

ITEM OPPORTUNITY SYNOPSIS

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|---------------------------------|-----------------|
| Scouting Number: | 2024-189 |
| Name of the item to be scouted: | PEFL-EOLA Laser |
| State item to be used in: | None |

Describe the Item:

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| <p>Please describe the item application/the end use of the item.</p> | <p>The National Oceanic and Atmospheric Administration (NOAA), Oceanic and Atmospheric Research (OAR), Earth Systems Research Laboratories (ESRL), Chemical Sciences Laboratory (CSL) is replacing an existing erbium doped fiber amplifier (EDFA) and integrated optical circulator that is installed in a new airborne Doppler lidar system being developed by CSL. The deployment of the airborne Doppler lidar is part of a larger research effort. The CSL requires a pulsed erbium fiber laser (PEFL) amplifier with integrated optical circulator like the Lumibird PEFL-EOLA (Eye-Safe Ozone Lidar for Aerosols) in order to have drop-in replacements for the current output telescope and scanner interface.</p> |
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Supplier Information:

| | |
|--|---|
| Type of Supplier Being Sought (select from the list below): | |
| Manufacturer | x |
| Contract Manufacturer | |
| Distributor | |
| Other (Please Specify) | |

| | |
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| Reason for Scouting Submission (select from the list below) | |
| 2nd Supplier | |
| Price | |
| Re-Shore | |
| Past supplier no longer available | |
| New Product Startup | |
| BABA | x |
| Other (Please Specify) | |

Summary of Technical Specifications and Performance Requirements:

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| <p>Describe the manufacturing processes (elaborate to provide as much detail as possible)</p> | <p>Unknown except as provided in attached specs documents.</p> |
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| <p>Provide dimensions / size / tolerances / performance specifications of the item</p> | <p>The Lumibird PEFL-EOLA is specially designed for Doppler heterodyne LIDAR systems, delivering Fourier transform limited pulses with high energy and high peak power. The laser can emit up to 400 μJ energy and up to 900W peak power with a linear polarization, a very high extinction ratio in between two pulses, a long coherence length, and an excellent output beam quality. It is ideal for wind measurement applications such as turbine mounted lidar, windfarm optimization, and wind hazard and wake vortices monitoring. This is the only known instrument that can meet the Government's needs, and this notice's intent is to identify any other products that meet the full requirements listed below. Optical Specifications: Mode of operation: Pulsed Operating center wavelength: 1550.12nm Spectral linewidth: 5 kHz Relative intensity noise: -110 dB/Hz RF frequency: 160 MHz CW port output power: 1 mW CW port output fiber: Panda SM CW port output fiber length: 90-110 cm CW port output termination: FC/APC Polarization extinction ratio: 20 dB Output pulse width (FWHM): 200+/-20 ns; 400+/-40 ns; 800+/-80 ns Pulse repetition frequency: 15-20 kHz Output peak power: 600W Single pulse energy: 120 μJ Average output power: 1.8 W Constant pump current, at PRF = 15 kHz and PW = 200 +/- 20 ns Output peak power: 600 W Single pulse energy: 240 μJ Average output power: 3.6 W Constant pump current, at PRF = 15 kHz and PW = 400 +/- 40 ns Output peak power: 300 W Single pulse energy: 240 μJ Average output power: 3.6 W Constant pump current, at PRF = 15 kHz and PW = 800 +/- 80 ns Output peak power: 600 W Single pulse energy: 120 μJ Average output power: 2.4 W Constant pump current, at PRF = 20 kHz and PW = 200 +/- 20 ns Output peak power: 450 W Single pulse energy: 180 μJ Average output power: 3.6 W Constant pump current, at PRF = 20 kHz and PW = 400 +/- 40 ns Output peak power: 225 W Single pulse energy: 180 μJ Average output power: 3.6 W Constant pump current, at PRF = 20 kHz and PW = 800 +/- 80 ns ASE ratio: 5% Optical polarization: Linear Polarization extinction ratio: 17 dB Circulator isolation (port 2->1): 20 dB Circulator crosstalk (port 1->3) 55 dB Circulator Port 3 output fiber: Panda SM Circulator Port 3 output fiber length: 90-110 cm Circulator Port 3 output fiber: FC/APC Output fiber: Panda 25 μm, 0.07NA Output fiber length: 33-37 cm Output termination: FC/APC Beam quality 1.5 M squared Electrical Specifications: Control mode: ACC only RF driver: YES Interface: RS232; Interlock; AOM TTL trigger Supply voltage: 24 V Power consumption: 130 W Mechanical & Environmental Specifications: Housing: 270mm x 220mm x 50mm Weight: 3 kg Cooling: Conductive via bottom surface Operating case temperature: -10 – 65 degrees C Storage temperature: -40 – 85 degrees C</p> |
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| <p>List required materials needed to make the product, including materials of product components, if applicable</p> | <p>Unknown except as provided in attached specs documents.</p> |
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| Are there applicable certification requirements? | |
| Yes | |
| No | x |
| Please explain: | |
| Are there any applicable regulations that apply to the production of this item? | |
| Yes | |
| No | x |
| Please explain: | |
| Are there any other standards / requirements? | |
| Yes | |
| No | x |
| Please explain: | |
| NAICS CODES: | |
| NAICS 1 | 334516 Analytical laboratory instrument manufacturing |
| NAICS 2 | |
| Additional Comments: | |
| Additional technical comments: | Any proposed products must be direct optical drop-in for the existing telescope without need for modification to the product or system. |
| Volume and Pricing: | |
| Estimated Potential Business Volume (i.e. #units per day, month, year): | One-time purchase |
| Estimated Target Price/Unit Cost Information: | \$42,971.00 for PEFL-EOLA, estimated \$250.00 for shipping. |
| Delivery Requirements: | |
| When is it needed by? (Immediate, 30 days, 6 months, etc.) | Anticipated award by end of current fiscal year (by 09/20/2024), with delivery by 90 days after award. |
| Describe packaging requirements (i.e. individually/group packaging, etc.) | Product must adequately protected to be delivered undamaged. |
| Where will this item be shipped? | Boulder, CO |
| Additional Comments: | |
| Is there other information you would like to include? | This is a Simplified Acquisition, which has a shorter lead time to completion than an action over \$250,000.00. It is expected that this requirement will be awarded within the next 30-60 days, and any timely scouting (requested completed within 15 days from submission) would be appreciated to align with Simplified Acquisition requirements for posting and the Buy American Act Waiver process. Department of Commerce Point of Contact: Marcelle Loveday, Director, Acquisition Policy & Workforce Office of Acquisition Management, MLoveday@doc.gov. |

PEFL-EOLA

PULSED ERBIUM FIBER LASER

1.5 μm LONG PULSE FIBER LASER



1.5 μm



PE 11A/ PE 12A

PE 13D

Eye-safe 1.5 μm operating wavelength,
Energy per pulse up to 400 μJ ,

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The PEFL-EOLA series is a range of 1.5 μm pulsed fiber lasers specially designed for Doppler heterodyne LIDAR systems, delivering Fourier transform limited pulses with high energy and high peak power. Shorter pulse duration with high peak power are well suited to high spatial resolution middle range systems whereas longer pulses with high energy are well suited for long range applications.

Thanks to innovative optical designs, the lasers can emit up to 400 μJ energy and up to 900W peak power with a linear polarization, a very high extinction ratio in between two pulses, a long coherence length and an excellent output beam quality (diffraction limited or $M^2 < 1.1$ to 1.5 depending on peak power). This product range is ideal for various wind measurement applications such as turbine mounted lidar, windfarm optimization and wind hazard and wake vortices monitoring.

The rugged modules can work in the most stringent environments 24 hours/24. Lumibird provides numerous of PEFL-EOLA lasers which operates continuously under vibrations, shocks and strong temperature variations. IP64 solutions are also available.

The OEMs incorporate a microcontroller for internal controls, alarms, and RS232 communications making the laser compatible with all systems. Pulses are triggered by external signals (one TTL used as a gate, one analog used for pulse shaping) supplied by the user system. The lasers can be proposed with integrated pulse shaping electronics for easy integration into lidar systems or for pulse shape optimization. In this case, only one external TTL trigger signal is required.

An output circulator can be implemented into the module in order to collect the backscattered light for the Heterodyne measurement.

Key features

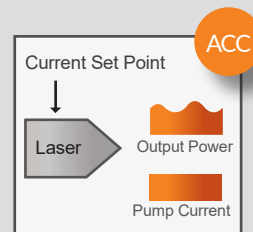
- Eye-safe 1.5 μm operating wavelength
- Energy per pulse up to 400 μJ
- Peak power up to 900 W
- Pulse duration from 100 to 800 ns
- Pulse repetition frequency from 10 kHz to 20 kHz
- Low RIN and low phase noise
- Linear Polarization
- Fourier transform limited linewidth operation
- Diffraction limited $M^2 < 1.1$ or < 1.5
- Wide operating temperature range from +10 $^{\circ}\text{C}$ to +65 $^{\circ}\text{C}$
- Highly integrated design

What applications

- Aerosol detection
- 2D/3D wind profiler
- Weather monitoring
- Pollution monitoring
- Turbine mounted LiDAR
- Wind hazard and wake vortices monitoring
- Wind farm optimization

Modes of operation

The devices offer one mode of operation :



ACC (Automatic Current Control) mode is standard for all devices. The laser is controlled from diodes current set point.

PEFL-EOLA

PULSED ERBIUM FIBER LASER
1.5 μm LONG PULSE FIBER LASER



Optical Specifications @ 25 °C

| PEFL-EOLA | |
|------------------------------|--|
| Mode of operation | Pulsed |
| Operating wavelength | 1550 +/-10 nm or ITU channel |
| Energy per pulse | Up to 400 μJ |
| Peak power | Up to 900 W |
| Pulse repetition frequency | From 10 to 20 kHz |
| Pulse duration | From 100 to 800 ns |
| Average output power | Up to 4 W |
| Spectral linewidth | From 3 kHz to <1 MHz |
| Polarization | Linear |
| Beam quality, M ² | <1.1 to < 1.5 |
| CW seed tap | > 1 mW power on Panda, 100 +/-5 cm, 3 mm PVC |
| Tap and output termination | FC/APC |

The PEFL-EOLA is available as OEM module for an easily integration

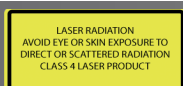
RELIABILITY

The Lumibird range of fiber lasers are manufactured with tested components and are submitted to several inspections during the manufacturing process under a rigorous quality management certified in accordance with the ISO 9001:2015 standard. Our all-in-fiber systems offer maintenance-free operation. Countless units are continuously running in demanding environments with no failure.

GUARANTEE

Our fiber systems are under 1 full year parts and labor warranty.
We offer a warranty extension of 1 or 2 years. Please contact us.

For ordering information and custom solutions, please contact us : websales@keopsys.com



Lumibird undertakes a continuous and intensive product development program to ensure that its products perform to then highest technical standards. As a result, the specifications in this document are subject to change without notice.

Lumibird has locations across the globe that are available to provide support for any product, service or inquiry. Visit www.lumibird.com to connect with any of our global sites.



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|--------------|---|
| Part number: | PEFL-E16-LP-240-400-015-W34-G2-T1-ET1-PE60D-CIRFA |
| Référence | L6747 |
| Edition: | 1 |
| Date: | 5/24/2024 |

Optical specifications (all optical specifications given at 25°C except if notified)

| Characteristic | Symb. | Min. | Typ. | Max. | Units | Notes / conditions |
|---------------------------------------|-------------------|--------------------|----------|----------|----------------|--|
| Mode of operation | MofO | Pulsed | | | | |
| Operating center wavelength | OW | - | 1550.12 | - | nm | ITU34 |
| Spectral linewidth | LW | - | 5 | - | kHz | |
| Relative intensity noise | RIN | - | - | -110 | dB/Hz | F > 2 kHz, measured on CW port F > 500 kHz, measured on CW port |
| RF frequency | RFF | - | 160 | - | MHz | Fixed, upshift |
| CW port output power | P _{out} | 1 | - | - | mW | per port, CW |
| CW port output fiber | OF CW | Panda SM | | | | |
| CW port output fiber length | FL CW | 90 | 100 | 110 | cm | 3mm jacket |
| CW port output termination | OT CW | FC/APC | | | | |
| Polarization extinction ratio | PER | 20 | - | - | dB | CW port |
| Output pulse width (FWHM) | OPW | 200+/-20 | 400+/-40 | 800+/-80 | ns | |
| Pulse repetition frequency | PRF | 15 | - | 20 | kHz | External Trigger |
| Output peak power | P _{peak} | - | 600 | - | W | Constant pump current, at PRF = 15 kHz and PW = 200 +/- 20 ns |
| Single pulse energy | E _{out} | 120 | - | - | μJ | |
| Average output power | P _{avg} | 1.8 | - | - | W | Constant pump current, at PRF = 15 kHz and PW = 400 +/- 40 ns |
| Output peak power | P _{peak} | - | 600 | - | W | |
| Single pulse energy | E _{out} | 240 | - | - | μJ | Constant pump current, at PRF = 15 kHz and PW = 800 +/- 80 ns |
| Average output power | P _{avg} | 3.6 | - | - | W | |
| Output peak power | P _{peak} | - | 300 | - | W | Constant pump current, at PRF = 15 kHz and PW = 800 +/- 80 ns |
| Single pulse energy | E _{out} | 240 | - | - | μJ | |
| Average output power | P _{avg} | 3.6 | - | - | W | Constant pump current, at PRF = 20 kHz and PW = 200 +/- 20 ns |
| Output peak power | P _{peak} | - | 600 | - | W | |
| Single pulse energy | E _{out} | 120 | - | - | μJ | Constant pump current, at PRF = 20 kHz and PW = 400 +/- 40 ns |
| Average output power | P _{avg} | 2.4 | - | - | W | |
| Output peak power | P _{peak} | - | 450 | - | W | Constant pump current, at PRF = 20 kHz and PW = 800 +/- 80 ns |
| Single pulse energy | E _{out} | 180 | - | - | μJ | |
| Average output power | P _{avg} | 3.6 | - | - | W | Constant pump current, at PRF = 20 kHz and PW = 800 +/- 80 ns |
| Output peak power | P _{peak} | - | 225 | - | W | |
| Single pulse energy | E _{out} | 180 | - | - | μJ | |
| Average output power | P _{avg} | 3.6 | - | - | W | |
| ASE ratio | ASE | - | - | 5 | % | All setpoints |
| Optical polarization | Pol | Linear | | | | |
| Polarization extinction ratio | PER | 17 | - | - | dB | Main output |
| Circulator isolation (port 2->1) | ISO | 20 | - | - | dB | |
| Circulator crosstalk (port 1->3) | CST | 55 | - | - | dB | |
| Circulator Port 3 output fiber | OF P3 | Panda SM | | | | |
| Circulator Port 3 output fiber length | FL P3 | 90 | 100 | 110 | cm | 3mm jacket |
| Circulator Port 3 output fiber | OT P3 | FC/APC | | | | |
| Output fiber | OF | Panda 25μm, 0.07NA | | | | |
| Output fiber length | FL | 33 | - | 37 | cm | 3mm jacket |
| Output termination | OT | FC/APC | | | | |
| Beam quality | BQ | - | - | 1.5 | M ² | Measured on each unit |

Electrical specifications

| Characteristic | Symb. | Min. | Typ. | Max. | Units | Notes / conditions |
|-------------------|-------|-----------------|------|------|-------|---|
| Control mode | CM | ACC only | | | | |
| RF driver | RFd | YES | | | | |
| Interface | INT | RS232 | | | | Through Sub-D 25 connector interface cable delivered with the unit |
| | | Interlock | | | | |
| | | AOM TTL trigger | | | | SMA connector |
| Supply voltage | SV | - | 24 | - | V | |
| Power Consumption | PC | - | - | 130 | W | |

| Mechanical & environmental specifications | | | | | | |
|---|-------|-------------------------------|------|-----|-------|--------------------|
| Characteristic | Symb. | Min. | Typ. | Max | Units | Notes / conditions |
| Housing | Hg | 270 x 220 x 50 | | | mm | without heatsink |
| Weight | Wgt | - | - | 3 | kg | |
| Cooling | Cg | Conductive via bottom surface | | | | |
| Operating case temperature | OCT | -10 | - | 65 | °C | |
| Storage temperature | TS | -40 | - | 85 | °C | |

| Optical pulse settings | | |
|------------------------|------------------|----------------------------------|
| S_PAGE | Pulse width (ns) | Pulse repetition frequency (kHz) |
| 0 | 200 | 15 |
| 1* | 400 | 15 |
| 2 | 800 | 15 |
| 3 | 200 | 20 |
| 4 | 400 | 20 |
| 5 | 800 | 20 |

* Every unit will be configured with this set-point before shipment