3D Line Confocal Sensor

Line Confocal Scanning in One Step

- Excellent dynamic detection, simultaneous output of 2D and 3D images

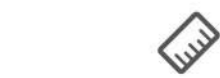**3C electronic products**   **Precision Hardware**   **Semiconductor industry**   **Lithium battery industry**

3D Line Confocal Sensor *(vertical side tab)*

Ultrahigh resolution: 2,048 points/line

Ultrahigh-speed scan rate: 35,000 lines/sec

Excellent material adaptability

Simultaneous output of 2D and 3D images
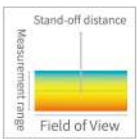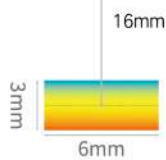
Precise measurement of multilayered materials

IP55 protection degree

3D Optical Profilometer

3D Line Confocal Sensor

Chromatic Confocal Sensor

High Speed Industrial Camera

6-Axis Force Torque Sensor

Laser Cross Beam Sensor

3D Solid-state LiDAR
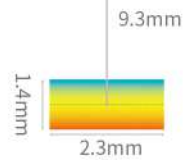
ToF Ranging Sensor

◎ Product Description

- Hypersen 3D Line Confocal Sensor (HPS-LCF Series) has broken through the limitations of traditional measurement methods and provided an optical measurement solution with higher accuracy and faster speed than the traditional ones for Industry 4.0. It can carry out high-precision 3D inspection with submicron precision for various complex materials like transparent glass, film, lithium batteries, 3C electronics products, and semiconductor components.

![Hypersen logo]

Sensor Head

HPS-LCF1000

16mm

3mm

6mm

Stand-off distance

Measurement range

Field of View

Sensor Head

NEW

9.3mm

1.4mm

2.3mm

Principle Introduction

The principle of 3D line confocal sensor is to extend the focus halo range of different colors of light by using special lenses to form a special magnified chromatic aberration. According to the different distance between the target and the lens, the light with a certain wavelength will be focused on the target. Then, by measuring the wavelength of the reflected ray, the precise distance from the object to the lens can be obtained.

The measurement results will not be affected by the intensity of the reflected lights, which means that the distance results stay the same no matter how much light is reflected from the target. And because the intensity of the reflected light only depends on the reflectivity of the target, this sensor can conduct reliable measurement even if the target is a strong light-absorbing material, such as black rubber, or transparent materials, such as glass or liquid.

Schematic of 3D Line Confocal Sensor Principle
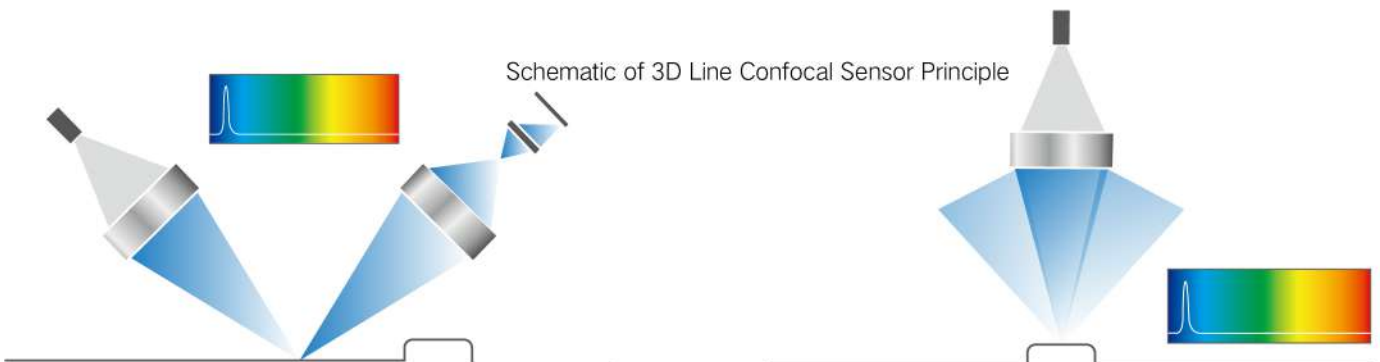
Excellent performance to deal with different scenarios

Advantages of Hypersen 3D line confocal sensor

Excellent adaptability to various materials

· High-precision measurement can be achieved for almost all materials, including highly reflective ones.

3D Line Confocal Sensor

Multilayered materials inspection

• By means of its unique line chromatic confocal scanning technology, Hypersen 3D line confocal sensors can construct 2D and 3D data of multiple transparent layers by scanning the display surface only once.

• Regardless of the glass thickness, it can provide excellent scanning performance on the glass surface and curved edges (±20.5°), and perform inline defect detection accurately, such as chips and cracks.

Line Confocal Scanning in One Step

This sensor adopts the unique line confocal scanning technology. Various forms of appearance diagrams and detailed raw data can be obtained by only one scan on the target surface.

- 3D point cloud
- 2D contour image
- HD depth image
- HD grayscale image
- Dimensions/Surface roughness
- Topography/Flatness
- Defects/Thickness
- Tomography/Step height
- Gap and flush measurement
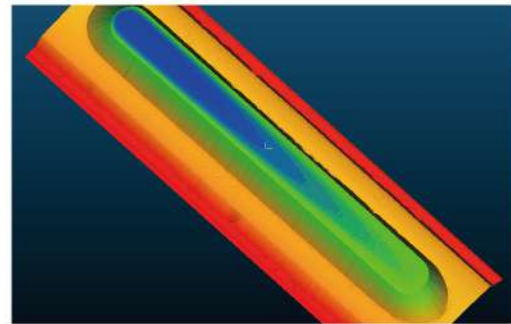
Micron-level Inspection with High Speed

• Scanning at 2,048 points/line with the minimum point interval of 2.9μm.

• The Z-axis repeatability is up to 0.1μm, which provides you with more accurate measurement results.

• Maximum scanning speed: 35,000 lines/sec.
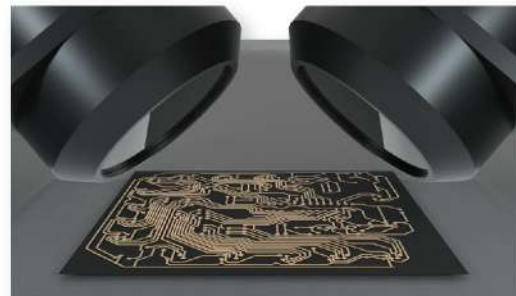
3D Optical Profilometer
3D Line Confocal Sensor
Chromatic Confocal Sensor
High Speed Industrial Camera
6-Axis Force Torque Sensor
Laser Cross Beam Sensor
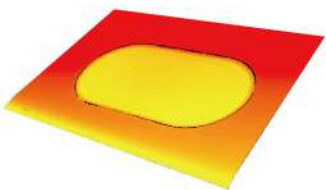3D Solid-state LiDAR
ToF Ranging Sensor

3C electronics

- Perfect image merging
- Multilayer data
- Defect detection
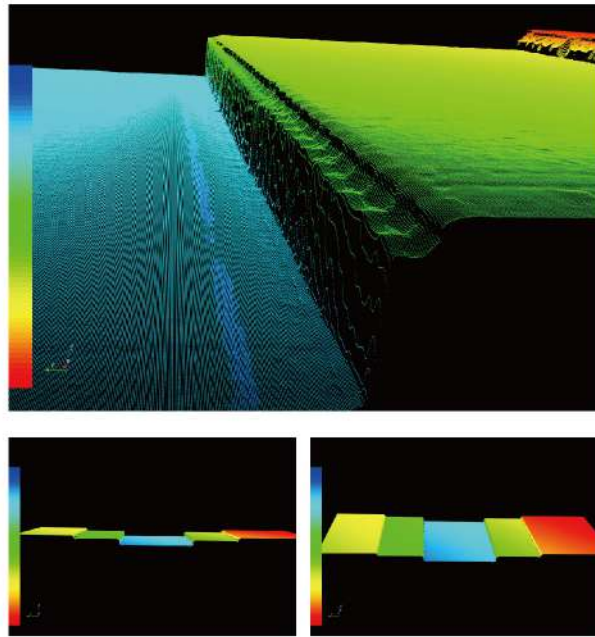
Perfect image merging
No matter how big the target is

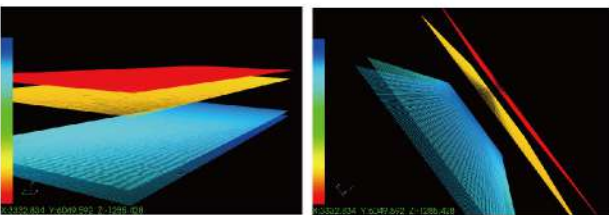Camera module defect detection ●

Button module defect detection ●

- Mobile phone mid-frame step height measurement

3D Line Confocal Sensor

Hypersen

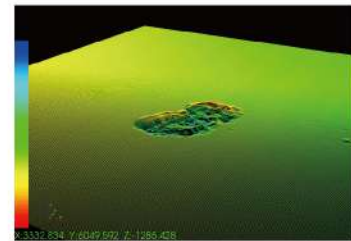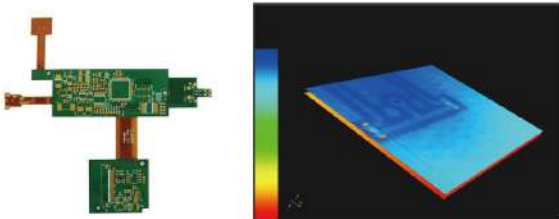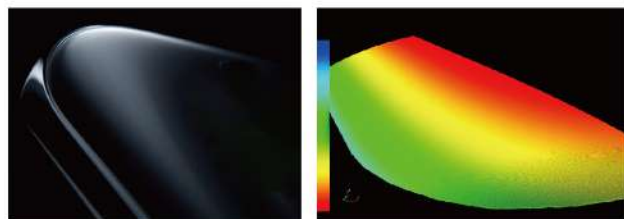## Multilayer data
Scan once * Multilayer data

- Multilayer glass inspection

- Printed circuit board/gluing defect detection

Defect detection
Detect the smallest defect

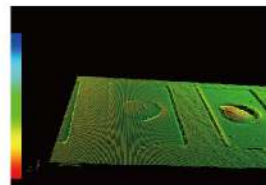
- Screen defect detection

- Curved screen curvature/defect detection

3D Optical Profilometer

3D Line Confocal Sensor

Chromatic Confocal Sensor

High Speed Industrial Camera

6-Axis Force Torque Sensor

Laser Cross Beam Sensor

3D Solid-state LiDAR

ToF Ranging Sensor

Hypersen

Excellence WALK THE TALK
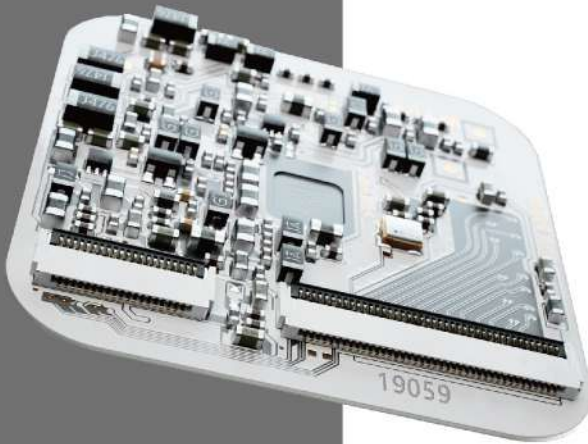
Semiconductor chip

- Various tests

- Extreme precision

- Defect detection

All Defects Detected in One Scan

● Through-silicon vias (TSVs) defect detection

OK

Overflow

Insufficient

Missing

● Integrated circuit/Transistor/Resistor/Capacitor/Inductor/IC chip-Completed in one scan

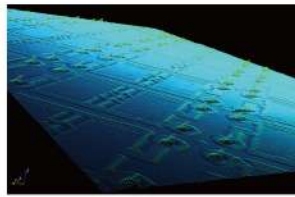**Ultrahigh precision at submicron level**
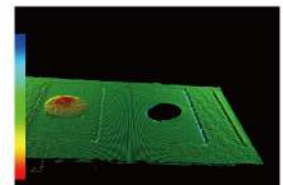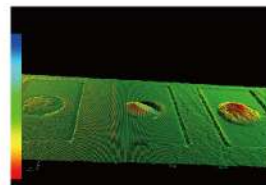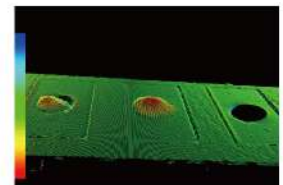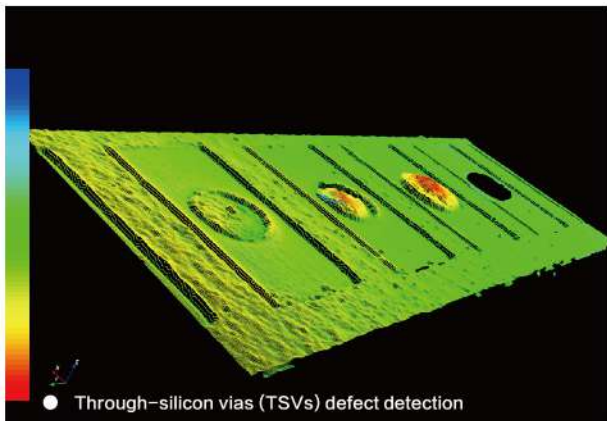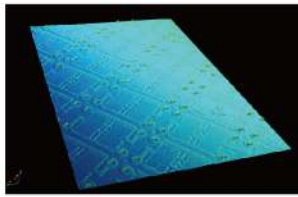
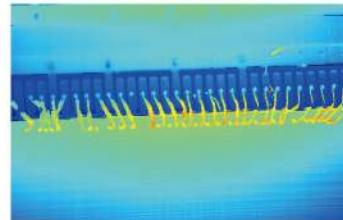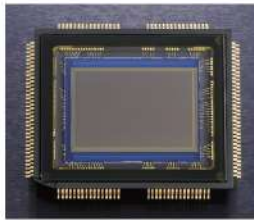**3D Line Confocal Sensor**
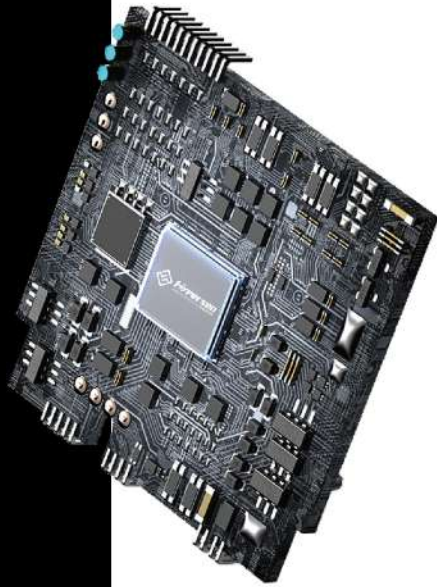
Hypersen

Extreme precision
Ultrahigh precision at submicron level
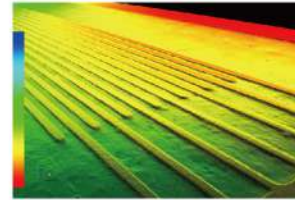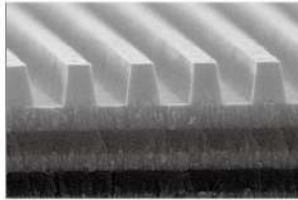
● Plasma etching defect detection

● Wafer solder joint defect detection

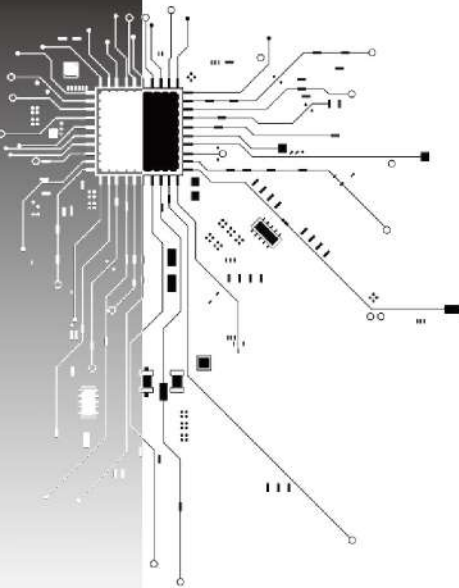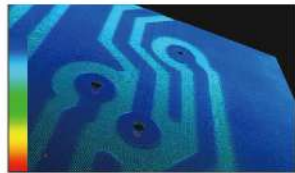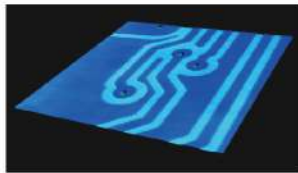● CMOS chip gold wire defect detection
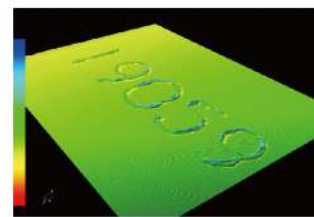
Detect the smallest defect

Defect detection
Detect the smallest defect

● Printed circuit inspection

● Metal's engraved characters detection

3D Optical
Profilometer

**3D Line
Confocal Sensor**
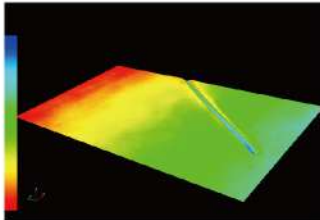
Chromatic
Confocal Sensor
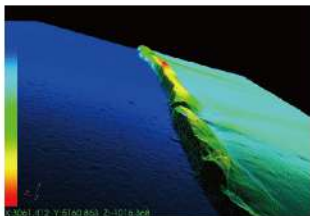
High Speed
Industrial Camera

6-Axis Force
Torque Sensor

Laser Cross
Beam Sensor

3D Solid-
state LiDAR

ToF Ranging Sensor

Applications in lithium battery industry

Lithium battery

● Metal film scratch detection

Bubble detection in battery pole piece coating ●
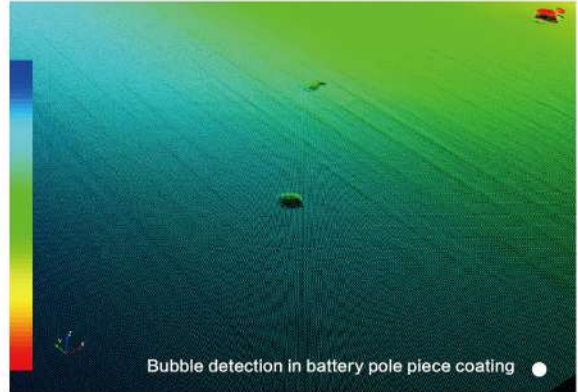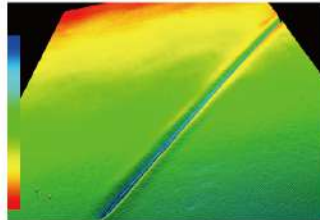
● Electrode edge burr detection
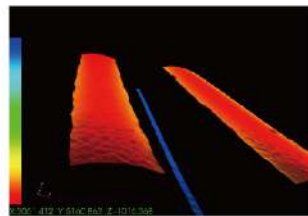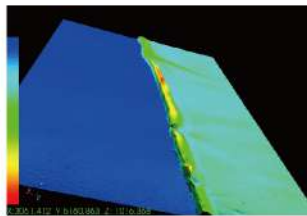
● Detection of defects in metal wire insulation adhesive

● Edge combining detection
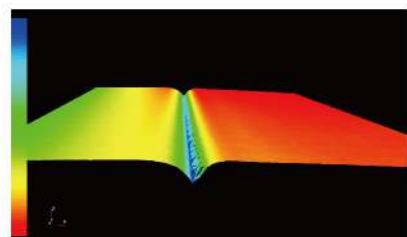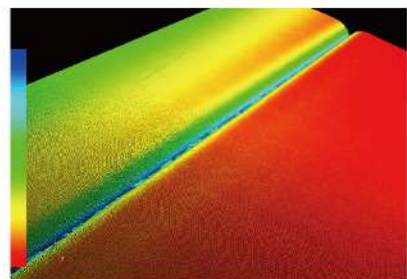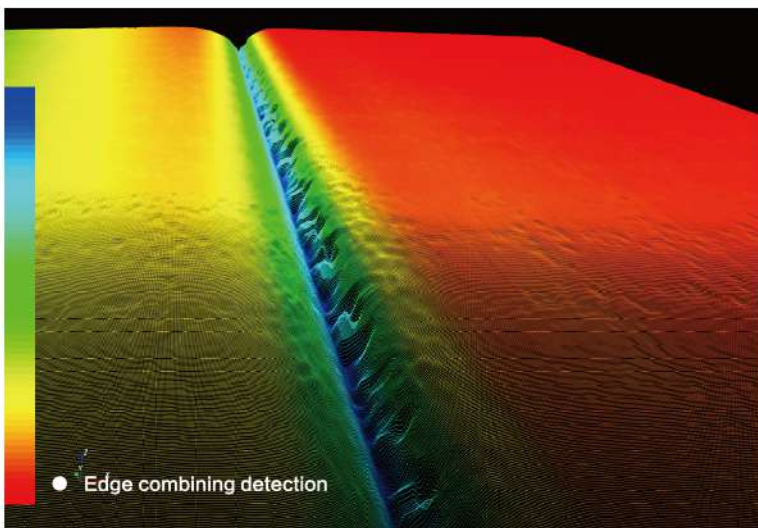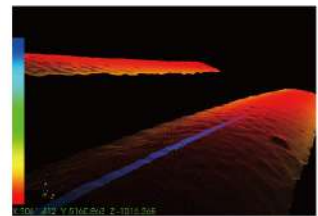
Excellent performance to deal with different scenarios

Technical Parameters

HPS-LCF Sensor Head

Model	HPS-LCF1000	HPS-LCF2000	HPS-LCF3000	HPS-LCX1000
Field of View(mm)	6	6	13	2.3
X-resolution (μm)	2.9	2.9	6.3	1.1
Z-repeatability(μm)[*1]	0.1	0.2	0.15	0.1
Stand-off distance (mm)	16	19	59	9.3
Measurement range (mm)	3	2.4	6	1.4
Scan rate at full measurement range (Hz)[*2]	5000	5000	5000	6500 [*3]
Max. scan rate (Hz) [*3]	35000	35000	35000	35000
Number of data points/profile	2048	2048	2048	2048
Max. surface slope on mirror (deg)	±20.5	±15	±13.5	±45
Dimensions (W*H*D) (mm)	397*449.3*106	276*341.7*75.5	384*487.6*105	315*454*104
Weight (kg)	19	8	20	13
Power	35W			
Protection degree (EN 60529)	IP55			
Power supply	24 VDC,3A			
Connection to the controller	40G optical fibre			
Digital input	Optocoupler input and output			

*1 This value is a 3σ value, which is obtained by measuring the mirror standard gauge block on the optical platform in our company's cleanroom .
  The number of contours: 200,000; Integration time: 200us; Light signal intensity (Manually adjusted): 20%.
*2 The number of data points/profile at this scan rate is 1024, while the scan rate will be 2400Hz with 2048 data points/profile.
*3 The measurement range under this scanning rate is 1/8 of the full range.
*All technical specifications are subject to the latest official datasheet. Hypersen reserves the right of final interpretation.

HPS-LCF Controller

Model		HPS-NB3200
Input power requirements		19V ≥ 5A
Power		55W
Operating temperature		0~50℃
Relative humidity		35-85%RH (non-condensing)
Weight		≈1400g
Dimensions (L*W*H) (mm)		134*100.5*135
Communication interface		QSFP 40G optical fiber interface USB3.1 * 2 /HDMI/Gigabit Ethernet/RS232
Input/output port	Optocoupler isolation input*2	AB phase signal input
	Optocoupler isolation output*2	Optocoupler isolation
Installation method	DIN rail	DIN rail/screws
Interactive part	Button*3	Button*1, Bi-Color LED (red and green)
Accessories		DIN bracket mounting buckle/cable clip

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