

OXIDE Deep-UV Single Frequency Lasers

OXIDE's Frequad series is a collection of continuous wave (CW) single frequency deep-UV lasers, built from the outcome of combining OXIDE's wavelength conversion technology, nonlinear crystal technology and unique high-speed, precision voice coil motor (VCM) laser, thereby enabling stable operation of CW. The original Frequad lasers (Frequad-HP, Frequad-M, Frequad-C) has a successful history of over 20 years, and the new additions (Frequad-M57, Frequad-W, Frequad-K) are extensions of this series.

Sintec Optronics is OXIDE's partner in Singapore.



1. Frequad-K CW 302nm UV Laser

Frequad-K inherits the high stability and reliability of the proven Frequad series of semiconductor inspection equipment while incorporating features enabling high-speed, precise control of wavelength and phase for quantum applications/quantum computing.

Features

- Expanding OXIDE laser technology for quantum applications/quantum computing (building on the proven Frequad series for semiconductor wafer inspection)
- Equipped with high-speed, precise wavelength and phase control functionality
- Achieves high wavelength and phase stability, meeting the stability standards required for quantum applications/quantum computing
- Versatility enabling broad applicability from research use to cutting-edge technologies including quantum applications/quantum computing.



Applications

- Yb-based quantum applications

Specification	Value
Wavelength	302nm
Output Power	500mW

Linewidth	<0.005pm
Extinction Ratio	>100:1
Beam Quality	TEM ₀₀ , M ² < 1.2
Polarization	Vertical, Linear
Power Supply	AC100-240V, 50/60Hz
Power Consumption	<300W
Cooling	Water
Dimensions (Head)	350 x 590 x 220mm (May change for future models)

2. Frequad CW 266nm DUV Lasers

2.1 Frequad-C CW 266nm DUV Laser

Features

- **Compact enclosure**
No water cooling or dry-air supply is required. The compact enclosure requires no setup.
- **Long-term stable output and beam quality**
OXIDE's proprietary ultra-high-purity BBO crystals deliver outstanding quality, providing an expected lifetime of over 10,000 hours. Because the crystals exhibit minimal degradation, high beam quality and long-term stable operation are ensured.
- **Refined servo-lock technology**
OXIDE's proprietary servo-lock technology, using a high-speed, high-precision voice coil motor (VCM), guarantees stable operation.
- **Low power consumption**
The high-efficiency wavelength-conversion laser system enables very low power consumption.



Applications

- Spectral analysis
- Optical microscope/UV microscope
- Biotechnology and Biological Research
- Material evaluation and surface analysis
- Photolithography Prototype

2.2 Frequad-M CW 266nm DUV Laser

Features

- OXIDE CW laser: Standard model Overhauls allow for long-term use.
- Long-term stable output and beam quality
- Refined servo-lock technology
- Low power consumption

Applications

- Semiconductor wafer inspection
- Lithography photomask and reticle inspection
- Photomask direct writing
- UV spectroscopy
- FBG writing



2.3 Frequad-HP CW 266nm DUV Laser

Features

- Module-based maintenance possible: The enclosure is designed for customer-replaceable modules (no need to return the laser).
- Long-term stable output and beam quality
- Refined servo-lock technology
- Low power consumption

Applications

- Semiconductor wafer inspection
- Lithography photomask and reticle inspection
- Photomask direct writing
- Photomask inspection
- FBG writing



Model	Frequad-C FQC-50/-20	Frequad-M FQM-20/-10/-07/-05/-03	Frequad-HP FQ50-20/-10
			
Wavelength	266nm	266nm	266nm
Output Power	50 / 20mW	2.0 / 1.0 / 0.7 / 0.5 / 0.3W	2.0 / 1.0W
Linewidth	<0.005pm	<0.005pm	<0.005pm
Power Stability	< +/-3 %/8 hrs	< +/-1 %/8 hrs	< +/-1 %/8 hrs
Extinction Ratio	>100:1	>100:1	>100:1
Beam Quality	TEM ₀₀ , M ² < 1.3	TEM ₀₀ , M ² < 1.2	TEM ₀₀ , M ² < 1.2
Polarization	Vertical, Linear	Vertical, Linear	Vertical, Linear
Beam Diameter	0.8mm ± 0.2mm	3mm ± 0.3mm	3mm ± 0.3mm
Divergence (1/e ²)	<0.4mrad	<0.2mrad	<0.2mrad
Power Supply	AC100-240V, 50/60Hz	AC100-240V, 50/60Hz	AC100-240V, 50/60Hz
Power Consumption	<70W	<340W	<300W
Cooling	Air	Water	Air
Dimensions (Head)	153 x 202 x 79mm	350 x 590 x 124mm	240 x 840 x 160mm

3. Frequad-M57 CW 257.5nm DUV Laser

OXIDE's Frequad-M57 laser is a continuous wave (CW) single frequency deep UV 257.5nm laser. Since its wavelength is the same as the second harmonic (SHG) of argon ion lasers, which are gas lasers, the M57 laser is designed for existing users of gas lasers or for new users of this wavelength without the ease of operation and maintenance. It is not only stable but is also highly reliable. Thus, it will reduce maintenance frequency and running costs when used in photo lithography equipment, inspection tools, and site flow meters.

Features

- Same wavelength as the second harmonic of argon ion lasers
- Long-term stable output and beam quality
- Refined servo-lock technology
- Low power consumption



Applications

- Semiconductor wafer inspection
- Lithography photomask and reticle inspection
- Photomask direct writing
- UV spectroscopy
- FBG writing

Specification	Value
Wavelength	257.5nm
Output Power	1.0, 0.7, 0.5, 0.3W
Linewidth	<0.005pm
Extinction Ratio	>100:1
Beam Quality	TEM ₀₀ , M ² < 1.3
Polarization	Vertical, Linear
Power Supply	AC100-240V, 50/60Hz
Power Consumption	<340W
Cooling	Water
Dimensions (Head)	350 x 590 x 124mm

4. Frequad-W CW 213nm DUV Laser

OXIDE's Frequad-W laser is a continuous wave (CW) single frequency deep UV 213nm laser. This laser has the shortest wavelength among the CW lasers offerings and is suited not only for scientific and technological applications such as photoelectron spectroscopy, but also for industrial applications due to its high reliability.

Features

- Ultra-high purity OXIDE CW laser: Shortest wavelength. Achieves the shortest continuous-wave wavelength of 213 nm.
- Long-term stable output and beam quality
- Refined servo-lock technology
- Low power consumption



Applications

- Semiconductor wafer inspection
- Lithography photomask and reticle inspection
- Photomask direct writing
- UV spectroscopy
- FBG writing

Specification	Value
Wavelength	213nm
Output Power	20mW, 10mW
Linewidth	< 1MHz (0.15fm)
Extinction Ratio	>100:1
Beam Quality	TEM ₀₀
Polarization	Vertical, Linear
Power Supply	AC100-240V, 50/60Hz
Power Consumption	<300W
Cooling	Air
Dimensions (Head)	240 x 840 x 160mm