1. PRODUCT OVERVIEW

ERDI LASER® ER10000 is a high-performance 1535nm Class 1 eye-safe pulsed laser delivering stable ≥10 mJ output with excellent beam quality for demanding electro-optical integration.

It is designed for long-range laser rangefinders, EO/IR systems, UAV payloads, targeting devices, and precision distance measurement applications requiring higher pulse energy levels.

Key advantages include strong pulse energy for extended detection range, stable output consistency, robust environmental adaptability, and compact structure for reliable system integration.

2. TECHNICAL SPECIFICATION

Model	ER10000
Laser Wavelength	1535nm
Eye safe	Class 1
Pulse energy	≥10 mJ
Laser Pulse width	12 ns
Drive pulse width	≤ 4 ms
Pulse repetition rate	1~5 Hz
Pulse stability	5 %
Raw Beam Diameter	0 .8 mm
Beam divergence angle	≤ 4mrad
Beam Mode	TEM_{00}
Operating temperature	-40 ℃ ~ +65 ℃
Storage temperature	-55 ℃ ~+ 75℃
Dimension (mm)	110×40×24.5mm³

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Weight	220 g
Voltage	≤ 14 V
Electric current	100 A
Shock	1500 G, 0.5 ms
Vibration	20~2000 Hz/20 G
Lifetime	＞1million shots

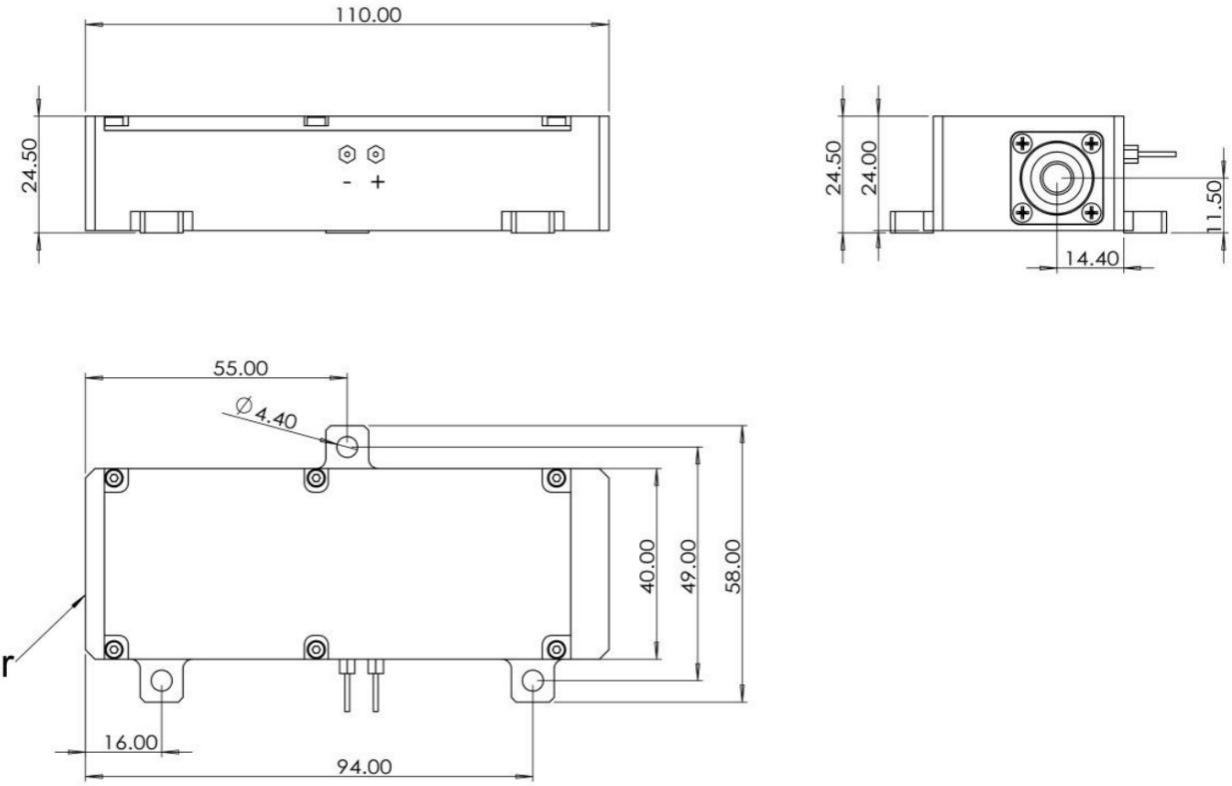
3. OPERATION INSTRUCTIONS

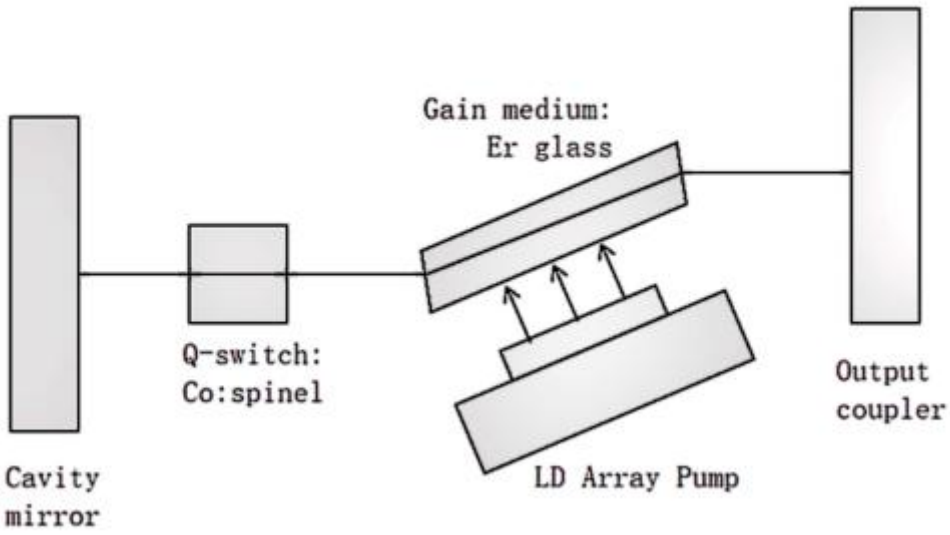
Match the laser driver to the ER10000 laser.
The laser driver power supply must be properly matched to the laser.
The typical load voltage of the ER10000 is < 14 V, with an operating current of 100 A, pulse width < 4 ms, and a repetition rate of 5 Hz. For the exact operating parameters, please refer to the attached factory test report.
The laser driver power supply must meet these requirements; otherwise, the laser may fail to operate properly or could be overloaded and permanently damaged. Therefore, before wiring, carefully check the laser specification sheet and confirm that the laser is compatible with the selected driver.

Always disconnect power before wiring.
Before making any connections, make sure the power is switched off and completely isolated. During wiring, carefully check the positive and negative terminals of the laser and ensure correct polarity. After the wiring is completed, perform a thorough inspection to confirm that all connections are correct, in order to avoid short circuits, reverse polarity, and other faults. At the same time, make sure all terminals are firmly secured to prevent poor contact due to loose wiring.

Set operating parameters according to the factory test report.
After confirming that the wiring is correct, set the corresponding parameters on the driver according to the attached factory test report. Once the parameters are correctly set, turn on the driver; the laser should then operate normally.

4. MECHANICAL DIMENSIONS





5. BRIEF INTRODUCTION TO THE PRINCIPLE

I.Basic Structure and Pumping Mechanism

The LD laser diode)-pumped erbium-doped glass laser is a solid-state laser that uses erbium-doped (Er^{3+})glass as the gain medium and a semiconductor laser as the pump source. Its core operating principle is as follows:

● Pump source: The laser diode (LD) emits light at a specific wavelength (typically around 940 nm), which excites erbium ions to a metastable high-energy level through direct absorption or indirect energy transfer.
● Gain medium: During stimulated emission, Er^{3+} ions in the erbium-doped glass transition from the 4113/2^4I_(13/2}4I13/2 energy level to the ground state 4I15/2^4I_(15/2}4I15/2,releasing laser radiation at a wavelength of approximately 1.535 μm.
● Resonator (laser cavity): The laser cavity consists of a high-reflectivity miror and a partially reflective output coupler. Multiple rellections within the cavity amplify photons and form acoherent laser output.

II. Characteristics of the Eye-Safe Wavelength Band

The output wavelength of an erbium-doped glass laser is around 1.5 μm, which lies in the near-infrared band.This wavelength region is classified as “eye-safe”(Class 1M) under international laser safety standards.
Because the photon energy at this wavelength is relatively low and is strongly absorbed by the anterior structures of the eye (such as the cornea and lens), it greatly reduces the risk of retinal damage. This makes it particularly suitable for use in open and man-in-the-loop environments.

6. TECHNICAL ADVANTAGES

I. Compactness
LD-pumped technology offers a very small form factor and long service life, making it ideal for integration into portable and embedded systems.

II. Narow Pulse Width
When combined with passive Q-swiching, the laser can generate nanosecond pulses with peak power in the kilowatt to megawatt range, fully meeting the requirements of long-range laser ranging.

III. Environmental Adaptability
At 1.5 μm, the laser exhibits low atmospheric transmission loss (with strong penetration capability in fog, rain and aerosol conditions) and provides excellent immunity to background light interference.

7. APPLICATIONS OF LASER RANGING

I. Basic Principle
Laser ranging is based on the Time-of-Flight (ToF) method: a laser pulse is emitted toward the target,and the time delay of the returned echo is measured.

II. System Composition

- Transmitter: The LD-pumped erbium-doped glass laser generates high-energy, narrow laser pulses (on the order of nanoscconds), which are then collimated by the transmit optics and projected toward the target.
- Receiver: An InGaAs APD (avalanche photodiode),matched to the 1.5 μm wavelength, is used to detect the return echo. A high-sensitvity analog front-end (such as a transimpedance amplifier) processes the weak optical signal.
- Time-measurement unit: A time-to-digital converter (TDC) or high-speed counter provides picosecond-level timing resolution, enabling centimeter-level ranging accuracy.

III. Key Technical Parameters

- Pulse width: The narrower the pulse width (eg, a few nanoseconds), the higher the timing precision and the better the range resolution (down to the centimeter level).
- Peak power: High peak power (from kilowatts to megawatts) improves long-range detection performance, with typical measurement distances from hundreds of meters to tens of kilometers.
- Repetition rate: A high pulse repetition frequeney (up to the kHz level) supports fast, continuous ranging and is well suited for dynamic target tracking.

IV. Application Scenarios

- Military applications: Used in fire-control systems for tanks and naval vessls, as well as in handheld laser rangefinders, providing both safety and low observability. The compact LD-pumped architecture enables lightweight systems suitable for mobile platforms such as UAVs and micro/small electro-optical gimbals.

- Topographic mapping: Airborne and spaceborne LiDAR systems employ erbium-doped glass lasers to generate high-precision three-dimensional terrain maps.
- Industrial inspection: Applied to structural health monitoring of bridges and buildings, as well as obstacle ranging and environment perception in robotic navigation.

- Microjoule-level products: These lasers are very compact and lightweight, making them easy to integrate at the board level in micro and small laser rangefinder modules.

- Millijoule-level products: These lasers provide high single-pulse energy and high peak power, making them suitable for long-range systems with detection distances beyond 15 km, such as miniaturized electro-optical pods.

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