



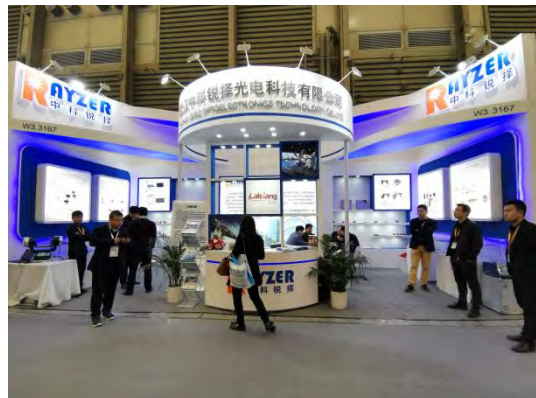
Introduction of Capability, Facility and Product Range For Quantum and Atoms Application

Kokyo

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Overview



Company

4 Factories

Wuhan, Xi'an, Ji'nan, Shanghai

Sales 2023

20 Million USD

Employees

240

Facility

15000 m²

Clean Workshop

Focusing Fields

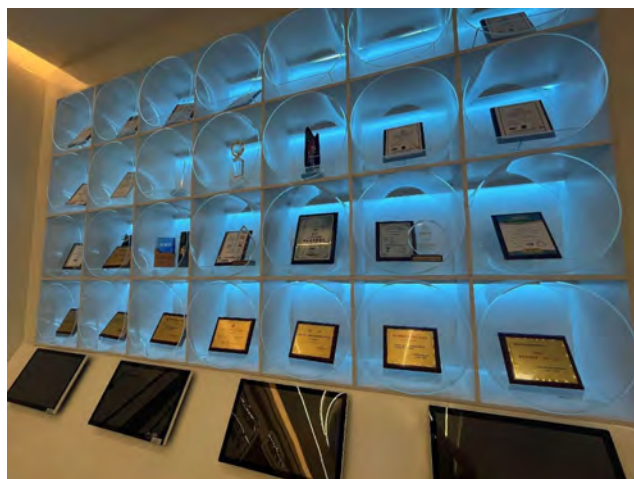
Inertial Navigation

Fiber Sensing, Laser, Lidar

Show Room



Awards and Certificates



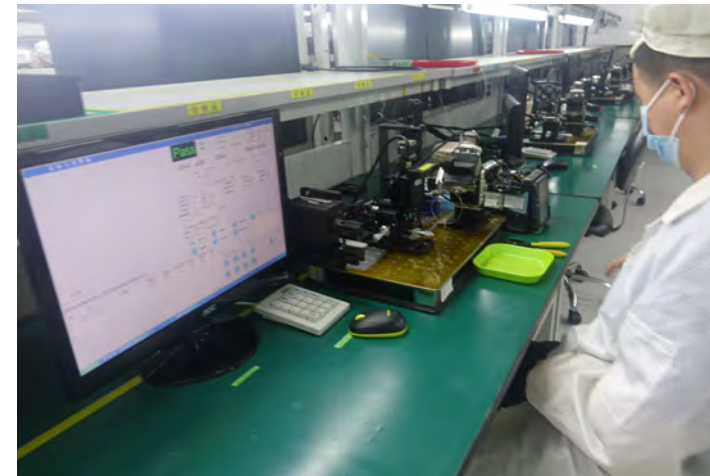
Measurement



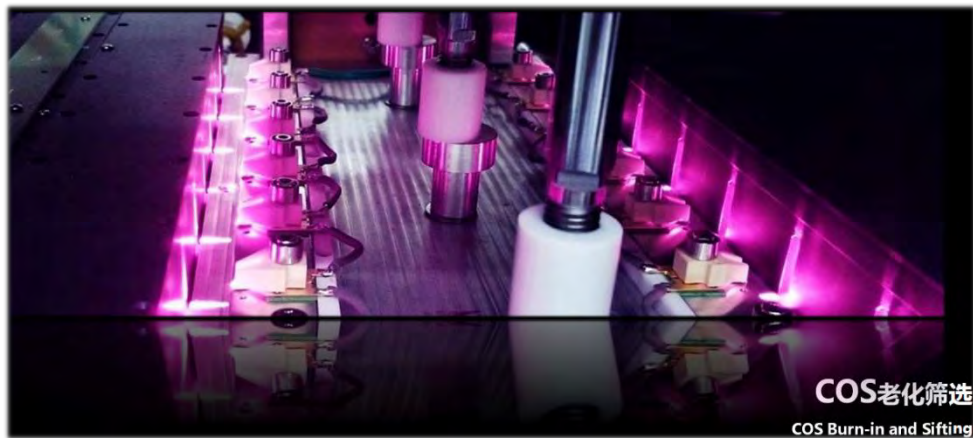
Fabrication



Fabrication



Chip Packaging



Testing

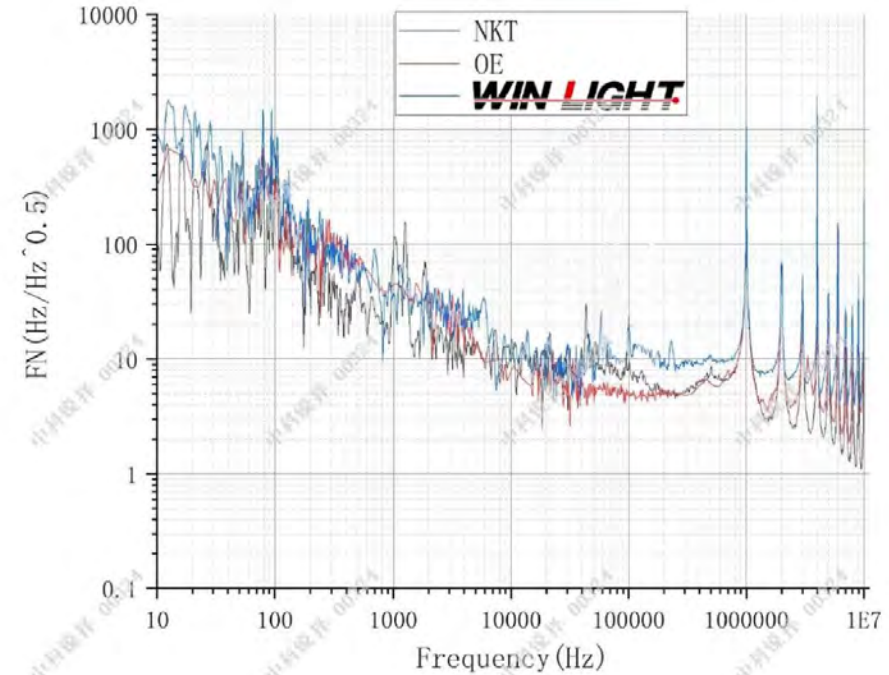


Application of Quantum and Atoms

Ultra-Narrow Linewidth Seed Laser



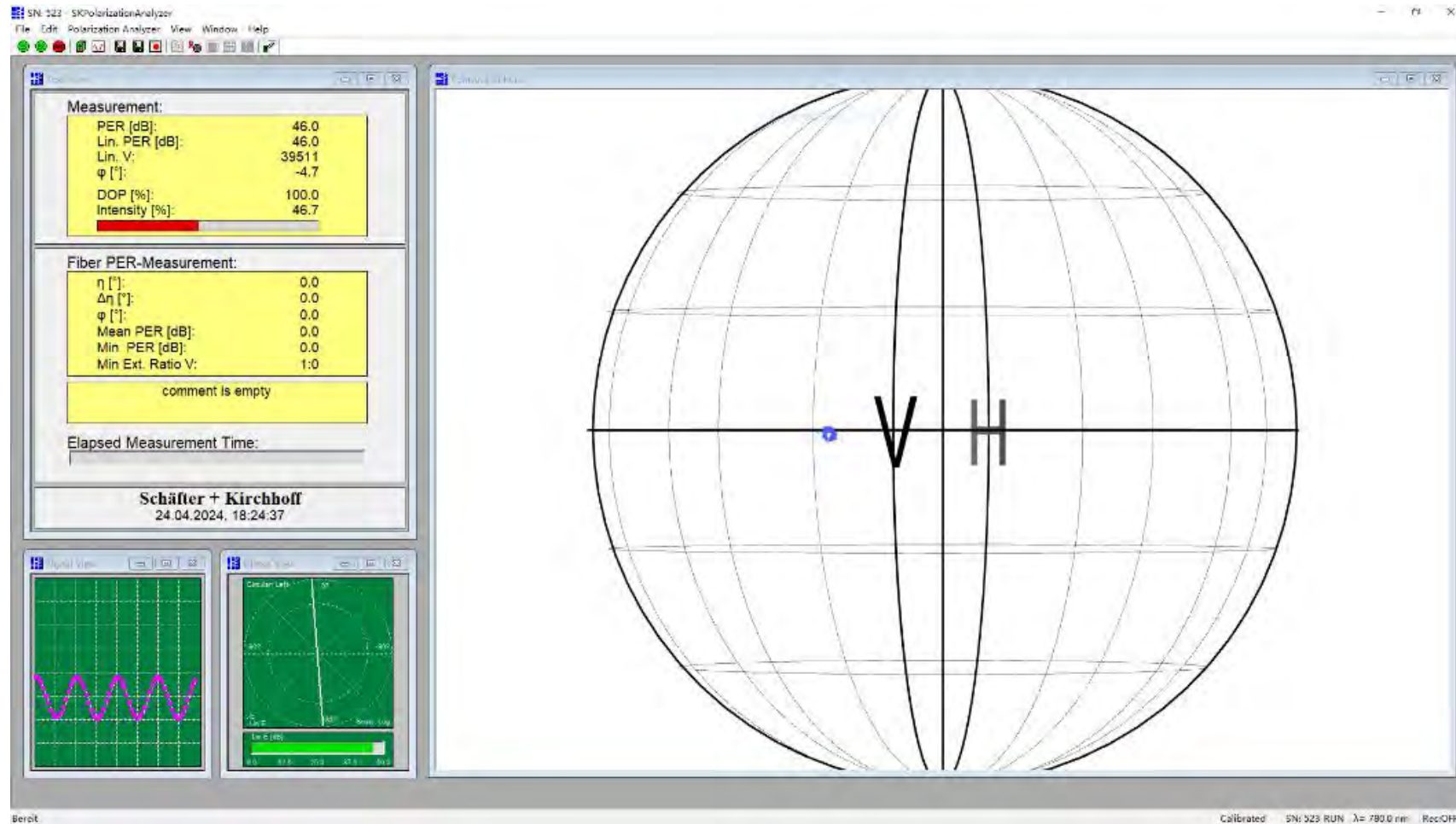
- ◆ Wavelength: 1550nm/1560nm or Customized
- ◆ Output Power $\geq 20\text{mW}$
- ◆ Line Width: 10 / 100 Hz / 1 kHz
- ◆ Tuning Range of PZT $\geq 500\text{MHz}$, Thermal Adjustment 1nm.
- ◆ Stable Non-Jumping Mode
- ◆ Small Size, Easy Integration, Low Power Consumption



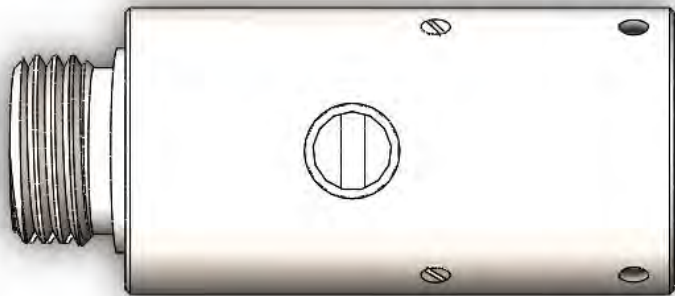
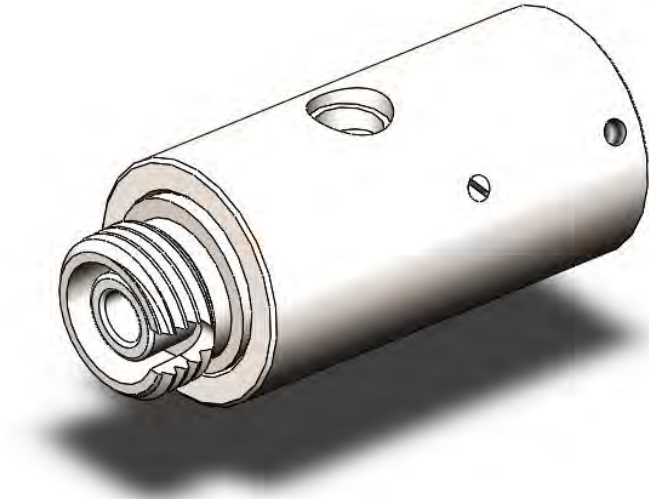
Suitable for: Atomic clock, Quantum Calculation, Quantum Precision Measurement, Quantum Communication, Laser Cooling and Trapping.



- ◆ High Polarization ER ≥ 30 dB
- ◆ Wavelength Range 350-2000nm
- ◆ Low Loss
- ◆ Stable Polarization State
- ◆ Quantum Optical System



Polarization State Characteristics Test Diagram



- ◆ Wavelength Range 461/633/780/795nm/852 nm, or Customzed
- ◆ Focal Length Can be Fine-tuned, so as to adjust the distance between the lens and the end face of the optical fiber and match the best coupling efficiency
- ◆ Coated with Broadband AR Antireflection Film
- ◆ FC/APC or FC/PC Connector Availiable



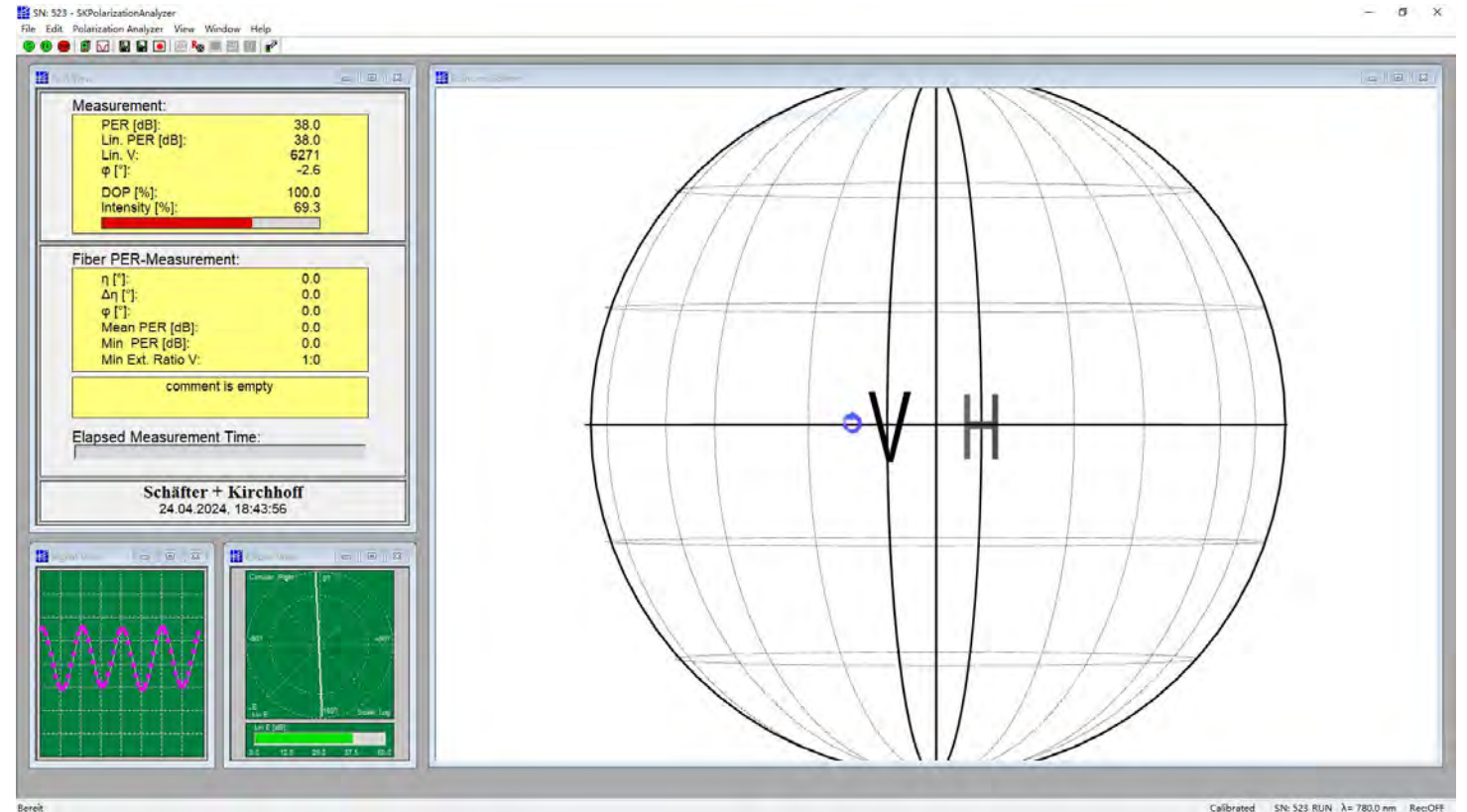
- ◆ Wavelength Range 633nm/780nm/795nm/852nm/1064nm, or Customized
- ◆ Single-Stage Min Isolation ≥ 30 dB.
- ◆ High transmittance $\geq 90\%$
- ◆ Available Diameters 2mm,3mm and 5mm
- ◆ High Damage Threshold (≥ 5 j/cm @ 10 ns)
- ◆ Miniaturized size, optional optical fiber coupling type
- ◆ Polarization extinction ratio ≥ 30 dB



- ◆ High diffraction efficiency
- ◆ Wavelength 400-2000nm or Customized
- ◆ High on-off extinction ratio (above 55dB)
- ◆ Frequency 40Mhz-350Mhz is optional
- ◆ Low power consumption materials is optional
- ◆ 3dB RF bandwidth ± 10 Mhz
- ◆ **Annual shipment 10,000 pieces+**



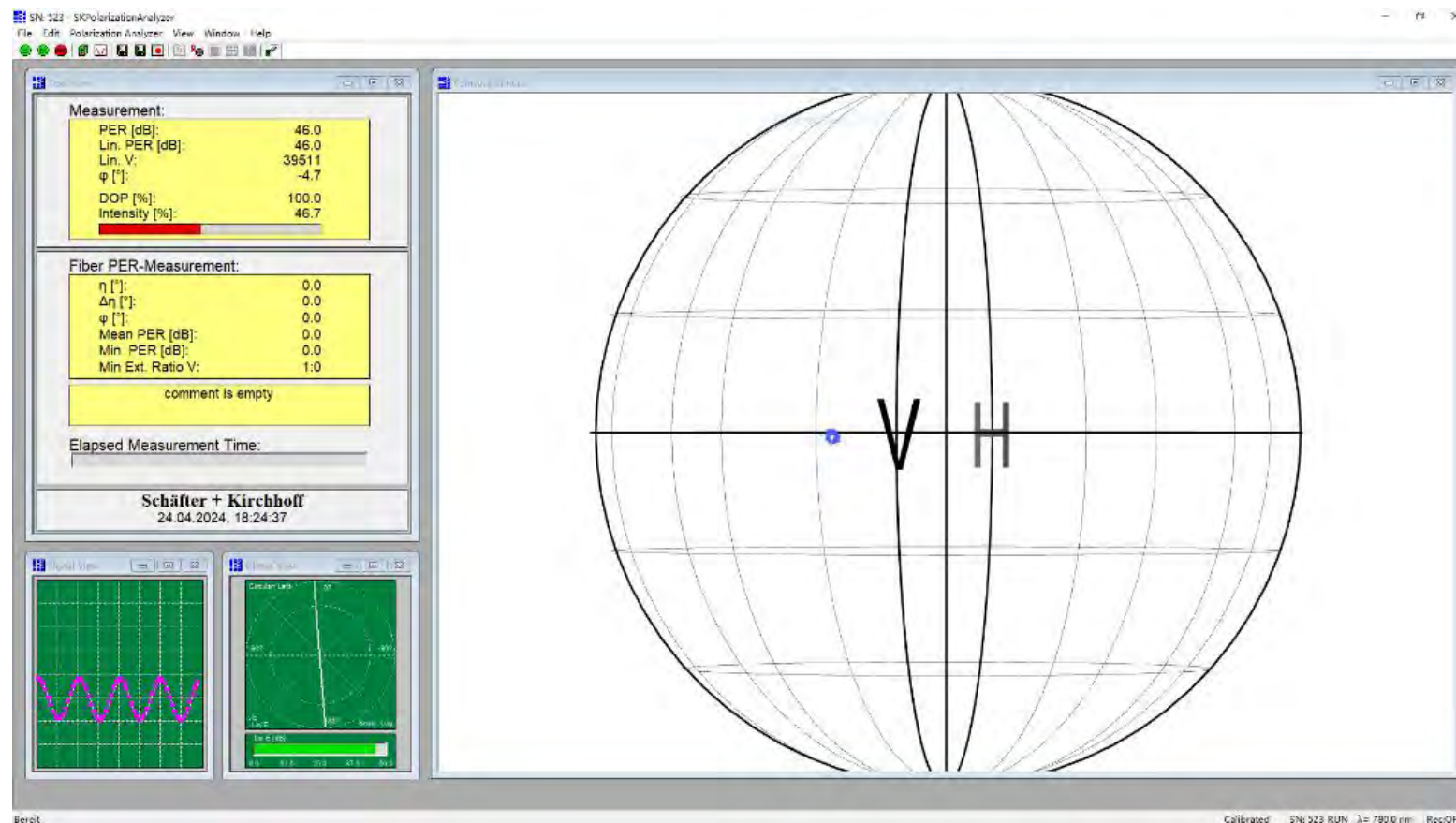
- ◆ Ultra-high polarization extinction ratio ($PER \geq 28\text{dB}$)
- ◆ Frequency: 40-200Mhz optional
- ◆ High coupling efficiency (Coupling Efficiency $\geq 85\%$)
- ◆ High power is optional
- ◆ Stable and High Polarization



Polarization State Characteristics Test Diagram

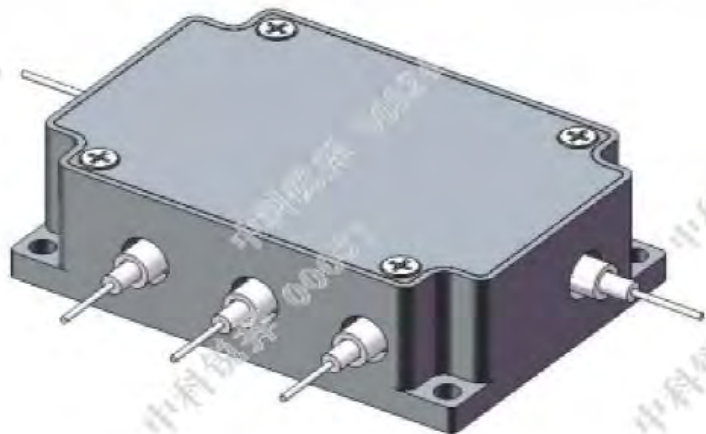


- ◆ Coating both inside and outside the transparent surface
- ◆ The light-transmitting surface of vacuum tube adopts optical glue+femtosecond laser welding process to ensure the integrity of the film system on the inner light-transmitting surface.
- ◆ Size can be customized.
- ◆ The angle of the light-transmitting surface can be customized according to the requirements.
- ◆ Can be substituted for Rb atoms and Cs atoms.

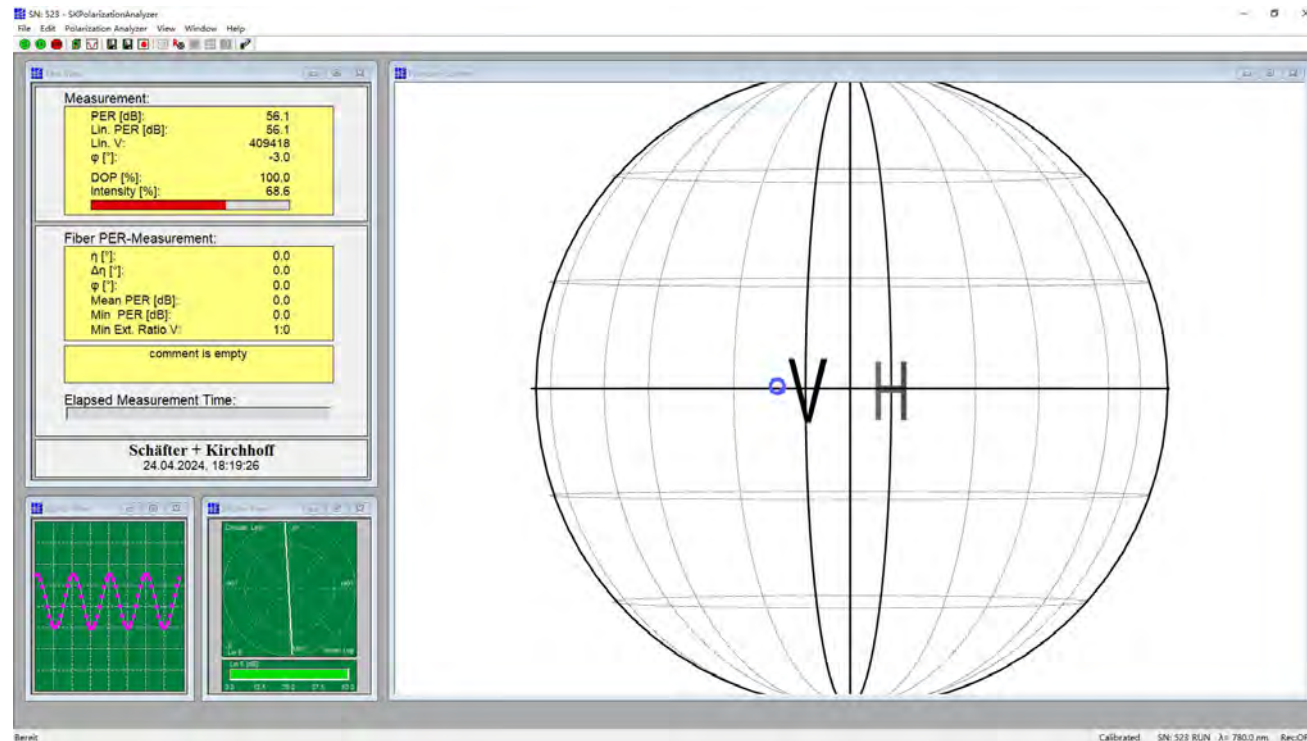


- ◆ Ultra-high polarization extinction ratio (PER \geq 30dB/ channel)
- ◆ High coupling efficiency (coupling efficiency \geq 85%)
- ◆ Power stability is better than five ten thousandths @24h.
- ◆ Small size miniaturization design

Polarization State Characteristics Test Diagram



- ◆ Ultra-high polarization extinction ratio (PER \geq 30dB/ channel)
- ◆ High coupling efficiency (coupling efficiency \geq 85%)
- ◆ Adjustable splitting ratio
- ◆ Wavelength: 461/780/852 and other wavelengths
- ◆ Small size and miniaturization design, vibration resistance, high and low temperature resistance
- ◆ 1X4/1X8, maximum support for 256 channels beam splitting

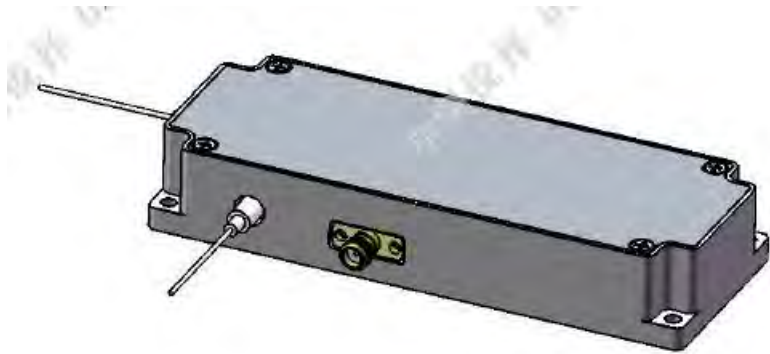


Polarization State Characteristics Test Diagram

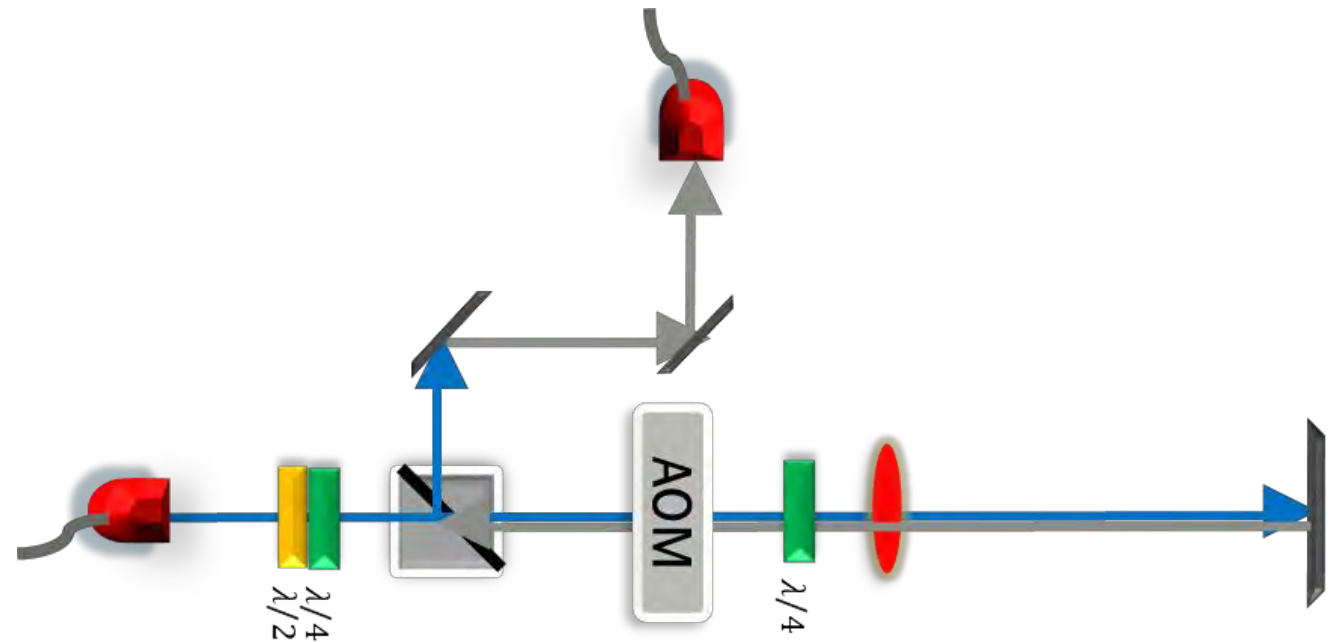
Miniaturized integrated optical design achieves high polarization extinction ratio and high fiber coupling efficiency output under -20~60°C conditions!

Application of Quantum and Atoms

Dual Pass AOM Optical module



- ◆ Ultra-high polarization extinction ratio ($PER \geq 30\text{dB}$)
- ◆ Frequency: 40-200Mhz optional.
- ◆ High coupling efficiency (coupling efficiency $\geq 85\%$)
- ◆ Optional high power option

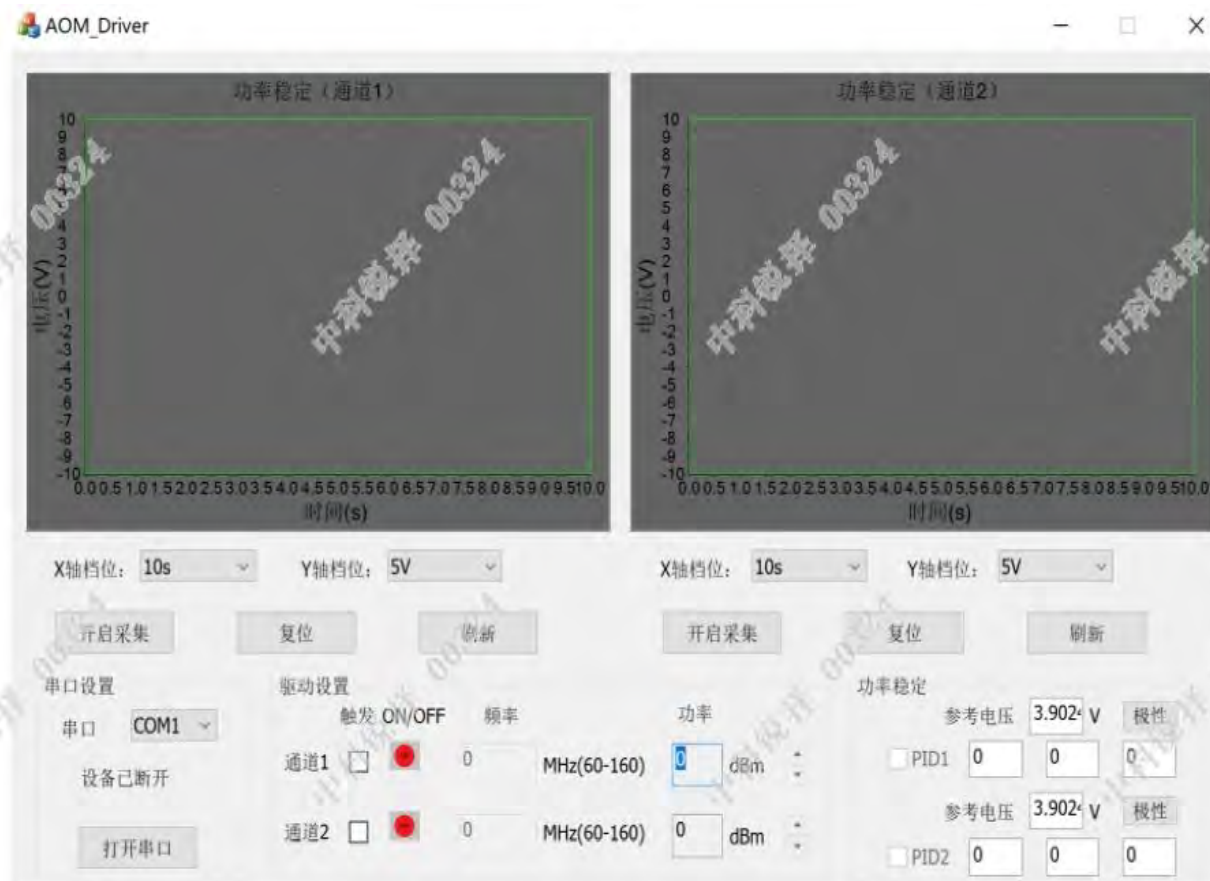


Application of Quantum and Atoms

Servo Control Electrical Module



- ◆ Dual-channel ultra-low phase noise DDS
- ◆ Frequency range: 60-350Mhz adjustable.
- ◆ Frequency adjustment accuracy: 1Hz
- ◆ The maximum RF output power is 2.5W
- ◆ PID optional



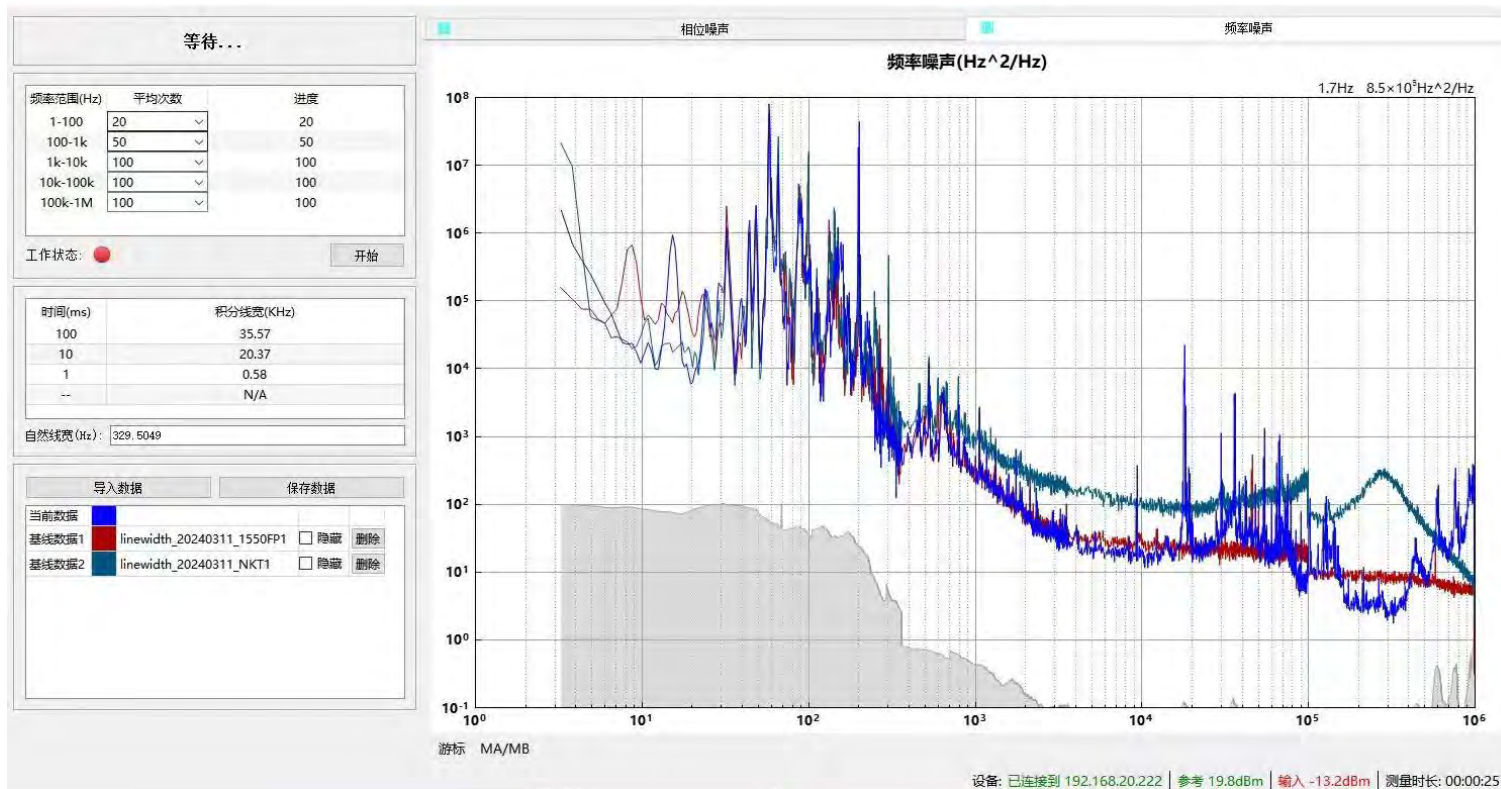
PC software Operation Interface

Application of Quantum and Atoms

Line Width Test Instrument



- ◆ Wavelength: 1530-1565nm
- ◆ Integral linewidth range (< 10ms) 1 Hz ~ 10MHz
- ◆ Lorentz linewidth sensitivity: < 1 Hz
- ◆ Input power range: 0~26dBm
- ◆ Phase noise floor: -160dBc/Hz
- ◆ 3U chassis



PC software Operation Interface

System Qualified Certificates



ISO 9001:2015



ISO 45001:2018



ISO 14001:2015

➤ Active Optical Components

- ❑ Narrow Linewidth Laser Diode
- ❑ 976/974nm Pump LD
- ❑ Superluminescent Laser Diode
- ❑ Pulse Laser Diode
- ❑ TO Packaged Laser Diode

➤ Optical Amplifier and Module

- ❑ SM/PM CW/PULSE EDFA
- ❑ Space Grade PA/BA EDFA
- ❑ ASE Light Source
- ❑ Customized Optical Module
- ❑ Balanced Photodetector

➤ Fiber Optic Components

- ❑ Polarization Maintaining/SM
- ❑ Collimator, Coupler, WDM, Isolator, Filter
- ❑ Circulator, FRM, Interferometer
- ❑ Hybrid Components

➤ Modulator

- ❑ Acousto Optic Modulator
- ❑ Electro Optic Modulator

➤ FOG Components

- ❑ FreeStanding/Skeleton Fiber Coil
- ❑ Passive Components, SLD, ASE
- ❑ Coil Winding Machine, UV OVEN



Solutions CSRayzer Involved

➤ Fiber Optic Gyroscope

- ❑ Gyro Components
- ❑ Equipment and instruments

➤ LIDAR

- ❑ Vehicle LIDAR
- ❑ Wind Measurement
- ❑ Laser Rangefinder

➤ Quantum System

- ❑ Cold Atoms
- ❑ Quantum Gravimeter

➤ Fiber Lasers

- ❑ Ultrafast Fiber Laser
- ❑ CW high power laser

➤ Fiber Distributed Sensing

- ❑ DAS/DVS/DTS
- ❑ Underwater Hydrophone Detecting

➤ High Accuracy Time Frequency Transmission

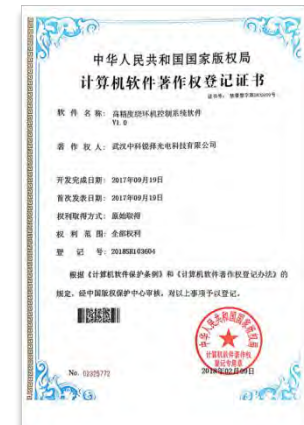
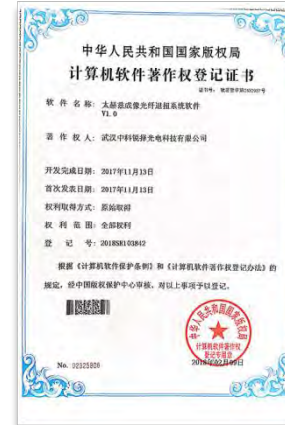
- ❑ Atomic clock
- ❑ Optical Frequency Comb

Scientific Research Activity



Our R&D investment accounts for more than 10% of income. In year 2023, the research and development investment is 13 million yuan, and we have 2 national key joint experimental centers.

80+ patents (40+ invention patents) + 31 software patents



Strategic Objectives



CSRayzer Optical Technology Co., Ltd. is committed to building a top service provider of special optical system solutions, serving the science and research at universities, fiber laser companies, fiber sensing companies and inertial navigation system, etc. The quality and reputation of products are the foundation of the company's development. We strengthen technological innovation, focus on team building, and strive to build the company into a competitive optical enterprise.



THANKS!

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