RAEA™ Series- Unprecedented Performance from a Single-Box Ultrafast Amplifier

Ultrafast Ti:sapphire amplifier- 20W average power over a wide range of repetition rates

Applications

- High harmonic generation (HHG)
- Frequency conversion, OPA pumping
- Materials research
- Femtochemistry
- Laser particle acceleration
- Spectroscopy
- THz generation
- Ultrafast Imaging
- Pump probe experiments

Features

- Cryogenic cooling enables highest average powers on the market
- Average power 20W from a single box configuration
- Pulse energies up to 20 mJ
- Software based tuning of repeition rate
- Pulse duration of < 35 or < 25 fs
- Excellent beam quality: M^2 typically 1.1-1.2
- Intuitive control GUI including wavelength, bandwidth, power, and repetition rate control with integrated diagnostics
- One-box configuration with integrated pump lasers and oscillator
- Combination of clean (low pedestal), short pulses and high energies gives higher peak intensities to drive nonlinear processes

Preliminary Specifications

RAEA is KMLabs' sub-25 fs, single-box amplifier. It is a fully engineered and integrated commercial source based on a single rugged opto-mechanical platform. It employs patented (US 6,804,287) cryogenically-cooled amplifier technology, allowing for a continuous trade-off between pulse energy and repetition rate.
Flexibility to optimize the laser to utilize its full output power while optimizing pulse energy for the experiment. Often more than an **order of magnitude** increase in experimental throughput.

RAEA Unique Features

- Optimized for pumping HHG (KMLabs' XUUS™ product)

Systems Built to Perform

- Sealed modular components for plug and play upgradeability
- Hands-free, software-based operation including repetition rate adjustments, and real-time power and spectrum monitoring and tuning
- Next-generation oscillator
- Unprecedented output power for a single-stage Ti:sapphire system
- 2nd-generation Permacell™ cryocell technology for improved performance and temperature-cycling capabilities, and ultra-low maintenance

The Cryo-cooling Advantage

Cooling a Ti:sapphire crystal to 50-80K results in a greater than 200x decrease in thermally-induced distortions in the beam being amplified. At 90W pump power, the thermal lens of several meters is easily managed, while a room temperature crystal would exhibit a catastrophic < 1 cm thermal lens effect.

This capability underpins KMLabs' unique ability to offer versatile repetition rate and power-scalable systems.

KMLABS™ inc.
LEADING IN ULTRAFAST

RAEA Preliminary Specifications

RAEA: Single box, Single Stage Ti:sapphire amplifier	
Tunable Repetition Rate Ranges	1-5 kHz, 5-10 kHz, 5-30 kHz, 30-200 kHz
Average Power	up to 20 W
Center Wavelength	790 +/- 10 nm
Pulse Width	<25fs or <35 fs *Measured using FROG*
Spatial Mode	TEM00, M^2<1.25
Pulse Energy Stability	<0.5% or <1% RMS *measured single shot over 100,000 shots*
Power Stability	<0.5% RMS over 24 hours[2], <0.5% / °C
Pointing Stability	<10 µrad RMS over 24 hours[2], <10 µrad / °C
ns Pre Pulse Contrast	>250:1
ns Post Pulse Contrast	>100:1
Sub ps Contrast	>500:1
Footprint (LxW)	50"x42"
Environmental Conditions	Temperature: 15-30C Stabilized to +/- 3 °C Humidity: <50%

RAEA Example Performance Data at 10 kHz