXX	None
MDS-401-N-XXYY	External Reference	Range XXYY	USB Programmable
MDS-402-N-XXYY	External Reference	Range XXYY	USB Programmable with Flash Memory

*N: Blank (fundamental)

*N: 2 or 4 with multiplier

OUTLINE DRAWING



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Low Noise and General Purpose Microwave Amplifiers 2-23GHz

Features:

- * Low Cost
- * SMA Connectors
- * Wide Bandwidth 2-23 GHz.
- * Power Output up to + 17 dBm
- * Low VSWR 2.5:1 Max



MD Model Number	Frequency Range (GHz)	Min. Gain (dB)	Typical Noise Fig (dB)	In-Out VSWR (50 Ω)	Output Power (dBm)	Supply Requirements (VDC @ I Typ)	Case Style
AL0206-30-1	2.0-6.0	15	3.0	2.5:1	+13	8 V @ 50 ma	-1, M3
AL0206-30-2	2.0-6.0	30	3.0	2.5:1	+16	8 V @ 100 ma	-2, M4
AL0307-25-1	2.0-8.0	16	2.5	2.5:1	+13	8 V @ 75 ma	-1, M3
AL0307-25-2	2.0-8.0	30	2.5	2.5:1	+13	8 V @ 150 ma	-2, M4
AL0508-25-1	5.0-8.0	14	2.5	2.5:1	+13	8 V @ 75ma	-1, M3
AL0508-25-2	5.0-8.0	27	2.5	2.5:1	+13	8 V @ 150ma	-1, M4
AL0613-20-1	6.0-13.0	24	2.0	2.5:1	+9	8 V @ 75ma	-1, M3
AL0714-25-1	7.0-14.0	14	2.5	2.5:1	+13	8 V @ 130ma	-1, M4
AL0714-25-2	7.0-14.0	27	2.5	2.5:1	+13	8 V @ 250ma	-2, M4
AL0618-30-1	6.0-18.0	14	3.0	2.5:1	+13	8 V @ 130ma	-1, M3
AL0618-30-2	6.0-18.0	27	3.0	2.5:1	+13	8 V @ 250ma	-2, M4
AL0618-40-1	8.0-18.0	16	4.0	2.5:1	+13	8 V @ 50 ma	-1, M3
AL0618-40-2	8.0-18.0	30	4.0	2.5:1	+17	8 V @ 150ma	-2, M4
AG0210-1	2.0-10.0	15	6.0	2.5:1	+13	8 V @ 75 ma	-1, M3
AG0210-2	2.0-10.0	30	6.0	2.5:1	+13	8 V @ 150ma	-2, M4
AG0618-1	6.0-18.0	13	5.0	2.5:1	+12	8 V @ 130ma	-1, M3
AG0618-2	6.0-18.0	25	5.0	2.5:1	+17	8 V @ 250ma	-2, M4
AG0220-1	2.0-20.0	14	7.0	2.5:1	+13	8 V @ 130ma	-1, M3
AG0220-2	2.0-20.0	25	7.0	2.5:1	+13	8 V @ 250ma	-2, M4
AG0623-1	6.0-23.0	17	6.0	2.5:1	+17	8 V @ 180ma	-1, M3



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Low Noise Microwave / Millimeter Wave Amplifiers

Features:

- * Low Cost
- * SMA, 2.92, 2.4 mm Connectors, Std. Waveguide
- * Wide Bandwidth 12-100 GHz.
- * Power Output up to +13dBm
- * Low VSWR 2.5:1 Typ.



MD Model Number	Frequency Range (GHz)	Min. Gain (dB)	Typical Noise Fig (dB)	In-Out VSWR (50 Ω)	Output Power (dBm)	Supply Requirements (VDC @ I Typ)	Case Style
AL1218-30	12-18	18	2.5	2.5:1	+13	8 V @ 50 ma	-1,M3
AL1218-30-2	12-18	30	2.5	2.5:1	+13	8 V @ 100 ma	-2,M4
AL1830-30	18-30	18	3.0	2.5:1	+12	8 V @ 50 ma	-1,M3
AL1830-30-2	18-30	30	3.0	2.5:1	+12	8 V @ 100 ma	-2,M4
AL2634-30	26-34	18	3.0	2.5:1	+7	8 V @ 75 ma	-1,M3
AL2634-30-2	26-34	27	3.0	2.5:1	+13	8 V @ 150 ma	-2,M4
AL2640-30	26-40	17	3.5	2.5:1	+7	8 V @ 75 ma	-1,M3
AL2640-30-2	26-40	25	3.5	2.5:1	+7	8 V @ 150ma	-2,M4
AL3042-35	30-42	17	3.5	2.5:1	+10	8 V @ 50 ma	-1,M3
AL3042-35-2	30-42	23	3.5	2.5:1	+13	8 V @ 120 ma	-2,M4
AL3640-30-2	36-40	27	3.0	2.5:1	+7	8 V @ 125 ma	-2,M4
AL3645-40-2	36-45	27	4.0	2.5:1	+7	8 V @ 125 ma	-2,M4
AL3350-40	33-50 *	13	4.0	2.5:1	+10	8 V @ 75ma	-SQ
AL3350-40-2	33-50 *	25	4.0	2.5:1	+10	8 V @ 125 ma	-SQ
AL4060-45-2	40-60 *	25	4.5	2.5:1	+10	8 V @ 125 ma	-SU
AL5065-45-2	50-65 *	23	4.5	2.5:1	+10	8 V @ 130ma	-SV
AL7090-50-2	70-90 *	23	5.0	3.5:1	+5	8 V @ 100ma	-SW
AL90100-55-2	90-100 *	25	5.5	3.5:1	+3	8 V @ 100ma	-SW

* Limited Bandwidth Available Please consult factory



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Military Microwave and Millimeter Wave Amplifiers

Features:

- SMA Connectors
- Low Noise Figure from 2.5 dB
- Medium Power Output Up to 0.25 Watt.
- High Gain 15-45 dB Min
- Low VSWR 2.5:1 Max



MD Model Number	Frequency Range (Ghz.)	Min. Gain (dB)	Typical Noise Fig (dB)	In-Out VSWR (50 Ω)	Output Power (dBm)	Supply Requirements * (VDC @ Imax)	Case Style
AL0206-30-1M	2.0-6.0	15	3.0	2.5:1	+15	8 V @ 100 ma	M3
AL0206-30-2M	2.0-6.0	30	3.0	2.5:1	+15	8 V @ 200 ma	M4
AL0206-30-3M	2.0-6.0	43	3.0	2.5:1	+18	8 V @ 300 ma	M5
AL0408-30-1M	4.0-8.0	15	3.0	2.5:1	+15	8 V @ 100 ma	M3
AL0408-30-2M	4.0-8.0	30	3.0	2.5:1	+15	8 V @ 200 ma	M4
AL0408-30-3M	4.0-8.0	40	3.0	2.5:1	+18	8 V @ 300ma	M5
AL0612-25-1M	6.0-12.0	17	2.5	2.5:1	+7	8 V @ 75 ma	M3
AL0612-25-2M	6.0-12.0	30	2.5	2.5:1	+10	8 V @ 200 ma	M4
AL0612-25-3M	6.0-12.0	40	2.5	2.5:1	+17	8 V @ 300 ma	M5
AL0618-25-1M	6.0-18.0	17	2.5	2.5:1	+7	8 V @ 75 ma	M3
AL0618-25-2M	6.0-18.0	30	2.5	2.5:1	+10	8 V @ 150ma	M4
AL0618-25-3M	6.0-18.0	40	2.5	2.5:1	+17	8 V @ 250ma	M5
AG0220-1M	2.0-20.0	17	5.5	2.5:1	+10	8 V @ 100ma	M3
AG0220-2M	2.0-20.0	30	5.5	2.5:1	+14	8 V @ 200ma	M4
AG0220-3M	2.0-20.0	40	5.5	2.5:1	+17	8 V @ 350ma	M5
AP0206-17-2M	2.0-6.0	17	7.0	2.5:1	+17	8 V @ 200ma	M4
AP0206-17-3M	2.0-6.0	30	7.0	2.5:1	+17	8 V @ 300ma	M5
AP0408-17-2M	4.0-8.0	43	7.0	2.5:1	+17	8 V @ 200ma	M4
AP0408-17-3M	4.0-8.0	15	7.0	2.5:1	+17	8 V @ 300ma	M5
AP0612-17-2M	6.0-12.0	23	7.0	2.5:1	+17	8 V @ 200ma	M4
AP0612-17-3M	6.0-12.0	23	7.0	2.5:1	+17	8 V @ 300ma	M5



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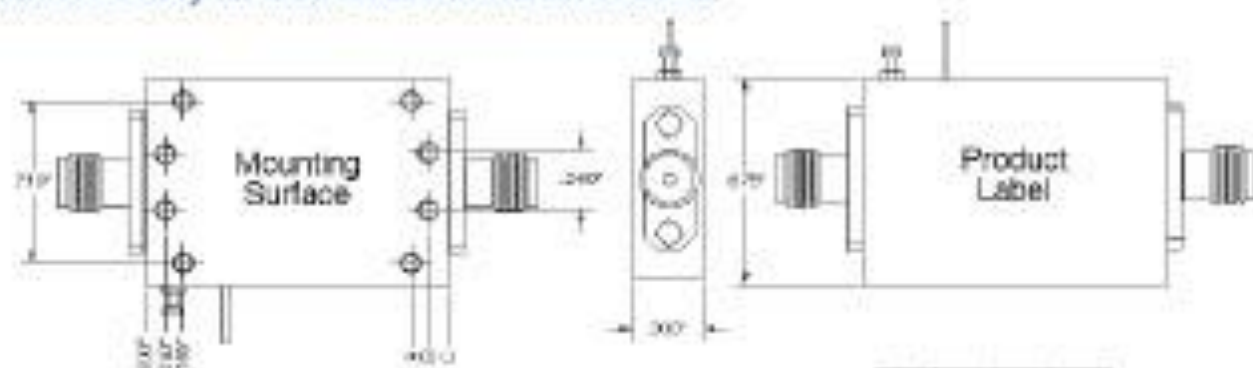
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Web Page: <http://www.microwave-dynamics.com> Email: info@microwave-dynamics.com

MD Model Number	Frequency Range (GHz.)	Min. Gain (dB)	Typical Noise Fig (dB)	In-Out VSWR (50 Ω)	Output Power (dBm)	Supply Requirements * (VDC @ I _{max})	Case Style
AP0618-17-2M	6.0-18.0	27	7.0	2.5:1	+17	8 V @250 ma	M4
AP0618-17-3M	6.0-18.0	40	7.0	2.5:1	+17	8 V @350 ma	M5
AP0220-17-2M	2.0-20.0	27	7.0	2.5:1	+17	8 V @250 ma	M4
AP0220-17-3M	2.0-20.0	40	7.0	2.5:1	+17	8 V @350 ma	M5
AP0206-20-3M	2.0-6.0	37	7.0	2.5:1	+20	10 V @450 ma	M5
AP0408-20-3M	4.0-8.0	37	7.0	2.5:1	+20	10 V @450 ma	M5
AP0612-20-2M	6.0-12.0	27	7.0	2.5:1	+20	10 V @400 ma	M4
AP0612-20-3M	6.0-12.0	37	7.0	2.5:1	+20	10 V @450 ma	M5
AP0618-20-2M	6.0-18.0	27	7.0	2.5:1	+20	10 V @400 ma	M4
AP0618-20-3M	6.0-18.0	37	7.0	2.5:1	+20	10 V @450 ma	M5
AP0218-23-3M	2.0-18.0	30	7.0	2.5:1	+23	10 V @550 ma	M5P **
AP0618-23-3M	6.0-18.0	30	7.0	2.5:1	+23	10 V @550 ma	M5P **
AP0218-27-3M	2.0-18.0	30	7.0	2.5:1	+27	10 V @800 ma	M5P **
AP0618-27-3M	6.0-18.0	30	7.0	2.5:1	+27	10 V @ 800 ma	M5P **
AP0218-29-3M	2.0-18.0	30	7.0	2.5:1	+29	10 V @1250 ma	M5P **
AP0618-30-3M	6.0-18.0	30	7.0	2.5:1	+30	10 V @1250 ma	M5P **

* Some models may also require a negative supply voltage.

** Contact Factory for M5P case outline dimensions.



M Case Style



MICROWAVE DYNAMICS, 16541 Scientific Way, Irvine, CA 92618

PHONE: 949-679-7788 FAX: 949-679-7748

Web Page: <http://www.microwave-dynamics.com> Email: info@microwave-dynamics.com

Medium Power Millimeter Wave Amplifiers

Features:

- ° 2.92 mm Connectors/Standard Waveguides
- ° Medium Power Output Up to 0.25 Watt.
- ° High Gain 15-25 dB Min
- ° Low VSWR 2.5:1 Max



MD Model Number	Frequency Range (Ghz.)	Min. Gain (dB)	Typical Noise Fig (dB)	In-Out VSWR (50 Ω)	Output Power (dBm)	Supply Requirements * (VDC @ I _{max})	Case Style
AP1840-17-1	18-40	18	10	2.5:1	+17	8 V @300 ma	-1, M3
AP1826-17-1	18-26	18	10	2.5:1	+17	8 V @125 ma	-1, M3
AP1826-17-2	18-26	25	10	2.5:1	+17	8 V @250 ma	-2, M4
AP2230-17-1	22-30	15	10	2.5:1	+17	8 V @200 ma	-2, M4
AP2436-17-1	24-36	17	10	2.5:1	+17	8 V @200 ma	-1, M3
AP3442-17-1	34-42	23	10	2.5:1	+17	8 V @150 ma	-1, M3
AP4046-17-2	40-46	23	10	2.5:1	+17	8 V @475 ma	-2, M4
AP5066-17-1	50-66	20	10	2.5:1	+17	8 V @250 ma	-1, M3
AP1840-20-2	18-40	23	10	2.5:1	+20	9 V @300 ma	-2, M4
AP1824-20-2	18-24	23	10	2.5:1	+20	9 V @300 ma	-2, M4
AP2027-20-2	20-27	23	10	2.5:1	+20	9 V @375ma	-2, M4
AP2634-20-2	26-34	23	10	2.5:1	+20	9 V @250ma	-2, M4
AP3035-20-2	30-35	23	10	2.5:1	+20	9 V @300ma	-2, M4
AP3342-20-2	33-42	23	10	2.5:1	+20	9 V @400ma	-2, M4
AP3540-20-2	35-40	23	10	2.5:1	+20	9 V @350ma	-2, M4
AP4046-20-2	40-46	23	10	2.5:1	+20	9 V @300ma	-2, M4
AP1824-23-2	18-24	23	10	2.5:1	+23	9 V @400ma	-2, M4
AP2027-23-2	20-27	23	10	2.5:1	+23	9 V @300ma	-2, M4
AP2632-23-2	26-32	23	10	2.5:1	+23	9 V @300ma	-2, M4
AP3035-23-2	30-35	23	10	2.5:1	+23	9 V @300ma	-2, M4
AP3540-23-2	35-40	23	10	2.5:1	+23	9 V @400ma	-2, M4

* Some models may also require a negative supply voltage



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Web Page: <http://www.microwave-dynamics.com> Email: info@microwave-dynamics.com

High Power Microwave and Millimeter Wave Amplifiers

Features:

- ° 2.92 mm Connectors
- ° High Power Output Up to 3.5 Watt.
- ° High Gain 23 dB Min
- ° Low VSWR 2.5:1 Max



MD Model Number	Frequency Range (GHz.)	Min. Gain (dB)	Typical Noise Fig (dB)	In-Out VSWR (50 Ω)	Output Power (dBm)	Supply Requirements (VDC & Imax)	Case Style
AP0618-27	6-18	23	10	2.5:1	+27	9 V @ 600 ma	-2, MP
AP0618-30	6-18	23	10	2.5:1	+30	9 V @ 800 ma	-2, MP
AP0618-33	6-18	23	10	2.5:1	+33	9 V @ 1200 ma	-2P, MHP
AP0618-35	6-18	23	10	2.5:1	+35	9 V @ 2000 ma	-2P, MHP
AP1826-27	18-26	23	10	2.5:1	+27	9 V @ 800 ma	-2, MP
AP1826-30	18-26	23	10	2.5:1	+30	9 V @ 1000 ma	-2, MP
AP2432-27	24-32	23	10	2.5:1	+27	9 V @ 800 ma	-2, MP
AP2432-30	24-32	23	10	2.5:1	+30	9 V @ 1000ma	-2, MP
AP2432-33	24-32	23	10	2.5:1	+33	9 V @ 1200ma	-2P, MHP
AP2734-27	27-34	23	10	2.5:1	+27	9 V @ 800ma	-2, MP
AP2734-30	27-34	23	10	2.5:1	+30	9 V @ 1000ma	-2, MP
AP2734-33	27-34	23	10	2.5:1	+33	9 V @ 1200ma	-2P, MHP
AP3038-27	30-38	23	10	2.5:1	+27	9 V @ 800ma	-2, MP
AP3038-30	30-38	23	10	2.5:1	+30	9 V @ 1000ma	-2, MP
AP3040-30	30-40	23	10	2.5:1	+30	9 V @ 1200ma	-2, MP
AP3040-33	30-40	23	10	2.5:1	+33	9 V @ 1500ma	-2P, MHP
AP3740-27	37-40	23	10	2.5:1	+27	9 V @ 800ma	-2, MP
AP3740-30	37-40	23	10	2.5:1	+30	9 V @ 1250ma	-2, MP
AP3740-33	37-40	23	10	2.5:1	+33	9 V @ 2000ma	-2P, MHP
AP4046-27	40-46	23	10	2.5:1	+27	9 V @ 900ma	-2, MP
AP4046-30	40-46	23	10	2.5:1	+30	9 V @ 1500ma	-2, MP



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High Power Amplifiers (MPA)

Available .5 -18 GHz up to 20W

FEATURES:

- High power output up to 20 Watts
- High gain 30 dB min; VSWR 2.5:1
- Compact Design 3.00" x 2.125" x .812"
- Pulse modulation
- Input limiter (OPTIONAL)
- Heat Sink (OPTIONAL)



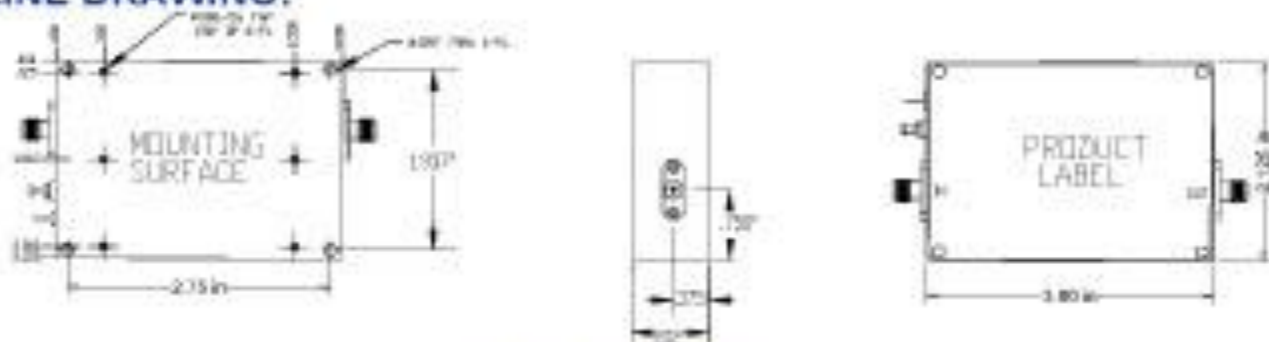
SPECIFICATIONS:

MD Model Number	Frequency Range GHz	Min. Gain (dB)	Typical Noise Figure (dB)	Output Power (dBm)	Supply Req (VDC @Imax)	Technology
MPA00506-33	0.5-6	30	10	+33	28V @ 0.8A	GaN
MPA00518-30	0.5-18	30	10	+30	28V @ 0.9A	GaN
MPA0206-43	2-6	30	10	+43	28V @ 3.5A	GaN
MPA0612-40	6-12	40	10	+40	24V @ 2.4A	GaN
MPA0618-33	6-18	33	10	+33	10V @ 1.8A	GaAs
MPA0618-40	6-18	33	10	+40	28V @ 2.4A	GaN
MPA0812-40	8-12	30	10	+40	12V @ 3.5A	GaAs
MPA0910-43	9-10	35	10	+43	28V @ 3.0A	GaN
MPA1011-43	10-11	35	10	+43	28V @ 3.0A	GaN
MPA1316-37	13-16	30	10	+37	10V @ 3.5A	GaAs

DESCRIPTION:

Model MPA is the new generation of power amplifiers designed by Microwave Dynamics. The compact rugged design enables these amplifiers to efficiently dissipate the heat with proper heat sink to assure the reliability of the product. The single supply voltage, with low drop internal voltage regulator, withstands surges in DC power, reverse input polarity and overtemperature operation. The supply voltage is kept minimal to reduce the heat dissipation. Heat sink and fans can be provided (optional).

OUTLINE DRAWING:



Microwave and Millimeter Wave Up Converters

Features:

- Fundamental and Harmonic Mixing.
- Power Output +7 dBm Typ
- Wide Frequency Ranges 2-99 GHz
- SMA, 2.92 mm, 2.4 mm Connectors
- Some Units Have Internal LO Amplifier



MD Model Number	RF Frequency (GHz.)	LO Power (dBm)	LO Frequency (GHz.)	IF Frequency (GHz.)	Typ. Conv. Gain (dB)	Typical Pout (dBm)	Supply Current 8 VDC @ IDC	Case Style
AUC0208-1	2.0-6.0	+13	2.0-6.0	DC-2.0	5 dB	+10 dBm	50 ma	-3M4,-3
AUC0408-1	4.0-8.0	+13	4.0-8.0	DC-3.0	5 dB	+10 dBm	75 ma	-3M4,-3
AUC0612-1	6.0-12.0	+13	6.0-12.0	DC-4.0	13 dB	+10 dBm	75 ma	-3M4,-3
AUC0618-1	6.0-18.0	+13	6.0-18.0	DC-6.0	5 dB	+10 dBm	130 ma	-3M4,-3
AUC0620-1	6.0-20.0	+17	6.0-20.0	DC-3.0	13 dB	+10 dBm	180 ma	-3M4,-3
AUC1423-1	14.0-23.0	+13	14.0-23.0	DC-2.0	12 dB	+10 dBm	75 ma	-3M4,-3
AUC1830-1	18.0-30.0	+13	18.0-30.0	DC-6.0	7 dB	+9 dBm	75 ma	-3M4,-3
AUC2640-1	26.0-40.0	+13	26.0-40.0	DC-8.0	10 dB	+10 dBm	150 ma	-3M4,-3
AUC3545-1	35.0-45.0	+13	35.0-45.0	DC-5.0	7 dB	+7 dBm	200 ma	-3M4,-3
AUC5565-1	55.0-65.0	+13	55.0-65.0	DC-5.0	7 dB	+7 dBm	150 ma	*
AUC1725-2	17.0-25.0	-5	8.5-12.5	DC-3.0	7 dB	+10 dBm	125 ma	-3M4,-3
AUC2030-2	20.0-30.0	0	10.0-15.0	DC-4.0	10 dB	+10 dBm	125 ma	-3M4,-3
AUC2840-2	28.0-40.0	+15	14.0-20.0	DC-4.0	5 dB	+10 dBm	125 ma	-3M4,-3
AUC2633-2	26.0-33.0	-5	13.0-16.5	DC-2.5	8 dB	+7 dBm	125 ma	-3M4,-3
AUC2040-2	20.0-40.0	+15	10.0-20.0	1.0-3.0	7 dB	+7 dBm	200 ma	-3M4,-3
AUC3342-2	33.0-42.0	+2	16.5-21.0	DC-3.0	8 dB	+7 dBm	150 ma	-3M4,-3
AUC5665-2	56.0-65.0	+12	28.0-32.5	DC-3.0	7 dB	+7 dBm	100 ma	-3M4,-3

* Consult Factory for Case Style and Specifications



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Microwave and Millimeter Wave Down Converters

Features:

- Fundamental and Harmonic Mixing.
- Low Noise Figure
- Wide Frequency Ranges 2-65 GHz
- SMA, 2.92 mm, 2.4 mm Connectors
- Some Units Have Internal LO Amplifier



MD Model Number	RF Frequency (GHz.)	LO Power (dBm)	LO Frequency (GHz.)	IF Frequency (GHz.)	Typ. Conv. Gain (dB)	Typ. Noise Figure (dB)	Supply Current 8 VDC @ IDC	Case Style
ADC0208-1	2.0-6.0	+13	2.0-6.0	DC-2.0	5 dB	3.5 dB	50 ma	-3M4,-3
ADC0408-1	4.0-8.0	+13	4.0-8.0	DC-3.0	5 dB	3.0 dB	75 ma	-3M4,-3
ADC0612-1	6.0-12.0	+13	6.0-12.0	DC-4.0	13 dB	2.5 dB	75 ma	-3M4,-3
ADC0618-1	6.0-18.0	+13	6.0-18.0	DC-6.0	5 dB	3.5 dB	125 ma	-3M4,-3
ADC0620-1	6.0-20.0	+17	6.0-20.0	DC-3.0	5 dB	7.0 dB	180 ma	-3M4,-3
ADC1423-1	14.0-23.0	+13	14.0-23.0	DC-2.0	8 dB	4.0 dB	75 ma	-3M4,-3
ADC1830-1	18.0-30.0	+13	18.0-30.0	DC-6.0	12 dB	4.0 dB	75 ma	-3M4,-3
ADC2640-1	26.0-40.0	+13	26.0-40.0	DC-8.0	12 dB	4.0 dB	75 ma	-3M4,-3
ADC3545-1	35.0-45.0	+13	35.0-45.0	DC-5.0	7 dB	5.0 dB	75 ma	-3M4,-3
ADC5565-1	55.0-65.0	+13	55.0-65.0	DC-5.0	7 dB	6.0 dB	75 ma	*
ADC1725-2	17.0-25.0	-5	8.5-12.5	DC-3.0	7 dB	4.0 dB	100 ma	-3M4,-3
ADC2030-2	20.0-30.0	0	10.0-15.0	DC-4.0	10 dB	4.0 dB	120 ma	-3M4,-3
ADC2840-2	28.0-40.0	+15	14.0-20.0	DC-4.0	5 dB	4.5 dB	100 ma	-3M4,-3
ADC2633-2	26.0-33.0	-5	13.0-16.5	DC-2.5	8 dB	4.0 dB	125 ma	-3M4,-3
ADC2040-2	20.0-40.0	+15	10.0-20.0	1.0-3.0	7 dB	4.0 dB	150 ma	-3M4,-3
ADC3342-2	33.0-42.0	+2	16.5-21.0	DC-3.0	8 dB	4.5 dB	75 ma	-3M4,-3
ADC5665-2	56.0-65.0	+12	28.0-32.5	DC-3.0	7 dB	5.0 dB	100 ma	*

* Consult Factory for Case Style and Specifications



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THE LO-MIX SERIES

A COMPACT LO, MIXER AND AMPLIFIER,
2-45 GHz ALL IN ONE PACKAGE



LO-MIX100

Free Running LO, Mixer and Amplifier

FEATURES

- * LOW COST
- * ONE SUPER COMPACT PACKAGE
- * WIDE BANDWIDTH 2-45 GHz
- * UP TO +25 dBm OUTPUT POWER
- * LOW VSWR 2.5:1 MAX
- * LOW POWER CONSUMPTION
- * LOW PHASE NOISE
- * INTERNAL VOLTAGE REGULATOR

DESCRIPTION

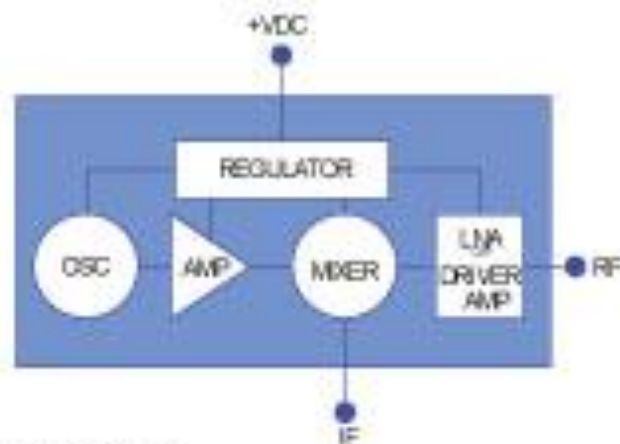
LO-MIX Series utilizes latest MMIC technology to provide a highly stable, low noise signal source (DRO), a mixer and a power amplifier or LNA in one small compact package.

LO-MIX is designed to solve the matching issues of LO, MIXER and AMPLIFIER together. All these components are internally matched to save time, space and cost for end-users. LO frequency up to 20 GHz (fundamental), and harmonically balanced mixers used for higher frequencies.

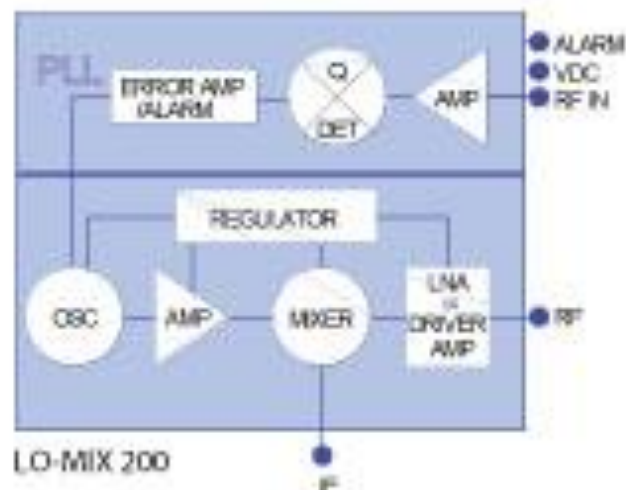
LO-MIX is available with different models:

- Free Running LO (LO-MIX100 Series)
- External Reference PLO (LO-MIX200 Series)
- Internal Reference PLO (LO-MIX300 Series)
- External 10MHz Reference PLO (LO-MIX400 Series)

LO-MIX models are available with driver amplifier (Up-Converter) or LNA (Down Converter). LO-MIX with driver amplifier up to +25 dBm (optional) is available.



LO-MIX 100



LO-MIX 200

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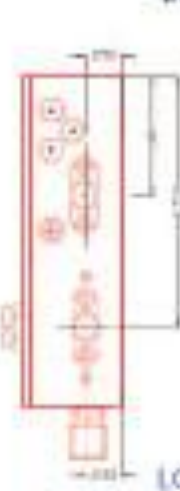
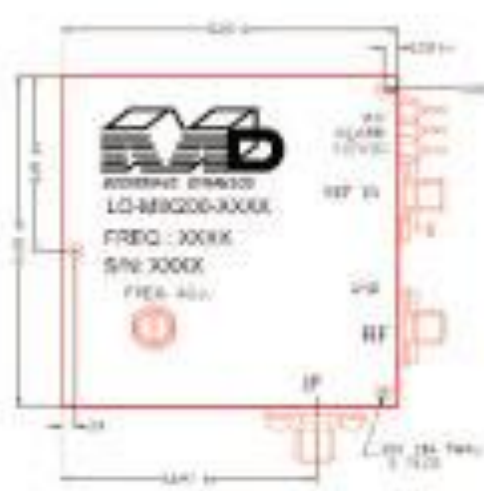
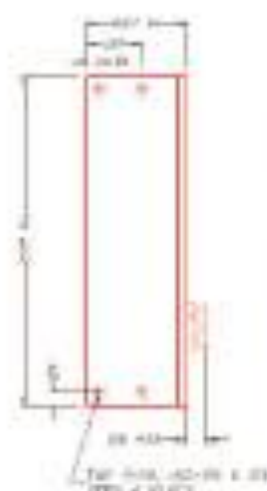
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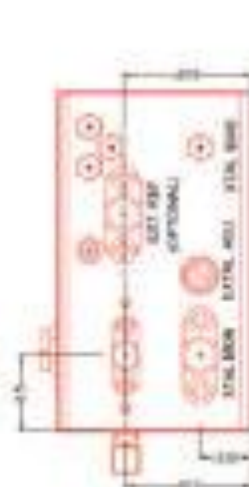
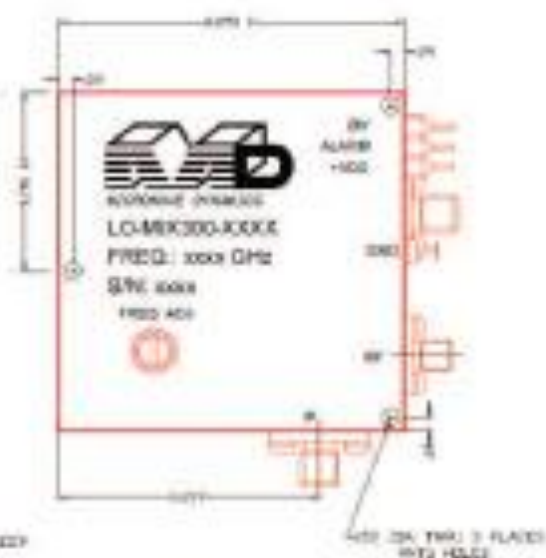
MD Model Number	Model Description	Frequency Range	F (GHz)	Conversion Gain (Typ)	Output Power (Typ)	Supply Requirements (VDC @ I TYP)
LO-MIX100-XXXX	Free Running LO & Downconverter	2-45 GHz	DC-8.0	5 dB min	+0 dBm	8 V @ 150 mA
LO-MIX101-XXXX	Free Running LO & Upconverter	2-45 GHz	DC-8.0	5 dB min	+7 dBm	8 V @ 150 mA
LO-MIX200-XXXX	Ext Ref PLO & Downconverter	2-45 GHz	DC-8.0	5 dB min	+0 dBm	8 V @ 300 mA
LO-MIX201-XXXX	Ext Ref PLO & Upconverter	2-45 GHz	DC-8.0	5 dB min	+7 dBm	12 V @ 300 mA
LO-MIX300-XXXX	Int Ref PLO & Downconverter	2-45 GHz	DC-8.0	5 dB min	+0 dBm	12 V @ 400 mA
LO-MIX301-XXXX	Int Ref PLO & Upconverter	2-45 GHz	DC-8.0	5 dB min	+7 dBm	12 V @ 400 mA
LO-MIX400-XXXX	Ext 10 MHz Ref PLO & Downconverter	2-45 GHz	DC-8.0	5 dB min	+0 dBm	12 V @ 400 mA
LO-MIX401-XXXX	Ext 10 MHz Ref PLO & Upconverter	2-45 GHz	DC-8.0	5 dB min	+7 dBm	12 V @ 400 mA



LO-MIX 100 Series



LO-MIX 200 Series



LO-MIX 300/400 Series

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In-Line Millimeter Wave Frequency Multipliers

Features:

- In-Line Design
- Low Conversion Loss 15-20 dB Typical
- Input Connector SMA Compatible
- Good Fundamental Isolation 20 dB Typical
- Input Drive Level +17 dBm Typical



MD Model Number	Input Frequency (GHz.)	Input Power (dBm)	Output Frequency (GHz.)	Output Power (dBm)	Typ. Fundamental Isolation dB	Input/Output Connection
A2X1826-0	9-13.25	+17 dBm	18-26.5	0	20 dB	SMA / 2.92 mm
A3X1826-0	6-8.83	+17 dBm	18-26.5	0	50 dB	SMA / 2.92 mm
A2X2640-0	13.25-20	+17 dBm	26.5-40	0	50 dB	SMA / 2.92 mm
A3X2640-0	8.83-13.3	+17 dBm	26.5-40	-1	50 dB	SMA / 2.92 mm
A2X3350-0	16.5-25	+17 dBm	33-50	TBD	40 dB	SMA / 2.4 mm
A3X3350-0	11-16.66	+17 dBm	33-50	TBD	40 dB	SMA / 2.4 mm
A2X4060-0	20-30	+17 dBm	40-60	TBD	TBD	2.92 / 2.4 mm
A3X4060-0	13.3-20	+17 dBm	40-60	TBD	TBD	2.92 / 2.4 mm
A3X5075-0	16.6-25	+17 dBm	50-75	TBD	TBD	2.92 / 1.85 mm

* Under Development Contact Factory



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Millimeter Wave Frequency Multipliers

Features:

- ° Low Cost
- ° 2.92 mm, 2.4 mm and 1.85 mm Connectors and Standard Waveguides
- ° Power Output + 7 dBm typical.
- ° Fundamental Isolation 20 dB Typical
- ° Low VSWR 2.5:1 Max



MD Model Number	Input Frequency Range (GHz.)	Input Power (dBm)	Output Frequency Range (GHz.)	Output Connection	Output Power (dBm)	Supply Requirements (VDC @ Imax)	Case Style
A2X1840-2	9-20	+7	18-40	2.92 mm	+7	8 V @ 200 ma	-2
A2X1826-2	9-13.25	+7	18-26.5	WR-42	+9	8 V @ 200 ma	-2
A3X1826-2	6-8.83	+7	18-26.5	WR-42	+9	8 V @ 200 ma	-2
A2X2640-2	13.25-20	+7	26.5-40	WR-28	+7	8 V @ 200 ma	-2
A3X2640-2	8.83-13.33	+7	26.5-40	WR-28	+7	8 V @ 250 ma	-2
A2X3350-1 *	16.5-25	+7	33-50	WR-22	0	8 V @ 150 ma	*
A3X3350-1 *	11-16.67	+7	33-50	WR-22	-2	8 V @ 150 ma	*
A2X4060-1 *	20-30	+7	40-60	WR-19	-1	8 V @ 150 ma	*
A3X4060-1 *	13.33-20	+7	40-60	WR-19	-3	8 V @ 150 ma	*
A3X5075-1 *	16.66-25.0	+7	50-75	WR-15	-3	8 V @ 200 ma	*

* Limited Bandwidth and Different Case Style. Please consult factory with requirements and Case Outline



-2 Case Style



MICROWAVE DYNAMICS, 16541 Scientific Way, Irvine, CA 92618

PHONE: 949-679-7788 FAX: 949-679-7748

Web Page: <http://www.microwave-dynamics.com> Email: info@microwave-dynamics.com

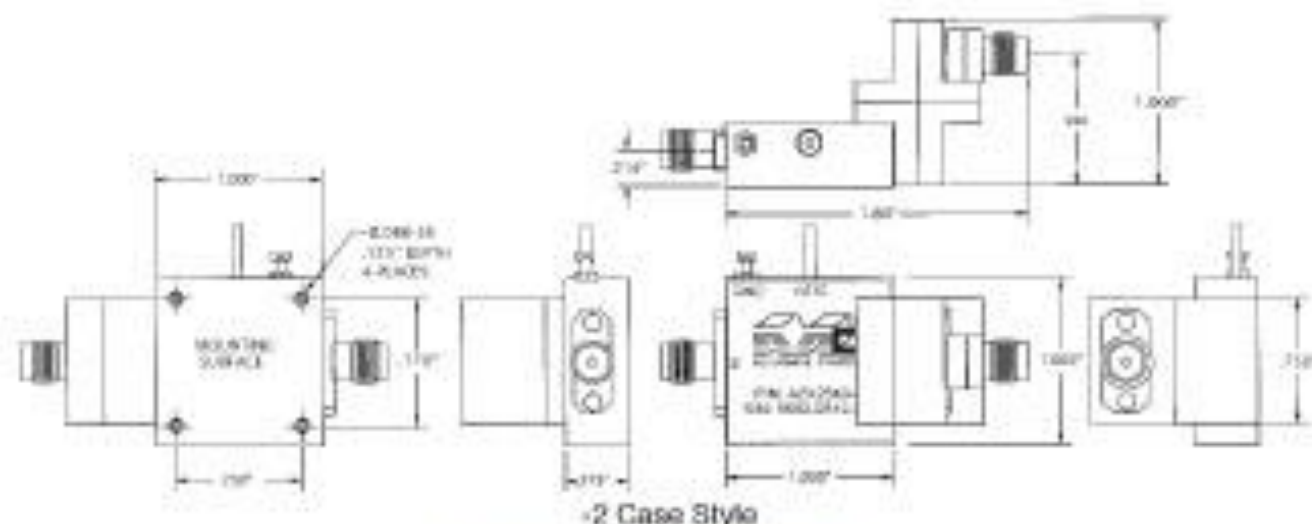
Millimeter Wave Frequency Multipliers

Features:

- ° High Harmonic Isolation 50 dBc Minimum
60-65 dBc Typical
- ° X2, X3 and X4 Multipliers
- ° 2.92 mm, 2.4 mm and 1.85 mm Connectors
- ° Power Output up to +20 dBm.
- ° Low VSWR 2.5:1 Max



MD Model Number	Input Frequency Range (GHz.)	Input Power (dBm)	Output Frequency Range (GHz.)	Output Connection	Output Power (dBm)	Supply Requirements (VDC @ I _{max})	Case Style
A2X2832-2	14-16	+7	28-32	2.92 mm	+17	8 V @ 300 ma	-2
A3X2832-2	9.33-10.66	+7	28-32	2.92 mm	+17	8 V @ 300 ma	-2
A2X3236-2	16-18	+7	32-36	2.92 mm	+17	8 V @ 300 ma	-2
A3X3236-2	10.66-12	+7	32-36	2.92 mm	+17	8 V @ 300 ma	-2
A4X3236-2	8.0-9.0	+7	32-36	2.92 mm	+17	8 V @ 300 ma	-2
A2X3640-2	18-20	+7	36-40	2.92 mm	+17	8 V @ 300 ma	-2
A3X3640-2	12-13.33	+7	36-40	2.92 mm	+17	8 V @ 300 ma	-2
A4X3640-2	9-10	+7	36-40	2.92 mm	+17	8 V @ 300 ma	-2
A2X4044-2	20-22	+7	40-44	2.4 mm	+17	8 V @ 300 ma	-2
A3X4044-2	13.33-14.66	+7	40-44	2.4 mm	+17	8 V @ 300 ma	-2
A4X4044-2	10-11	+7	40-44	2.4 mm	+17	8 V @ 300 ma	-2



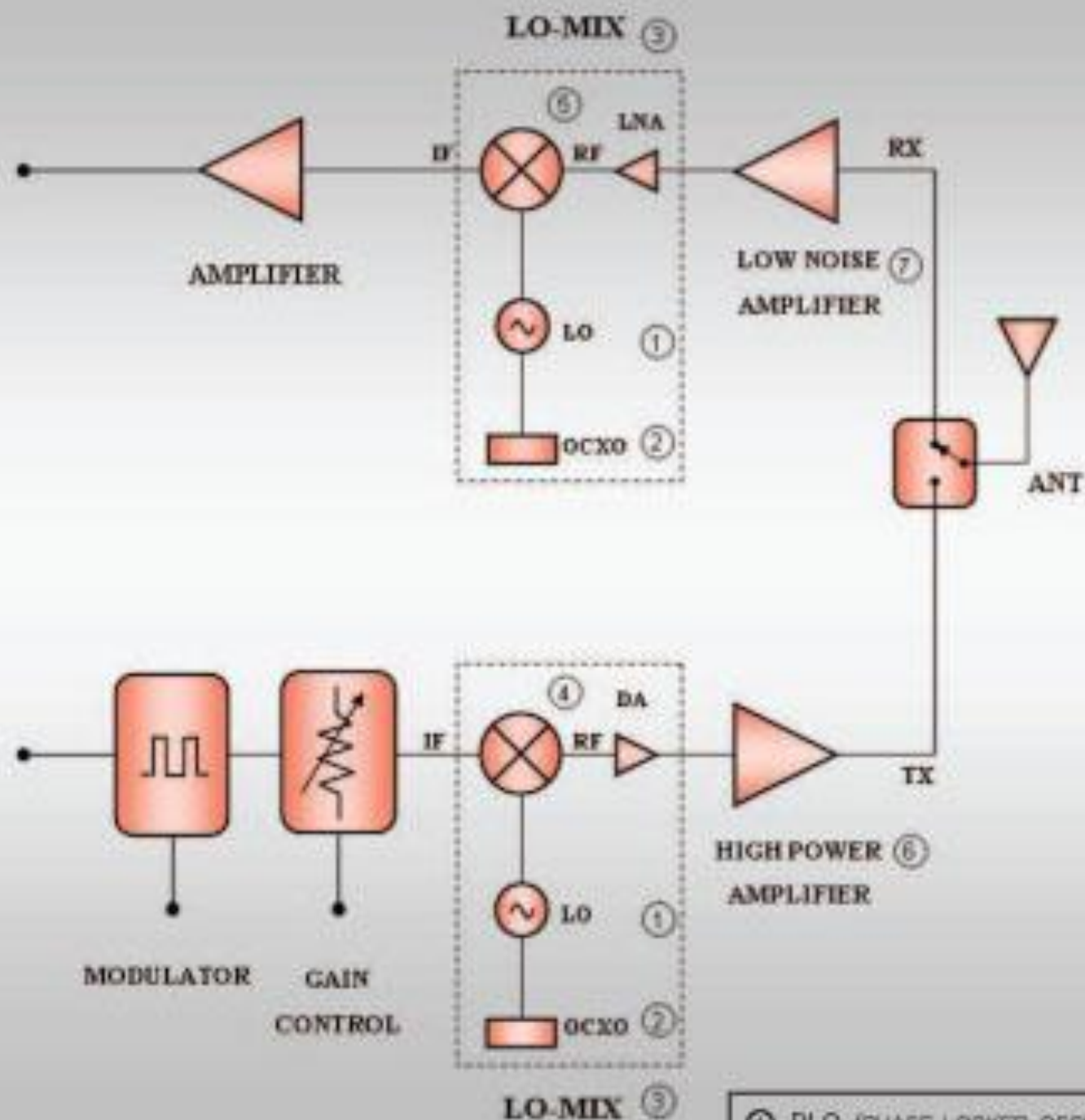
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MD PRODUCT OVERVIEW

Typical Transceiver Application



- ① PLO (PHASE LOCKED OSCILLATOR)
- ② OCXO-200 (CRYSTAL)
- ③ LO-MIX (UP/DOWN CONVERTER W/LO)
- ④ UP CONVERTER
- ⑤ DOWN CONVERTER
- ⑥ HIGH POWER AMP
- ⑦ LOW NOISE AMPS

Flight Hardware for F-22 Raptors

Since 1997, Microwave Dynamics has been a qualified supplier for the **F-22 Raptor Program**.

The F-22 Raptor is a single-seat air superiority fighter aircraft that uses stealth technology to avoid detection by employing a combination of features to interfere with radar.



MD designed and continues to manufacture Phase Locked Dielectric Resonator Oscillators with the following features:

- State-of-the-art design
- Balanced isolated dual output DDRO
- Compact package 2.25" x 2.25" x 0.7"
- Hermetic Seal
- Output with GPO connectors available
- Extended temperature range (-55°C to +105°C)
- Vibration and Shock Upgraded Flight Hardware
- MTBF more than 170,000 Hours
- Electrical Specification Capabilities,
 - Frequency: 7-24 GHz, dual output
 - Output power: +10 to +25 dBm
 - Power Supply: +12 or +15 VDC
- Environmental Specifications,
 - Shock: MIL-STD-810, Method 516, 18 Shock of 20 G's each.
 - Vibration: Grms 34.2, Freq. {20-2000 Hz}, {0.02 -6.0 G2/Hz}
 - Altitude: 75K ft, 4 hours

Awarded Contract Numbers are available upon request.



Aura Satellite



MH-60 Helicopters



International Space Station



F-22 Raptors



Earth Station





Where Real Quality Counts
WE ARE THERE

SPACE QUALIFIED HI-REL DRO



Models: Oscillators, Amplifiers, and
Up/Down-converters. Hermetic Sealed
Package.

Screening: Equivalent to MIL-PRF-38534
Class H and K and NASA Programs.
Element of Evaluation, Group A,B,C & D

Qualification Test/Acceptance Test

Program Management and AS9100:2009 Qualified Quality System

Microwave components are based on Hi-Rel standards according to
MIL-PRF-38535, MIL-STD-202, MIL-STD-883, MIL-STD-750, MIL-STD-810,
MIL-Q-9858, MIL-STD-19500, MIL-I-45208.

MD Has Been Providing Oscillators to the
Space Industry Since 2004



Aura Satellite



MH-60 Helicopters



International Space Station



F-22 Raptors



Earth Station

