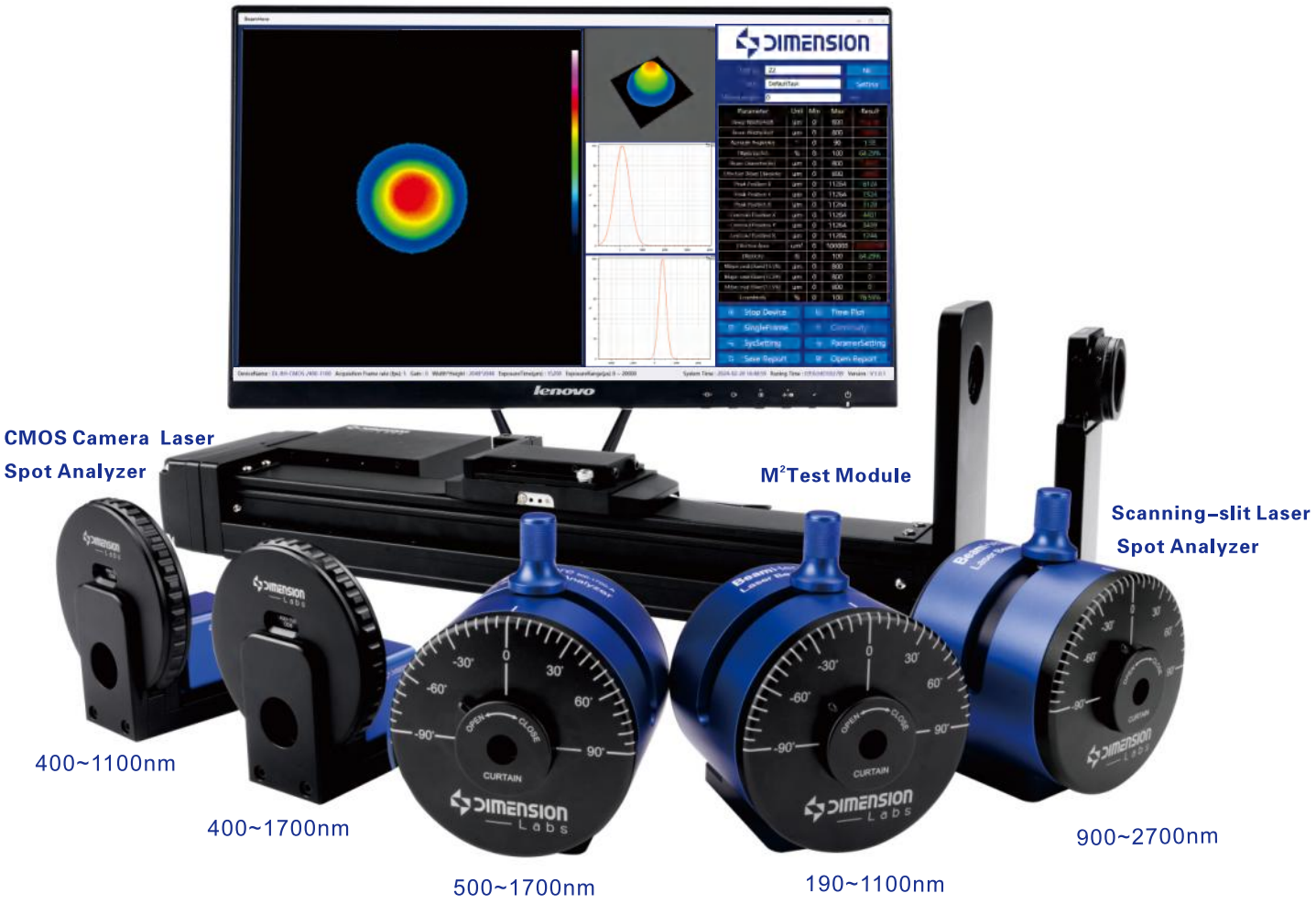
BeamHere Laser Spot Analyzer



Dimension-Labs launched Beamhere Laser Spot analyzer series products, with general software to achieve a complete beam quality analysis function.

Spot energy distribution and beam divergence angle and M² factor are important components of laser beam quality detection. Efficient and accurate measurement and analysis are the premise of making full use of laser. Beamhere Series of products have perfect functions, and can test and evaluate beam shaping, focused spot and beam collimation, and provide spot parameters that meet ISO11146 standards, such as beam width, peak center and ellipticity. The series of products can be equipped with M² factor test module to realize the measurement of beam waist position, beam divergence angle and M² factor in the direction of beam propagation. BeamHere Quantify the evaluation of the laser beam, and output the test report with one key to complete the beam analysis accurately and efficiently.

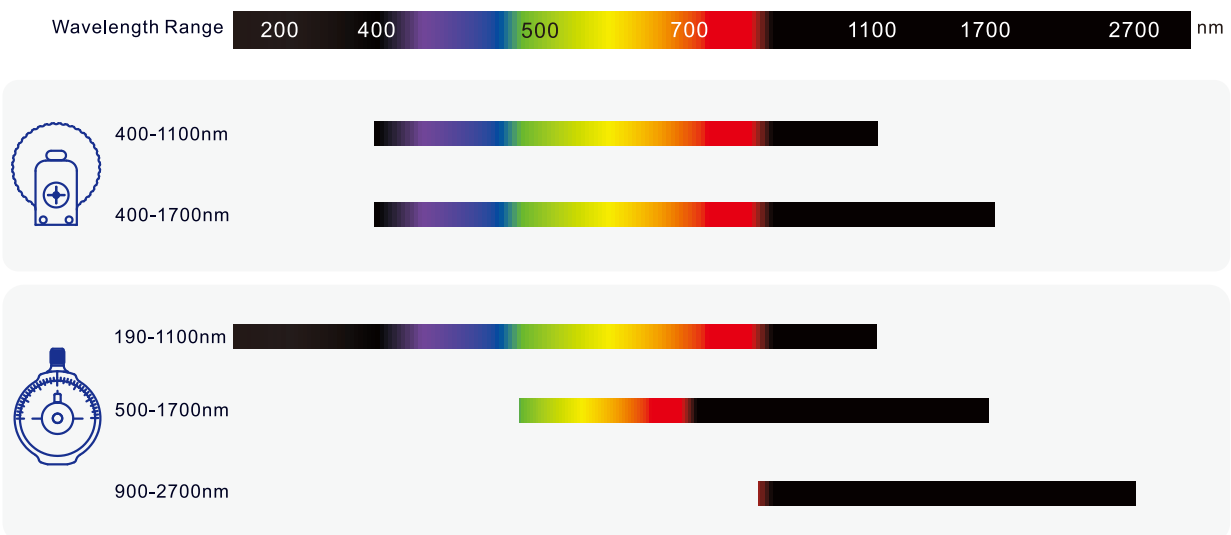
BeamHere Beam Analysis Product Series

▶▶Superiority

- A full range of products that meet the extensive testing requirements.
- M² factor test module for all Beamhere Laser Spot analyzer.
- Independent research and development, carefully designed analysis software.
- The software is truly interactive and friendly, simple and easy to use, and it is a one-key output test report.

▶▶ A Full Range of Products that Meet the Extensive Testing Requirements

The Scanning-slit Laser Spot Analyzer series and CMOS Camera Laser Spot Analyzer series launched by Dimension Labs are divided into different applicable bands to form a complete product series, covering a wide range of spot testing needs in various bands.

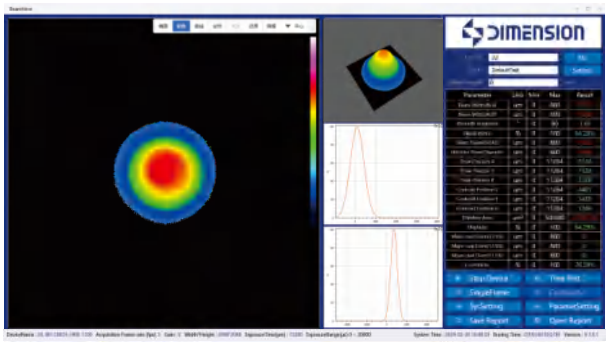


▶▶ M^2 Factor Test Module for all Beam here Laser Spot Analyzer

The M² factor test module introduced by Dimension-Labs measures the quality evaluation parameters in the beam propagation direction, such as M² factor and beam divergence angle, and is compatible with Scanning-slit Laser Spot Analyzer and CMOS Camera Laser Spot Analyzer.

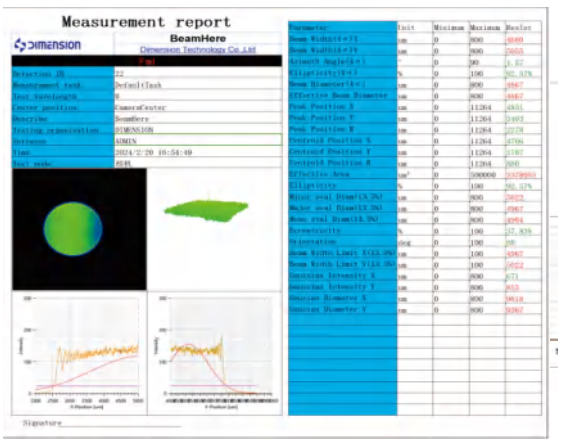
▶▶ Independent Research and Development, Carefully Designed Analysis Software

Dimension-Labs self-developed Beamhere Laser Beam Analyzer beam analysis software, compatible with all the hardware modules in the Beamhere series of beam measurement products. Dimension-Labs strictly check customers' use experience, the interface is clear and simple, convenient and efficient operation.



▶▶ The Software is Truly Interactive, Friendly and easy to use

Beamhere soft beam analysis software, from logical settings to visual presentation, is guided by simplicity and clarity, considering different usage scenarios to create practical and efficient operation software for users. Users can complete the testing process normally without reading the detailed operation manual and output the test report with just one click.

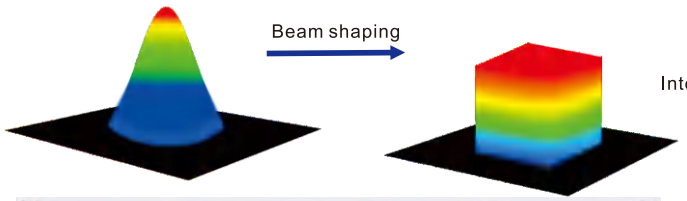


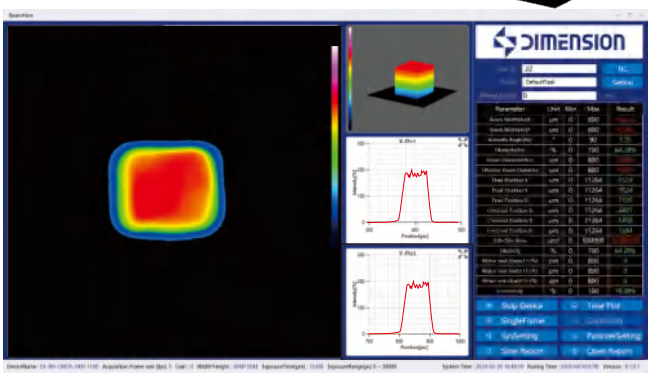
Application Scenarios

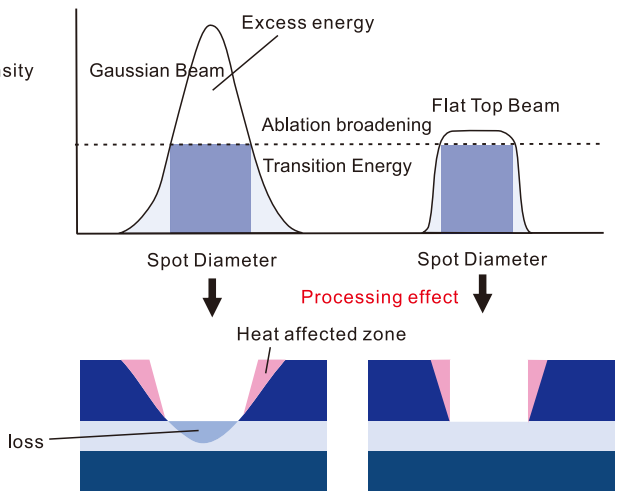
Nowadays, laser applications have penetrated into various industries, and the characteristics of laser beams bring us more efficient and cost-effective production methods. With the increasing demand for laser beam characteristics in various applications, how to accurately detect laser beam characteristics has become the key in laser applications. The BeamHere series laser spot analyzer launched by Dimension Labs is suitable for measuring and analyzing laser beam quality in various laser applications.

Beam-Shaping Test

Laser beam shaping technology refers to the process of redistributing the irradiance and phase distribution of the incident beam. Whether it is material processing, medical beauty, military fields, or scientific research, there is an increasing demand for laser shaping. Therefore, rapid and accurate inspection of the beam shaping effect is an important driving force for the stability, quality, and efficiency progress of laser shaping technology.







Cross-section of processed material system

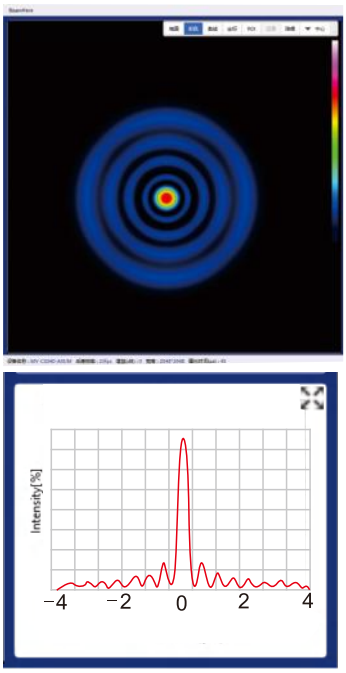
Beam Collimation

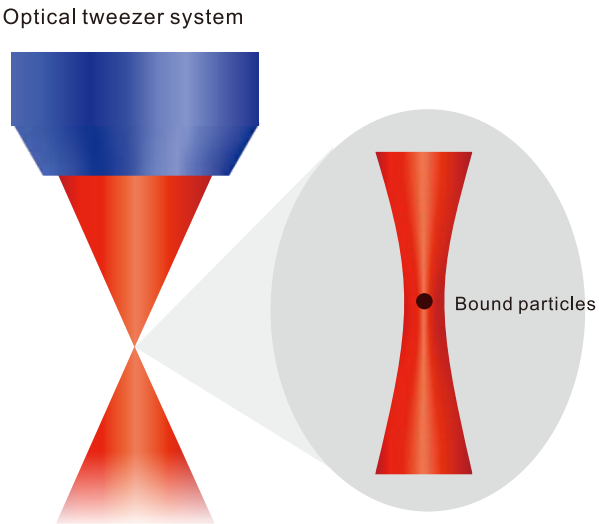
We know that the laser output inside the laser resonator usually exhibits a Gaussian distribution on the beam cross-section, and the beam is also non collimated in the direction of light propagation. In some long-distance ranging and other applications, in order to further improve the accuracy of using laser beams as a straight line reference, we often make various collimating devices. Measuring the beam size at different positions in the direction of beam propagation using a beam analyzer is a visual means of measuring the collimation effect.

Parameter	Unit	Min	Max	Result
Beam Width(4σ)X	um	0.0	1000.0	422.65
Beam Width(4σ)Y	um	0.0	1000.0	458.52
Spot Diameter(4σ)	um	0.0	1000.0	440.58

Optical Tweezers System Detection

Zero-order Bessel beam, this beam has an ideal infinite transmission distance, beam self-repair. At the same time, it also has the characteristics of highly concentrated transverse plane light, strong distribution symmetry, concentric cross section field and energy equalization. These advantages are precisely needed for optical tweezers technology ,it can be applied to light operation to a great extent, and has strong maneuverability and adaptability in the micro world.

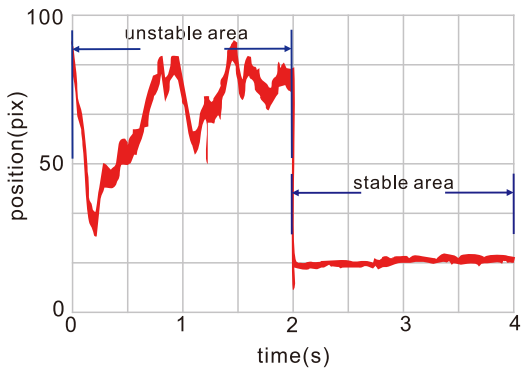




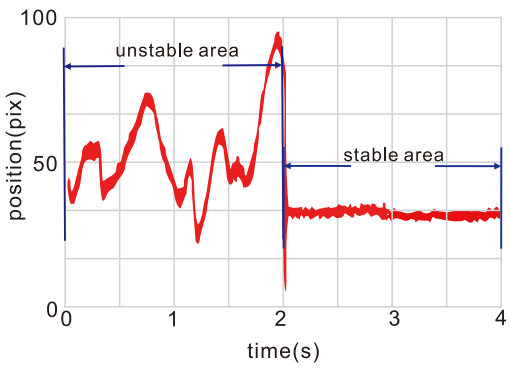
Stability Monitoring

In many fields of precision measurement of laser, the collimation and the stability of spatial position will have a great impact on the test of the system, and seriously increase the measurement error. When we stabilize the system with various feedback, the Laser Spot analyzer can detect the position in real time and give a schematic diagram, which will greatly improve the efficiency and reduce the research and development cost.

X-axis position monitor



Y-axis position monitor



The Scanning-slit Laser Spot Analyzer

Description

- Dimension-Labs series includes three models that achieve spot analysis in the range of 190 to 2700 nm. Double-mode slit blade switch is used to expand the measurable beam diameter to the range of 2.5μm~10mm that can measure the higher power without external attenuation sheet.

Characteristic

- The slit dual-mode
- μm level small beam measurement
- 0.1 μm high resolution
- Measurable high-power light beam
- Innovative, precise, and compact structural desig

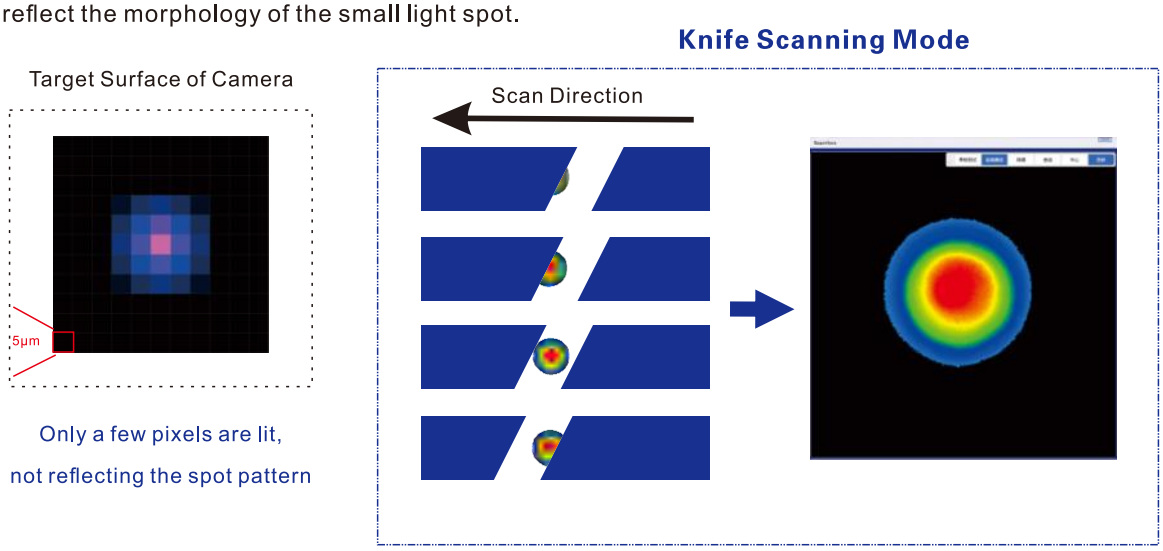
With the Dual mode of Knife Edge and Slit Scan

Different models of scanning slit Laser Spot analyzer have two modes of knife and slit and slit scanning, which can be switched by the software to meet the test requirements of different beam sizes.

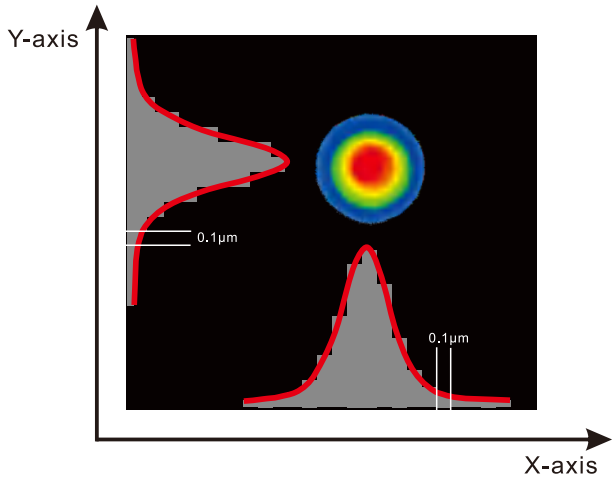
Knife–Edge Mode **Slit Mode**

▶▶μm Level Small Beam Measurement

The Scanning-slit Laser Spot Analyzer has an incomparable advantage of other types of analyzer when measuring small light spots with a diameter of less than 20um. Testing by the knife edge method can reflect the morphology of the small light spot.



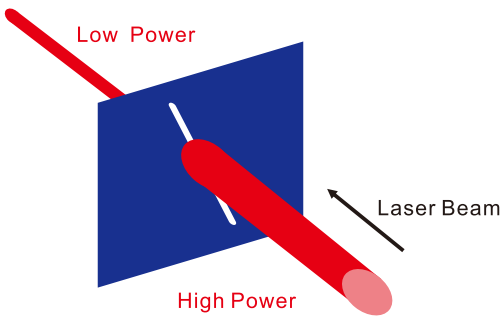
▶▶0.1μm for Ultra–High Resolution



The Scanning-slit Laser Spot Analyzer, based on the unique measurement principle, has a resolution of 0.1 μm, which can reflect the spot morphology more clearly and accurately, without loss of important features.

▶▶Measurable High-Power Laser Beam

The Scanning-slit Laser Spot Analyzer only allows light at the slit to pass through and collect power values each time, and does not receive all the light power at once. This allows the Scanning-slit Laser Spot Analyzer to test nearly 10W of high-power laser.



Innovative, Precise, and Compact Structural Design

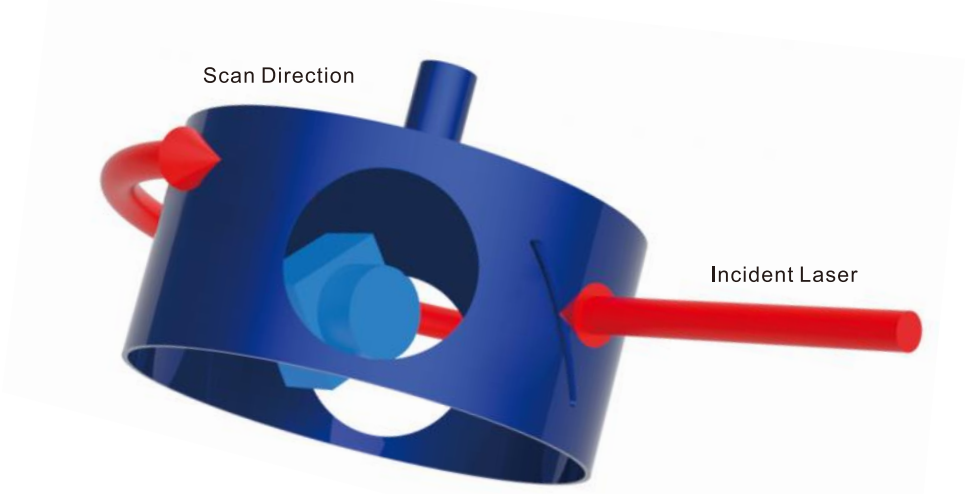
The newly launched the Scanning-slit Laser Spot Analyzer by Dimension Labs has a rotating cylinder with a ± 90 ° adjustment range in the vertical laser incidence direction, so that the XY axis marked on the front corresponds to the long and short axes of a spot, outputting more accurate spot simulation and measurement.

At the same time, an adjustable aperture is used structurally to cover the aperture, with a zero adjustable range of light transmission, effectively isolating the interference of ambient light and stray light, while protecting the aperture and fragile slits from human touch and damage. The adjustment method is also intuitive and convenient.

Technology Profile

The slit scanner contains a rotating wheel with two pairs of slits with different widths perpendicular to each other. The rotating wheel is equipped with a rotating motor that can control the rotation of the rotating wheel and change the rotation rate. The laser enters from the slit scanner and the incidence port. While the wheel rotates, the vertical slit can scan the x and y axes of the laser. At the same time of scanning, the photodetector inside the rotating wheel records the power size and position information, which can get the power size at different positions of x axis and y axis at different moments. The data was processed to obtain some parameters of beam quality, such as beam diameter, ellipticity, and center position.

In the rotary roller orthogonal slit measurement scheme, the physical attenuation of the measured light intensity to the linear response range of the detector, which can be used for high power range laser beam mass measurement.



CMOS Camera Laser Spot Analyzer

Description

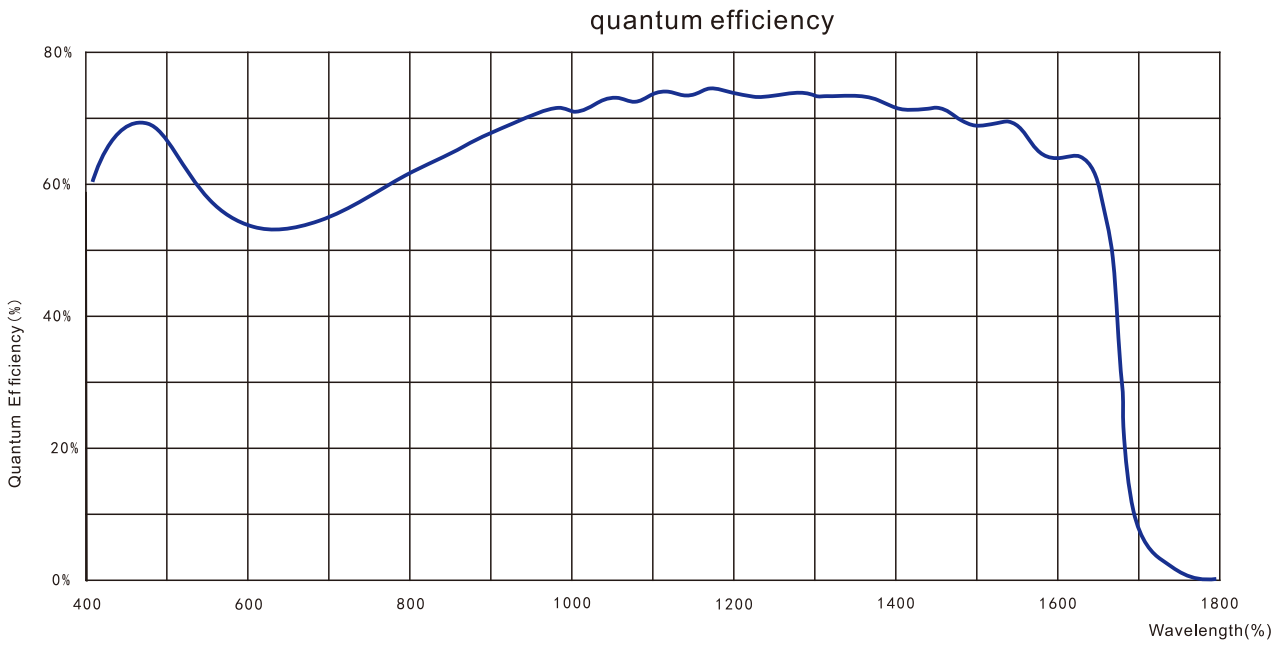
- Dimension-Labs's CMOS Camera Laser Spot Analyzer contains two models to achieve real-time display and analysis of light spots in the range of 400 to 1700 nm.

Characteristic

- A single model can meet the light spot measurement within the range of 400~1700nm
- 20 Spot is displayed in real-time
- Real-time analysis of the 3D power distribution
- It is very suitable for complex light spot testing with high-order transverse modes
- Standard 6 attenuating tablets to meet extensive power test requirements
- Spot analysis function and scientific research camera imaging have both

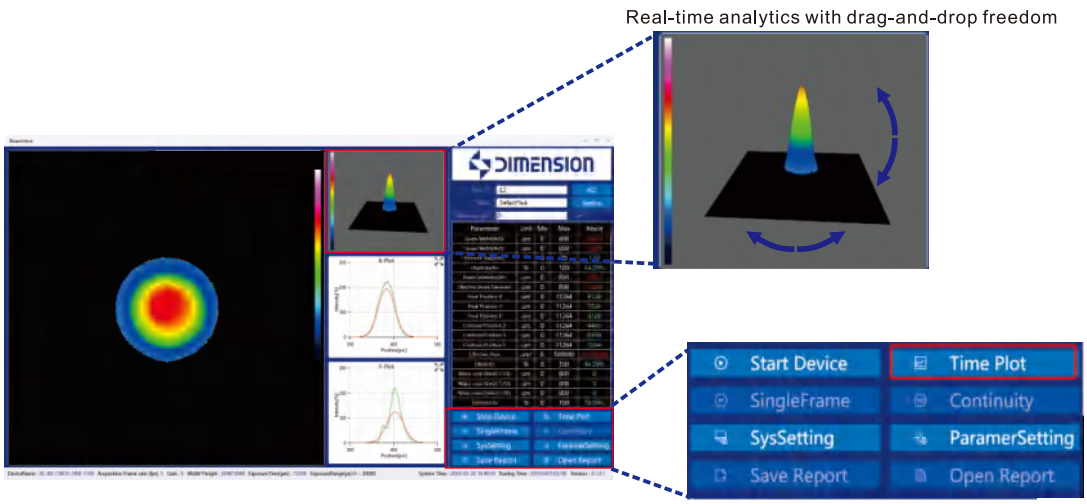
A Single Model can meet the Light Spot Measurement within the Range of 400~1700nm

The Dimension-Labs short-wave infrared band model spot analyzer has a spectral response range of 400 to 1700 nm, covering the requirements of conventional spot measurement of visible light and near-infrared wavelengths.



Real-Time Display of 2D Spots and Real-Time Analysis of 3D Power Distribution

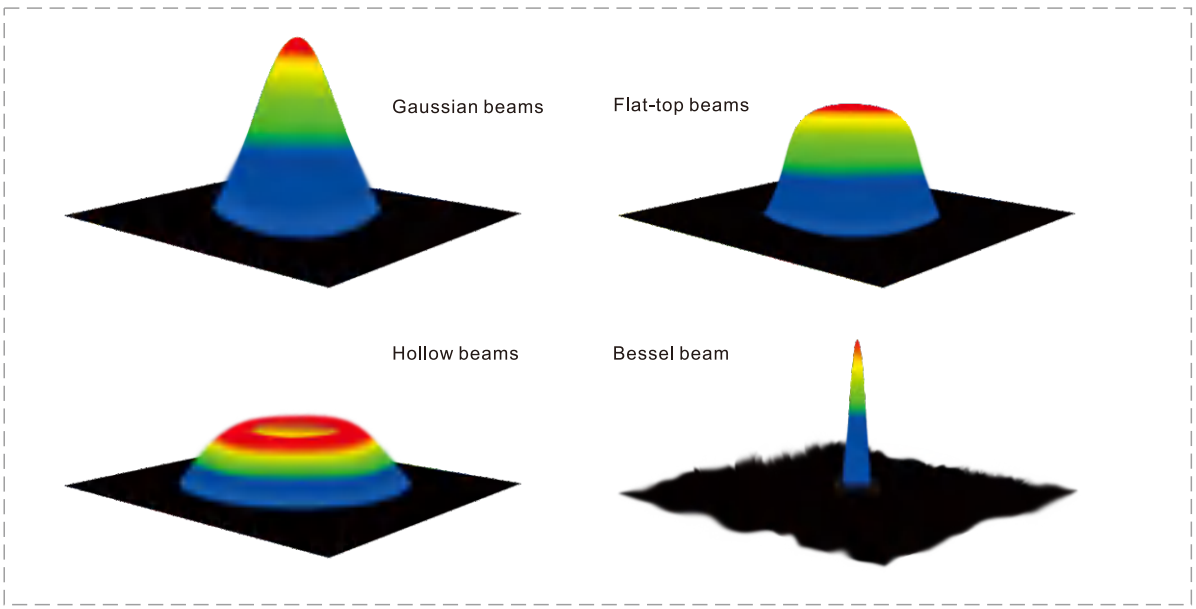
BeamHere In the mode of continuous measurement, the CMOS Camera Laser Spot Analyzer can refresh the picture at a high frame rate to reflect the changes of the spot in real time. Meanwhile, the 3D view can also be analyzed in real time and can be viewed from any perspective. Real-time performance is a huge advantage in dynamic testing, optical system adjustment, or time monitoring.



Suitable for Complex Containing High-Order Transverse Mode Light Spot Test

Camera based imaging is a process where multiple pixels simultaneously provide feedback on the shape of the same spot at different positions on the cross-section. Therefore, even if the energy distribution of the spot is irregular or non Gaussian and contains higher-order transverse modes, it can be accurately measured by the CMOS Camera Laser Spot Analyzer

Common Beam



▶▶ Standard 6 Attenuating Tablets to Meet Extensive Power Test Requirements

Dimension-Labs'sCMOS Camera Laser Spot Analyzer, which adopts a unique filter runner structure, can have up to 6 filters with different wavelengths and different attenuation installed in the runner, to achieve the maximum power measurement range in the most compact way, and the filter can be replaced by gentle rotation, so as to achieve simple operation and efficient measurement.

▶▶ Spot Analysis Function and Scientific Research Camera Imaging have Both

The removable design of spot analysis camera and filter wheel greatly expands the functional application. The disassembled camera and additional camera drive software can meet the application requirements of scientific imaging for CMOS camera or short-wave red machine.

Infrared Camera 400~1700nm

Infrared Camera Imaging

M² Factor test module

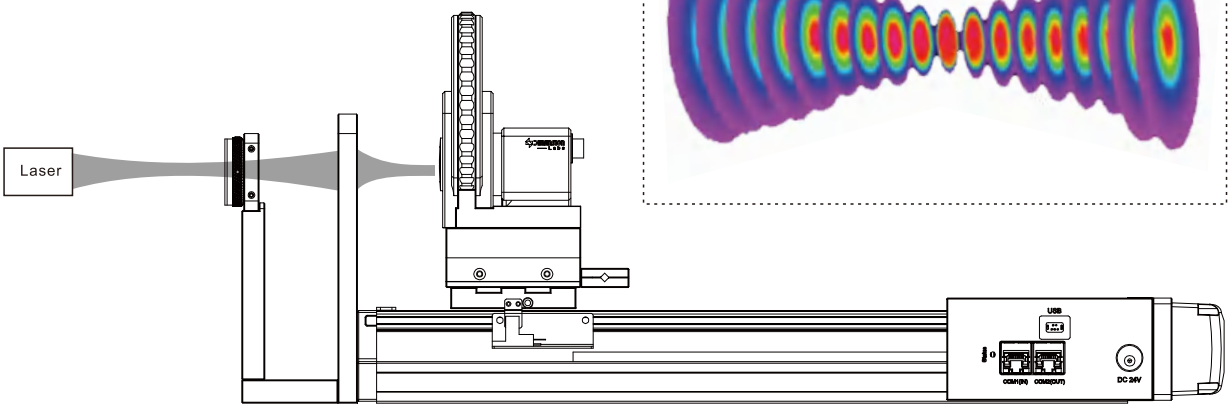
Description

- Dimension-Labs has launched the M² test module for the CMOS Camera Laser Spot Analyzer and Scanning-slit Laser Spot Analyzer series products. For the propagation quality detection of laser, it can measure M², divergence Angle, beam waist position, beam waist diameter and other beam mass characteristic parameters.

Characteristic

- Automatic measurement of the slide rail
- Software for automatic analysis
- Is small in size
- Universal installation hole, easy to disassemble and assemble

Technology Profile



Using the scheme of fixed lens and mobile probe, under the premise of ensuring the lens aberration, the beam width at multiple Z axis positions is usually collected to calculate the beam parameters such as M2 factor. In order to comply with the IS 011146 standard to improve the measurement accuracy, the beam width at more than 10 positions is collected in the light propagation direction of the beam, where at least five position points from the waist of the beam must be located within its double Rayleigh distance.

Parameter Specifications

	Product Model	DL-BH-190-1100-A	DL-BH-500-1700-A	DL-BH-900-2700-A
Scanning-slit type	Applicable wavelength	190~1100nm	500~1700nm	900~2700nm
	Maximum power is allowed	10W		
	Chip types	Si	InGaAs	InGaAs
	The beam diameter was measured	2.5μm~10mm		
	scanning rate	2~20Hz (continuously adjustable)		
	Spot resolution	0.1μm		
	show	Black and white / pseudo color		

	Product Model	DL-BH-CMOS-400-1100	DL-BH-CMOS-190-1100	DL-BH-CMOS-400-1700
CMOS Camera type	Applicable wavelength	400~1100nm	190~1100nm	400~1700nm
	Maximum power is allowed	1W		
	Chip types	Si		InGaAs
	The beam diameter was measured	55μm~10mm	27μm~7mm	50μm~2.5mm
	Spot resolution	5.5μm	2.75μm	5μm
	show	Black and white / pseudo color		
	Picture resolution	2048×2048		656×520
	Shutter	Global shutter		

Product selection DL-BH-

Analyzer type	CMOS (Camera Style) ☐	NA (Slit type) ☐
Operating wavelength	400~1100nm ☐	190~1100nm ☐ 900~2700nm ☐
	400~1700nm ☐	500~1700nm ☐
Suffix		A(Slit version 1.0) ☐

ISO Parameter Definition

Location of the Centroid of the Technical Light spot

By the following formula child to determine $x_{centroid} = \frac{\sum(X \times Z)}{\sum Z}$ $y_{centroid} = \frac{\sum(Y \times Z)}{\sum Z}$

Note: X (calculate the x position value of pixels) Y (calculate the Y position value of pixels) z (selected pixel value)

Beam Diameter

Beam diameter (second order moment) $d_\sigma(Z) = 2\sqrt{2\sigma(Z)}$

Note: $\sigma^2 = \frac{\iint r^2 \cdot E(r,\varphi,z) \cdot r \cdot dr d\varphi}{\iint E(r,\varphi,z) \cdot r \cdot dr d\varphi}$ r（distance from roid）φ(azimuth)

Centre of gravity: $\overline{x} = \frac{\iint xE(x,y,z)dxdy}{\iint E(x,y,z)dxdy}$ $\overline{y} = \frac{\iint xE(x,y,z)dxdy}{\iint E(x,y,z)dxdy}$

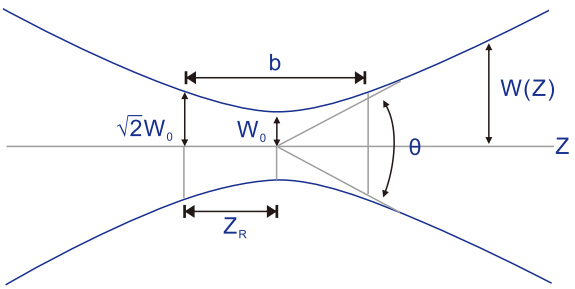
Angle of Divergence

The far-field full angle of the envelope formed by increasing the beam diameter $\theta_\sigma = \frac{d_{\sigma,fl}}{fl}$

In fl (focal length of the focused optical element), $d_{\sigma,fl}$（Beam diameter at the intersection point）

Rayleigh Length

The beam diameter is the distance value from the waist of the beam with 2 diameter at the waist



$Z_R = \frac{d^2_{\sigma,0}}{\theta_\sigma}$

Beam Propagation Ratio M²

Represents the proximity to the diffraction limit of an ideal Gaussian beam when propagating M²

$M^2 = \frac{\pi d_{\sigma 0} \theta_\sigma}{4\lambda}$

DIMENSION
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INNOVATION LIGHTS OUR FUTURE

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