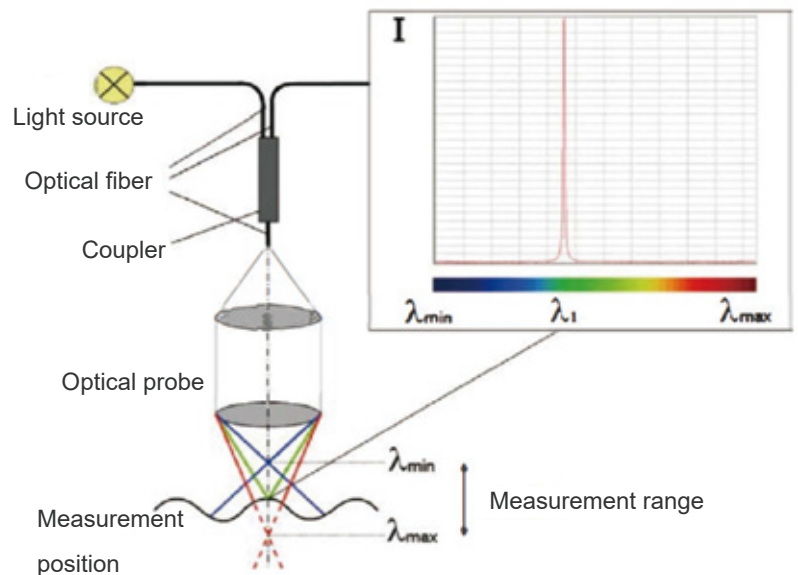


## Structure of spectral confocal sensor

The spectral confocal sensor can establish the corresponding relationship between distance and wavelength through the principle of optical dispersion and acquire the position information by decoding the spectral information via spectrometer.

In spectral confocal displacement sensing system, the system measurement range is affected by 4 factors:

1. Spectrum distribution range of light source
2. Axial color difference of chromatic dispersion lens within the working waveband range
3. Working waveband of spectrometer
4. Working waveband of optical fiber coupler



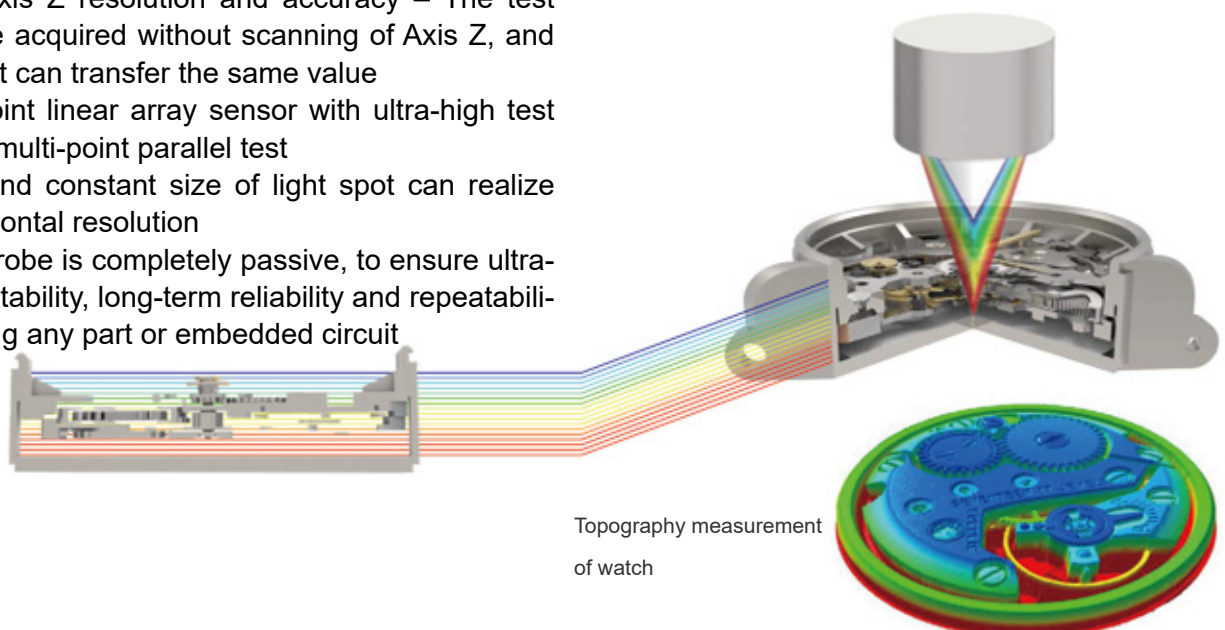
## Merits of Spectral Confocal Sensor

### Multi-function spectral confocal sensor

Through the high-quality optical lens, our spectral confocal sensor can focus the white light at different distance along with the optical axis, instead of single point, and all visible light bands are on the focus. This multi-function optical sensor opens new dimensions for the measurement technology of optical sensor.

- Support test of all materials – Non-transparent/transparent materials, diffuse reflection/reflection, absorption, colored, roughness/polishing
- Axial test to avoid the influence of shadow
- Ultra-high acceptance of slope and numerical aperture to reach the measurable angle of  $45^\circ$  on the reflection surface, the diffuse reflectance is  $>80^\circ$
- Ultra-high Axis Z resolution and accuracy – The test results can be acquired without scanning of Axis Z, and each test point can transfer the same value
- The multi-point linear array sensor with ultra-high test speed allows multi-point parallel test
- The small and constant size of light spot can realize ultrahigh horizontal resolution
- The optical probe is completely passive, to ensure ultra-high thermal stability, long-term reliability and repeatability without using any part or embedded circuit

Spectral confocal principle



# Comparison of Measurement Methods

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## Digital microscope

- The surface topography needs overlay of depth of field, speed is low
- Small field of view
- Scanning accuracy depends on the Axis Z motor and depth of field of objective lens

## Laser confocal microscope

- The surface topography needs overlay of depth of field, speed is low
- Small field of view
- Artificial data measurement

## Triangle type reflection spectral confocal sensor

- Lower resolution of Axis Z
- Dead zone in scanning
- Poor effects of transparent materials and mirror materials

## White light interferometry

- High cost of use and maintenance
- Not applicable to samples with large size and fluctuation
- Poor effects of samples with rough surface

## MTS merits

- Non-contact and lossless measurement
- Axis Z resolution of 20nm maximally
- No overlay of depth of field, higher acceleration
- No restriction on reflexivity of sample surface
- Provide all 3D information of surface
- Customized scanning area
- Accessible to Q-DTS avocado AI



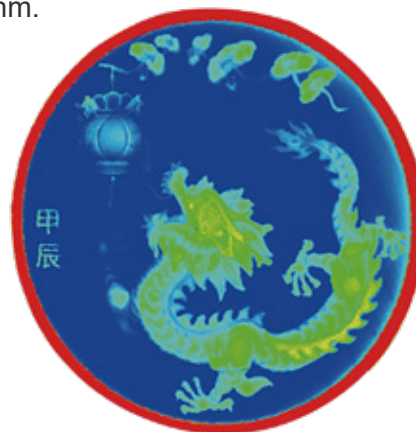
## Fast

XY is fitted with linear motor drive platform, its motion speed is 4 times higher than that of common screw rod transmission platform.



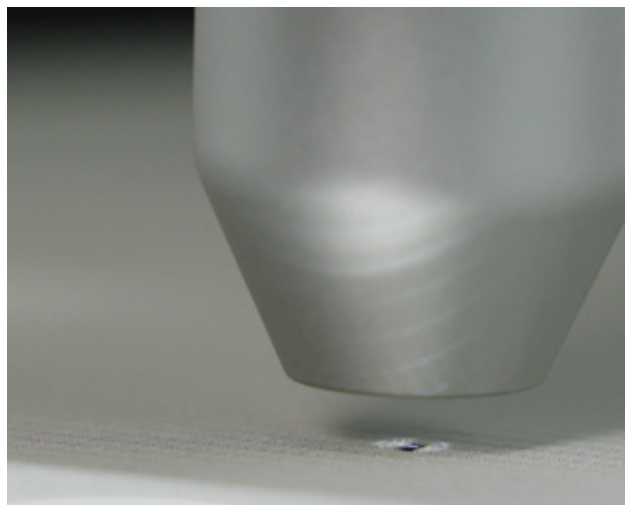
## Accurate

The min. diameter of light spot is  $2\mu\text{m}$ , both XY axes are fitted with built-in  $0.1\mu\text{m}$  high-accuracy grating ruler, to realize high-accuracy positioning. Guarantee accurate measurement of plane with the help of self-researched software and AI algorithm.



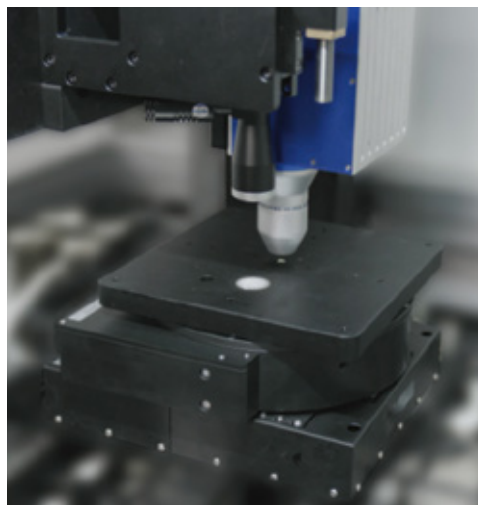
## Spectral confocal technology

The coaxial colored spectral confocal technology provides excellent and fast detection at Z direction, to avoid the defects.



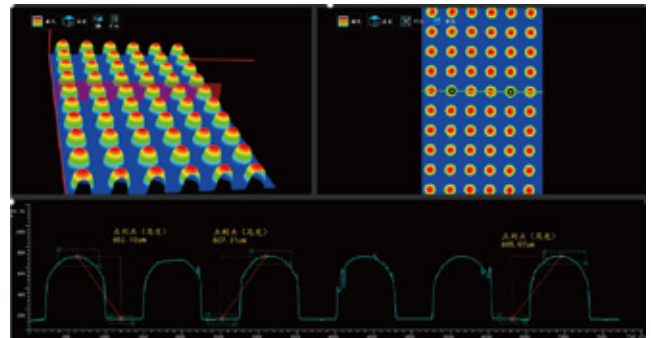
## Customized expansion

Four-axis movable platform with the default dimensions of  $350\times 350\text{mm}$ , to provide customized platforms for clients. It can apply to the detection environment with higher complexity in order to improve the flexibility. It can be fitted with other optical systems, in order to further optimize the 2D detection accuracy.

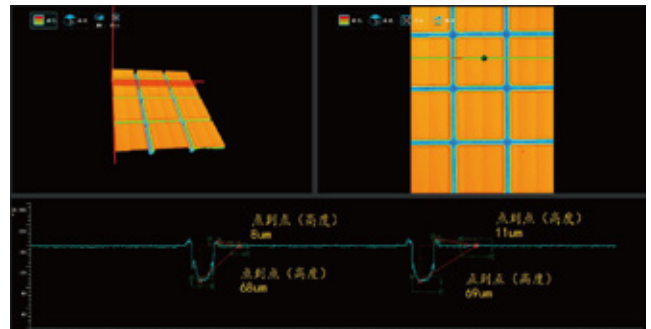


# Applications in MTS Industry

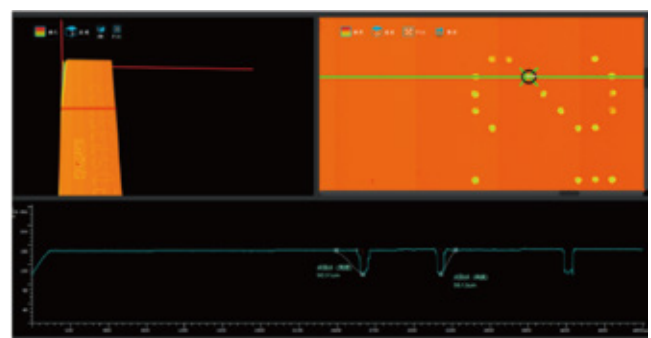
Bump detection



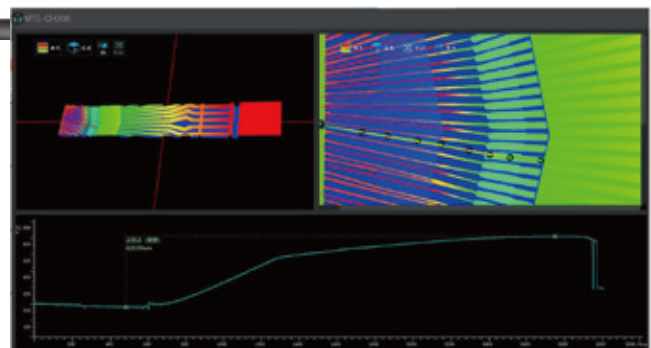
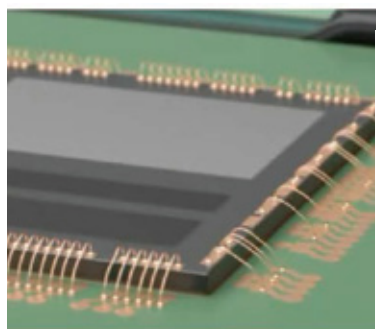
Groove depth and width



Laser Mark

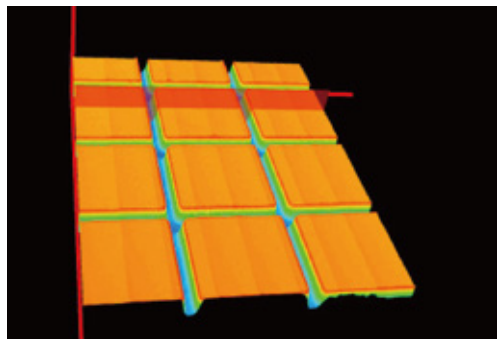


Gold thread height measurement

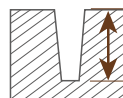


# Professional Analysis Software

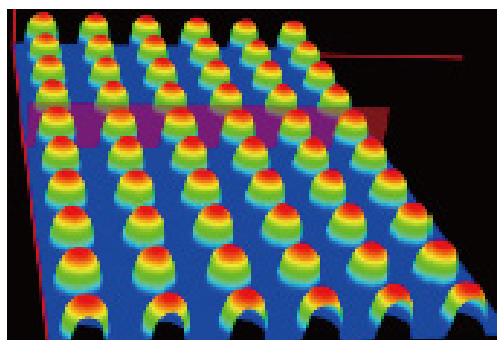
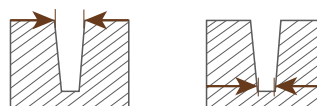
Have improved auto measurement tools for scribing groove depth, groove width of Wafer samples and Bump samples in the semiconductor industry.



Groove depth



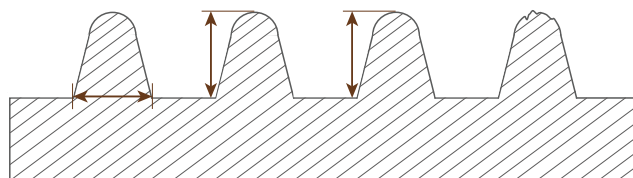
Groove width



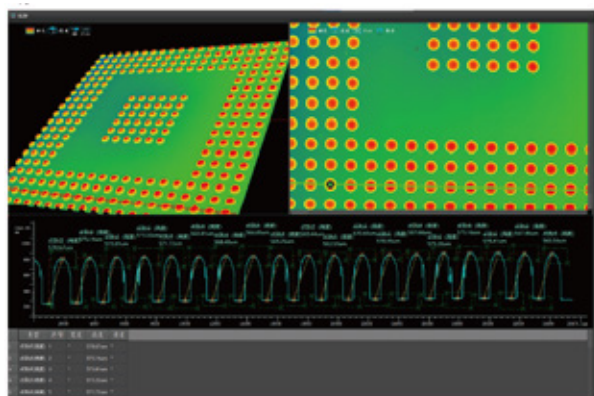
BGA height

Ball diameter Ball height Coplanarity Integrity

measurement



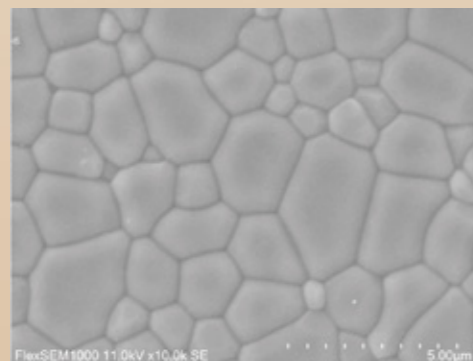
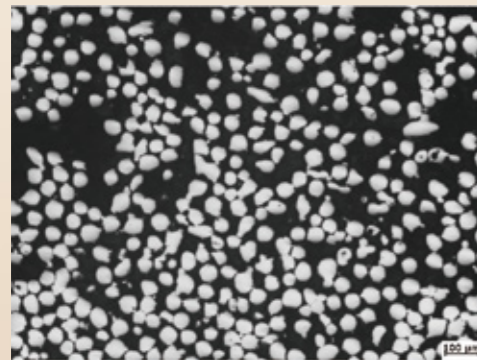
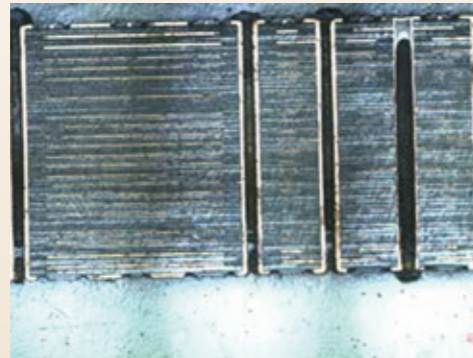
Have improved auto data report for the Bump height, diameter, coplanarity and integrity of reballing.



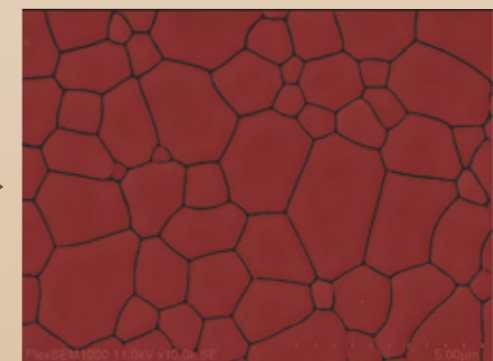
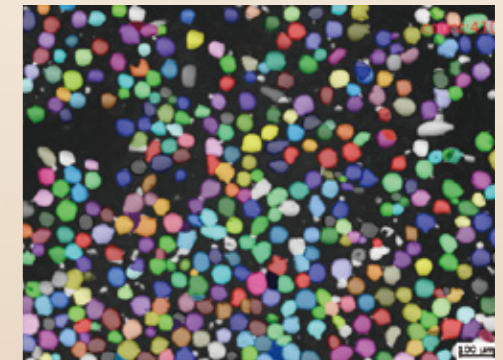
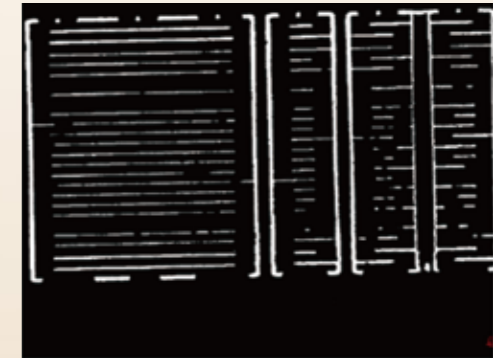
类型	序号	高度/um		
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点到点(高度)	2	579.16		
点到点(高度)	3	579.81		
点到点(高度)	4	571.32		
点到点(高度)	5	571.72		
点到点(高度)	6	560.41		
点到点(高度)	7	568.48		
点到点(高度)	8	564.45		
点到点(高度)	9	569.23		
点到点(高度)	10	569.44		
点到点(高度)	11	562.53		
点到点(高度)	12	570.6		
点到点(高度)	13	570.35		
点到点(高度)	14	567.66		
点到点(高度)	15	575.28		
点到点(高度)	16	575.16	平均值/um	570.404
点到点(高度)	17	578.41	最大值/um	578.67
点到点(高度)	18	567.46	最小值/um	560.41
点到点(高度)	19	560.56	最大差值/um	18.26

# Avocado AI Image Intelligent Analysis Platform

Before AI treatment



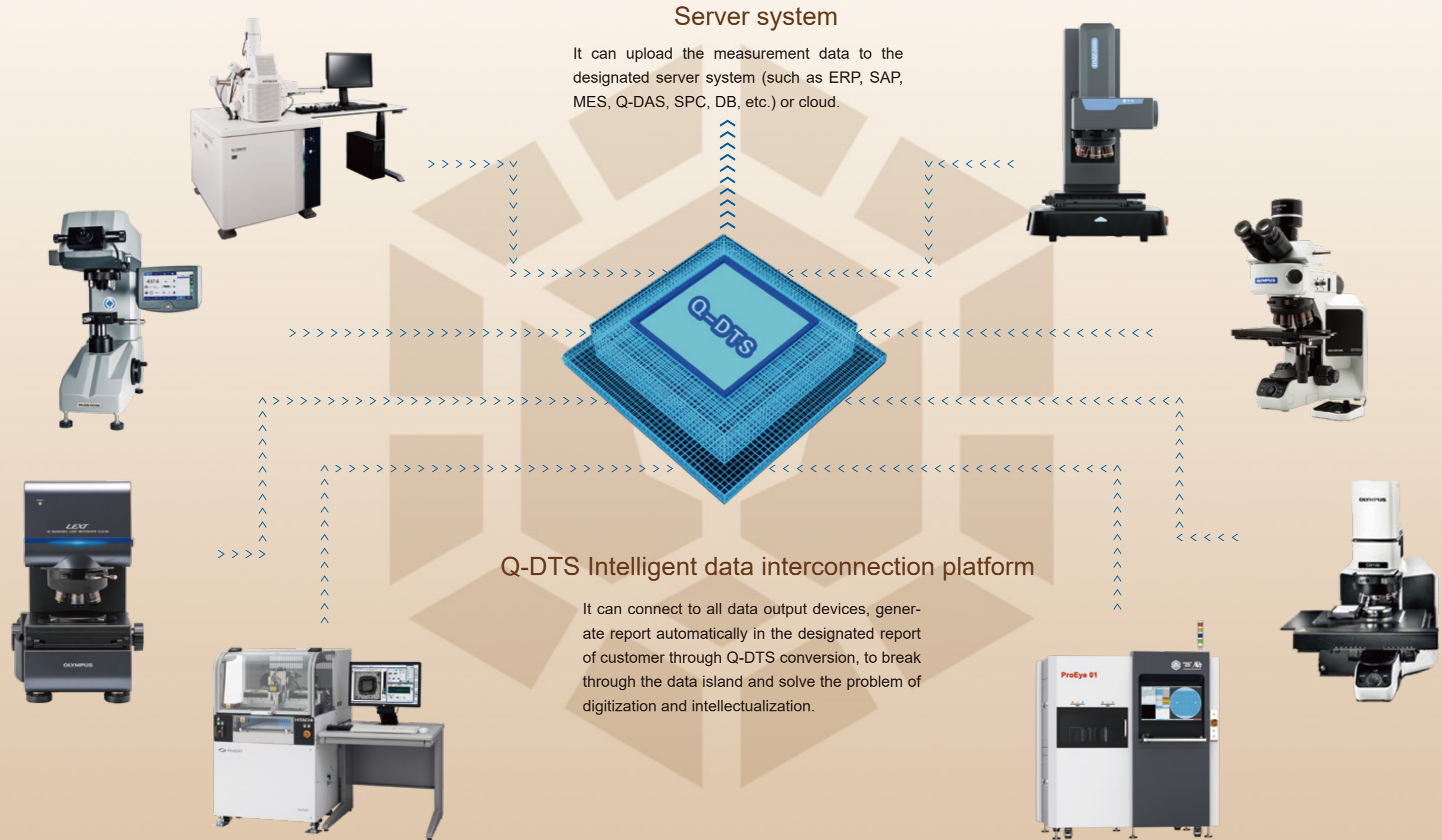
After AI treatment



## Avocado AI Image Intelligent Analysis Platform

The platform's core function modules include target cutting, object recognition, 3D point cloud measurement, data intelligent analysis, auto process, etc. Based on advanced in-depth learning algorithm, Lionhearted Avocado AI image intelligent analysis platform can recognize the microscopic image correctly, including surface topography, defect detection, dimension measurement and image cutting, in order to greatly improve the accuracy and efficiency of detection. Besides, this platform can analyze the detection data in real time, provide visual report and alarm, and help users reduce cost and increase efficiency.

# Q-DTS Intelligent Data Interconnection Platform



## Server system

It can upload the measurement data to the designated server system (such as ERP, SAP, MES, Q-DAS, SPC, DB, etc.) or cloud.

Q-DTS

## Q-DTS Intelligent data interconnection platform

It can connect to all data output devices, generate report automatically in the designated report of customer through Q-DTS conversion, to break through the data island and solve the problem of digitization and intellectualization.

# Technical Parameters

		MTS 01		MTS 02		
Optical module	Range <sup>①</sup> /mm	0.2	1	0.24	0.6	10.6
	Point quantity/line	192		1200		
	Line length/mm	0.96	1.91	1.18	2.36	11.9
	Point interval/ $\mu\text{m}$	5	10	0.98	1.97	9.9
	Axis Z resolution/nm	20	80	25	50	800
	Accuracy <sup>②</sup> /nm	$\pm 80$	$\pm 300$	$\pm 125$	$\pm 250$	$\pm 4000$
4-axis electric platform	Sampling speed/Hz	6000		36000		
	Axis XY stroke/mm	350X350				
	Axis XY positioning accuracy/ $\mu\text{m}$	$\pm 0.3$				
	Axis XY repeated positioning accuracy/ $\mu\text{m}$	$\pm 0.15$				
	Axis Z stroke/mm	5mm				
	Axis Z positioning accuracy/ $\mu\text{m}$	$\pm 0.2$				
	Axis Z repeated positioning accuracy/ $\mu\text{m}$	$\pm 0.1$				
	Axis T positioning accuracy	$\pm 2$ arcsec				
	Axis T repeated positioning accuracy	$\pm 1$ arcsec				
	Scanning speed/mm/s	80				
2D positioning camera	Effective pixels	2464 $\times$ 2056				
	Field size	8.6x7.2mm				
	Light source	LED点光				
Software system	Spectral confocal acquisition function					
	Navigation chart acquisition and positioning function					
	Optional Q-DTS data interconnection module, avocado AI					
	2D & 3D measurement	Measurement tools such as length, width, height, angle and volume				
Computer system	Customized software function					
	Report output	Word, Excel, etc.				

①Above 2kHz, the test range decreases along with frequency increase

②Measure vertical mirror at 20°C

All data are sourced from tests of typical applications, the test results in other special conditions may be different. The follow-up printing error, revision and update may also lead to difference of technical parameters in the table. So, the consistency of the product's technical parameters, measurement results and information is not guaranteed.

## Other Products

### Auto Defect Detection Device of Semiconductor

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#### ProEye 01



As a semi-conductor detection device developed by us and enjoys independent intellectual property rights, the system applies to the scenarios requiring automatic and fast detection and high-accuracy measurement in Wafer and chip process. We have optimized the defect detection accuracy, production efficiency and availability based on the samples, provided the auto and manual operation mode; therefore, it applies to the R&D stage as a production tool.

## Other Products

### Auto Infrared Detection Device of Semiconductor

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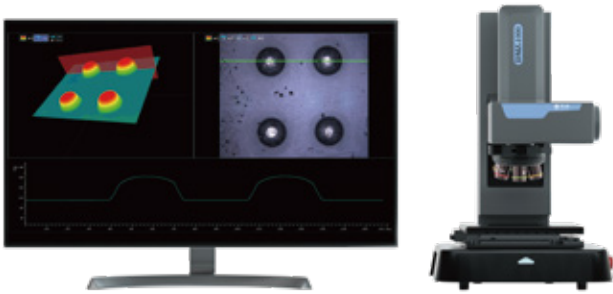
#### ProEye 02



The device is fitted with Olympus optical system, professional and rich optical parts, to realize the detection of infrared light and visible light based on the excellent imaging quality. It can realize contact-less handling of samples, auto control over light source, lens and auto-focusing, and provide mature solutions as required by users.

## Other Products

# DMZ1000 Series



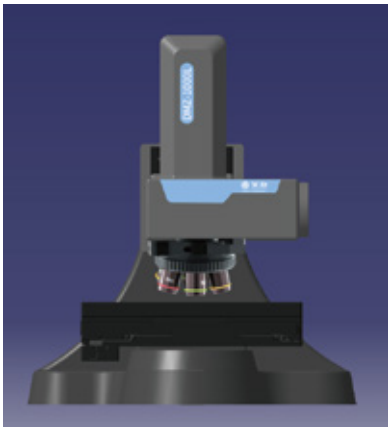
## DMZ1000

Not just 3D splicing and measurement  
Centralized expression of microscopic image technology  
Platform stroke: 100 \* 100 mm



## DMZ1000 D

DMZ1000D has deep customization of hardware & software for clients in PCB industry to meet their varying demands  
Platform stroke: > 300 \* 300 mm



## DMZ1000 L

Fitted with the objective table with higher stroke on basis of standard configuration, to carry the larger and heavier samples and meet the varying detection demands of clients.  
Platform stroke: 200 – 300 mm