



# Preliminary Product Brief

## Micro-Opto-Electronic Oscillator (uOEO)

### Low Phase Noise Microwave Photonic Hybrid Chip



Micro-Opto-Electronic Oscillator offers unprecedented *low phase noise* and *low vibration & acceleration sensitivity* in its class for signal sources required in high-frequency, high performance applications. The Micro-OEO offers typical phase noise performance levels of **-108 dBc/Hz at 10 KHz offset** from the carrier. Available in output frequencies between 18 and 40 GHz.

#### Features

- Low Phase Noise/Jitter
- Low Spurious Content
- Micro-Chip Form Factor
- Frequency Scalability
- EMI Tolerant
- High Stability
- Low Vibration/Acceleration Sensitivity Option

#### Applications

- Radar Systems
- Defense Communication
- Test & Measurement
- Satellite Communication
- Imaging
- Microwave Radio

The unique design of the Micro-OEO is based on the photonic generation of spectrally pure signals at RF and millimeter wave frequencies that enable OEwaves' signal sources to scale to higher frequencies with little to no penalty in phase noise performance. This is accomplished through the patented technology of ultra-high quality factor (Q) crystalline whispering gallery mode (WGM) optical resonators.

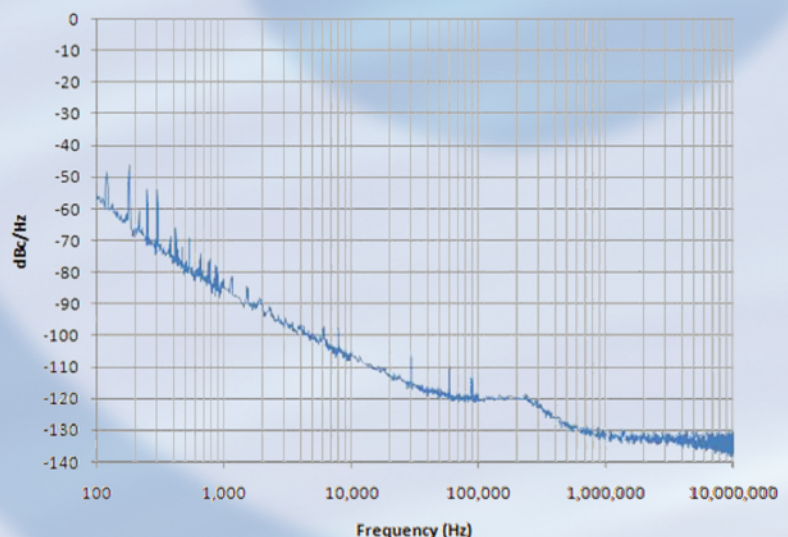
The high performance Micro-OEO allows enhanced radar system visibility, increased channel capacity of communication systems, and high capacity, high frequency next generation wireless communication systems. This level of performance in a micro-chip form factor enables new capabilities in legacy as well as new markets for a variety of terrestrial and airborne applications.

#### Free Running Phase Noise Plot

Micro-OEO - 35 GHz

NOTE: This product is designated as a defense article under Category XI(c) of the USML and is subject to ITAR licensing requirements.

OEO phase noise





## Product Specifications

Parameter	Micro-OEO	Notes
Output Frequency	18-40 GHz	Customer to designate frequency. Consult factory for other frequencies.
RF Output Power	+10 dBm	
SSB Phase Noise	- 55 dBc/Hz @ 100Hz - 85 dBc/Hz @ 1kHz - 108 dBc/Hz @ 10kHz -120 dBc/Hz @ 100kHz -130 dBc/Hz @ 1MHz -135 dBc/Hz @ 10MHz	
Output Return Loss	12 dB	
Frequency Accuracy	+/- 25 ppm	
Spurious	-70 dBc	
Short Term Stability	10 <sup>-9</sup> @ 1 Sec.	Allan Deviation at constant ambient.
Thermal Stability	1 ppm/°C	
Operating Temp. Range	-20° - +70° C	Case Temperature.
Power Sources	+4Vdc ; 300mA +1V; 500mA max TEC1 +1V; 500mA max TEC2	
Package Size	0.6" x 0.6" x 0.15"	
Options		
Extended Temp. Range	>90° C	Consult factory.
Vibration/Acceleration Sensitivity	5x 10 <sup>-11</sup> /g	Consult factory.

### For other inquiries:

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### NOTE:

These specifications are subject to change without notice due to OEwaves ongoing development cycle. Unless otherwise noted, all specifications in this document are to be treated as "typical".

This product line is covered by one or more of the following U.S. patents: 5,723,856; 5,777,778; 6,389,197; 6,488,861; 6,795,481; 6,798,947; 6,879,752; 7,173,749; 7,248,763; 7,356,214; 7,440,651. Other patents pending.



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