

Compact, High-Performance Wafer Reader

As fabs move toward full automated wafer traceability, they are more dependent than ever on reliable automated wafer identification. Wafer scribes must be read at every process step with a product that can be integrated into many types of equipment.

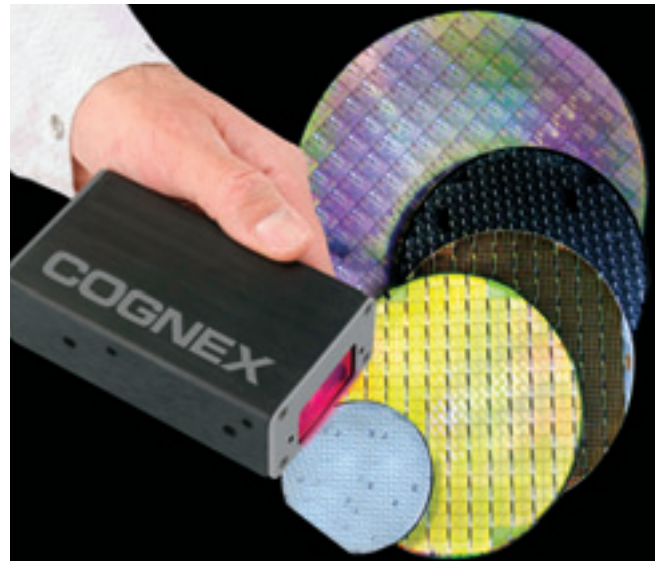
To accomplish this, Cognex® offers the In-Sight® 1721... the highest-performing wafer reader ever available to the semiconductor industry. The In-Sight 1721 offers twice the speed of earlier In-Sight wafer readers, a slimmer package, and full mounting and functional compatibility with earlier models.

Slim Design ... for Limited Equipment Space

The In-Sight 1721 wafer reader consists of a patented image formation system, processor, ID software, and connectivity all housed in a slim, compact package designed specifically to be integrated into fab equipment. The compact design of the In-Sight 1721 becomes an important attribute when considering the limited space available in wafer fab process equipment such as dicers, probers, sorter/handlers, and metrology systems.

Unmatched Performance

The image formation system, as well as every other aspect of the In-Sight 1721 wafer reader, is designed to provide dependable ID code reading performance at every manufacturing step ... regardless of variations from CMP, nitride coatings, copper metallization, or process effects.



Reliable traceability allows higher levels of process control, which results in significant yield improvement; this is particularly important in the advanced semiconductor processes used in 300mm wafer fabrication. When it comes to automatic wafer identification, the In-Sight 1721 reader provides unprecedented levels of performance and cost effectiveness ... exactly what the semiconductor industry needs.

Easy Setup and Use

The impressive power of the 1721 wafer reader is achieved without compromising ease of setup and use. No machine vision or image processing experience is required, as automated tuning optimizes wafer illumination and reading parameters. And, a simple graphical interface ... designed specifically for wafer ID ... provides fast setup and recipe changeover. For wafer traceability and management information at every step in the fab, the 1721 incorporates Ethernet and RS-232 interfaces for networking and machine communications.

Advantages

- ▶ Unsurpassed reading performance
- ▶ New slim, compact design easily integrates into fab equipment
- ▶ Field-proven Cognex algorithms, enhanced and optimized for SEMI standard 2D, OCR, and bar code identification
- ▶ No machine vision or image processing experience required ... automated tuning optimizes wafer reading
- ▶ Graphical user interface, designed specifically for wafer ID, provides fast and simple setup and modification
- ▶ Built-in serial and Ethernet communications for standalone and networked operation

The Industry Standard of Performance

The In-Sight 1721 OCR, 2D matrix, and bar code recognition algorithms are designed specifically for laser-etched silicon wafers, and can read codes that are hardmarked, softmarked, or super softmarked — on the front or back side of a wafer. The recognition algorithms are optimized to meet the SEMI M1.15 identification standard, allowing users to read both the T7 2D code and the M12 alphanumeric mark in the same field of view. Below are some examples of how the powerful algorithms of the In-Sight 1721 combine with speed and performance to meet a wide array of difficult applications:

- **Reading at an angle** ... a useful feature where the scribe is not aligned with the reader. Wafers may be scribed in different locations on the back of a wafer, while the reader is aligned with the flat or notch. As long as the mark is illuminated in the field of view, the reading window can be rotated to accommodate it
- **Virtual Checksum** ... uses multiple algorithms to ensure no misreads in cases where there is no SEMI checksum
- **Arc reading** ... used where wafers are marked in an arc along the edge to save space
- **Compressed bar codes** ... supports Base 35 and customer algorithms that map the data into shorter strings
- **Speed mode** ... a high-speed option for strings that use the SEMI checksum

Advanced Optics Enhance Reading Performance

The performance of the In-Sight 1721 wafer reader is enhanced by its image formation system, which introduces the next generation of advanced optics technology to wafer identification. Automatic software-controlled illumination of the 1721 provides bright- and dark-field modes, a variable angle of incidence, and adjustable brightness. And, the focus adjustment is placed at the back of the unit, providing easy access for adjustments.

The compact 1721 wafer reader incorporates uniform imaging over a wide range of working distances, and features the largest area of illumination ever available in a wafer reader. The high-resolution sensor (1024 x 768 pixels) provides a 31mm wide x 23mm high field of view, and a 31mm wide x 19mm high illumination area.

This technology offers the best solution for imaging heavily degraded marks, while tolerating mechanical wafer pre-alignment errors.



In-Sight wafer readers reliably read a wide array of marks, including the SEMI M1.15 300mm wafer mark shown above.

Codes, Fonts, and Specifications Supported by In-Sight 1721 Wafer Reader

Please contact Cognex for additional code support

2D Matrix		OCR		Bar Code	
Codes	SEMI Specifications	Fonts	SEMI Specifications	Codes	SEMI Specifications
2D Data Matrix™ (ECC 200)	T7, M1.15	SEMI IBM Triple	M12, M13, M1.15	BC 412 IBM 412	T1-95

Compact Package ... Designed Specifically for Wafer Fab Equipment

The slim design of the In-Sight 1721 wafer reader becomes an important attribute when considering the limited space available in most wafer fab process equipment. The In-Sight 1721 can be mounted vertically or horizontally, and the anodized finish is compatible with demanding cleanroom environments. Applications requiring mounting flexibility will find the 1721 ideal, since illumination and image magnification are independent of the working distance.

The In-Sight 1721 wafer reader utilizes the same mounting configuration as the earlier In-Sight 1701 wafer reader, as well as vertical LKx5 wafer readers. This allows the 1721 to be easily mounted into the most common probers, sorters, and other process equipment... without having to redesign any bracketry.

The In-Sight 1721 is also designed for easy retrofitting into existing equipment. Your Cognex sales engineer can provide additional information.



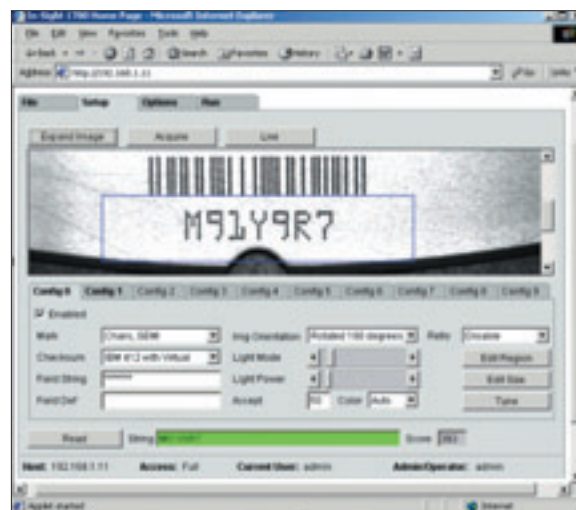
Features that Ease Integration

- Compact, slim design fits into limited space
- Mounts vertically or horizontally, for integration flexibility
- Anodized finish allows use in cleanroom environments
- Provides mounting holes for In-Sight 1701 wafer readers, as well as LKx5 readers

Fast, Easy Setup and Modification

Browser-based user interface

Fast, simple setup and modification is provided by a wafer ID-specific graphical user interface. This interface is viewed using a web browser, thereby supporting many operating systems and hardware platforms (unlike other wafer reading systems, a PC is not required for runtime use). This same interface allows remote monitoring of the reader, without having to enter the cleanroom. Multi-user access enables several users to simultaneously view the read status, recent results, and image display, without special viewing software.



The 1721 browser is designed specifically for simple wafer ID setup.

In-Sight 1721 Wafer Reader

Image tuning

Configuring the In-Sight 1721 wafer reader is simple through the use of automatic illumination tuning. When AutoTune is activated, advanced Cognex algorithms test a range of bright and dark field light combinations and optimize system parameters for the particular wafer type and process effects.

The reading algorithms also determine the optimal image processing for the wafer, eliminating the need for setup by skilled operators. And, because the In-Sight 1721 reader provides consistent images across all working distances, these optimized configurations can be shared between 1721 readers installed on other process equipment. This simplifies setup and allows the use of standard recipes for consistent performance.

A Network Interface ... for Information at Every Step

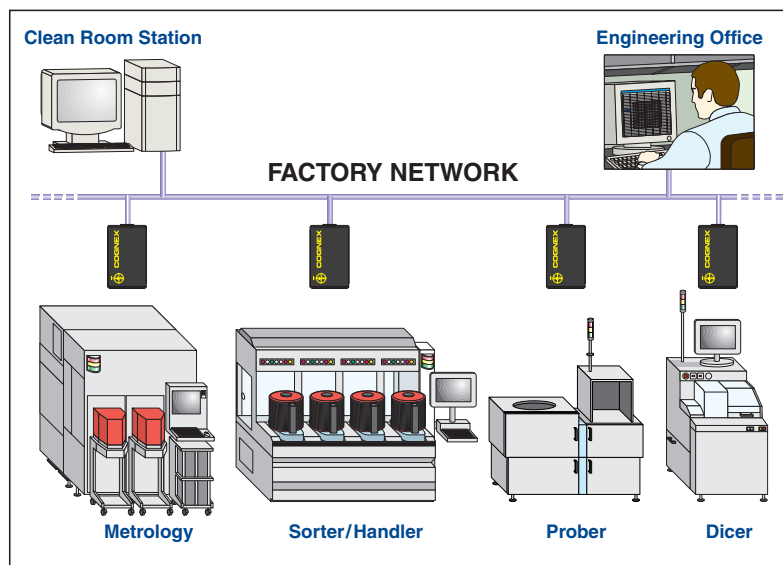
Ethernet communication is incorporated in the 1721, enabling a modular, expandable network of readers within a wafer fab. Remote setup, data access, and process monitoring are all possible from anywhere on the network. Additionally, networking makes linking real-time ID information with yield management and work-in-process



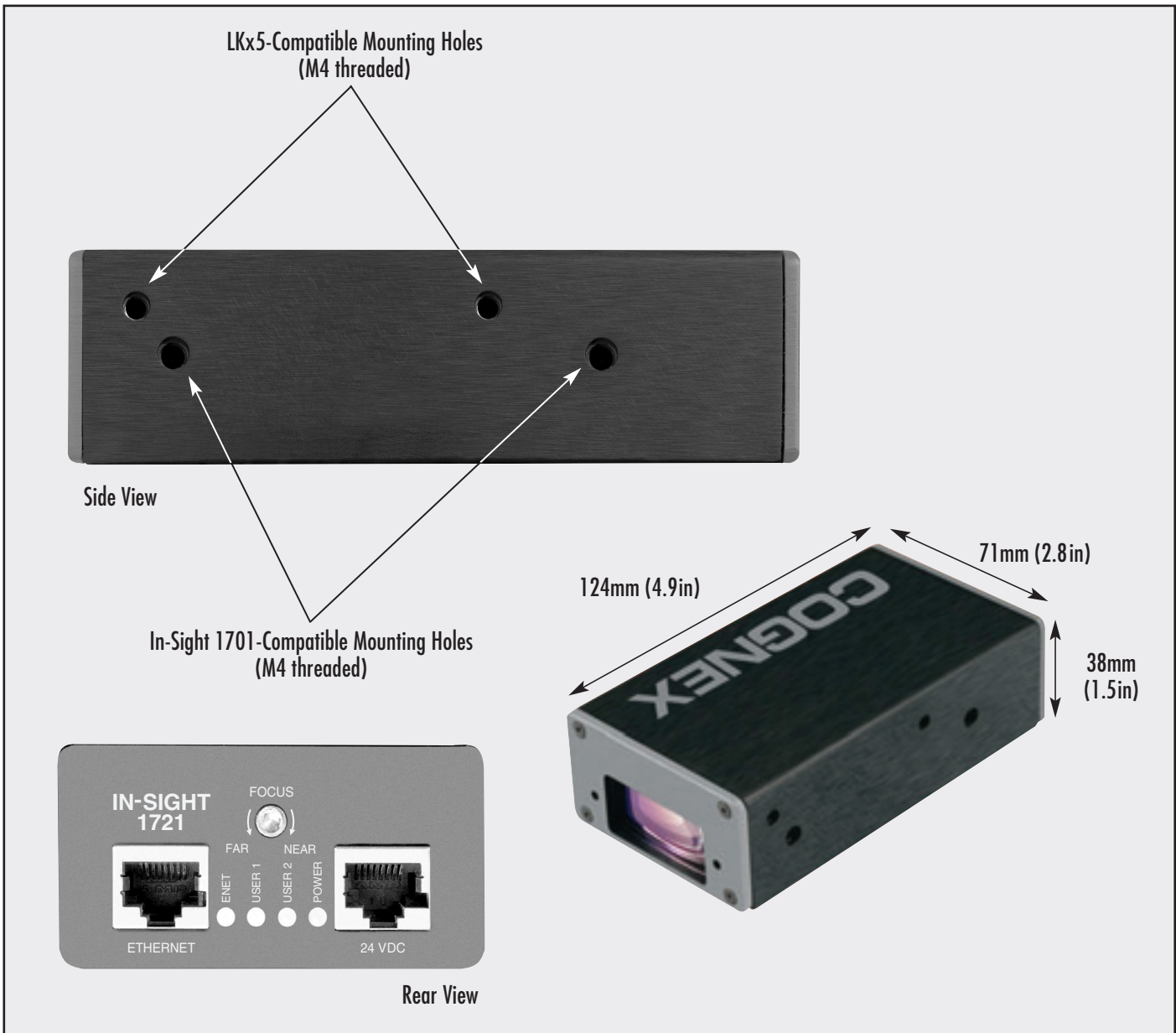
Automated parameter setup minimizes trial and error.

control software easier... enabling higher yields and better wafer tracking. All locations can share information, monitor ID code reading, and diagnose systems remotely. The 1721 also provides RS-232 serial communications to accommodate manufacturing equipment without Ethernet support.

WAFER ID IN A NETWORKED ENVIRONMENT



Dimensions, Mounting, and Connections



The In-Sight 1721 Wafer Reader Offers:

- ✓ Compact package
- ✓ Patented image formation system
- ✓ Digital camera
- ✓ Adjustable working distance
- ✓ Easy integration
- ✓ Operation without a knowledge of machine vision
- ✓ Reliable reading of low-resolution marks
- ✓ Multiple mounting configurations
- ✓ Low power consumption
- ✓ Standard Ethernet support
- ✓ Familiar browser interface

Specifications

Configurations		
	Vertical mount with optional horizontal mirror mount	
	Up to 80mm working distance (adjustable)	
	Adjustable, factory-set at 50mm	
Firmware		
	In-Sight version 2.40 and later	
Reading Capability		
	Supported wafer marks	SEMI standards
OCR	SEMI font	M12, M13, M1.15
	IBM font	N/A
	Triple font	N/A
2D	Data Matrix™ (ECC 200, 8 x 32)	T7 and M1.15
	Bar Code	
	BC 412	T1-95
	IBM 412	N/A
Memory		
Job/program	16MB non-volatile flash memory; Unlimited storage via remote network device	
Image/processing	32MB SDRAM	
Image		
Sensor	1/3-inch CCD (5.80 x 4.92mm, 6mm diagonal)	
	1024 x 768 pixel display (786,432 sq. pixels)	
	Electronic shutter speed: 64 μ s to 33 ms; up to 18 frames per second	
Acquisition	Rapid reset, progressive scan (supports partial scan), full-frame integration	
	256 grey levels (8 bits/sec)	
	Gain control by software	
Lighting/Optics		
Illumination area	31mm (W) x 19mm (H)	
Working distance	Adjustable, factory-set at 50mm	
Depth of focus	\pm 3mm	
	Red LEDs, 626 nm wavelength, with bright field and dark field modes	
	Variable intensity controlled through software	
I/O		
Trigger	1 opto-isolated, acquisition trigger input	
	Remote software commands via Ethernet and RS-232	

I/O (cont.)	
Discrete inputs	None built-in
	8 inputs available using optional I/O expansion module Unlimited inputs using optional Ethernet I/O Module
Discrete outputs	None built-in
	8 outputs using optional I/O expansion module Unlimited outputs using optional Ethernet I/O Module
Voltage	ON 20 to 30V (24V nominal)
	OFF 0 to 3V (12V nominal threshold)
Current	ON 0.9 to 1.3mA
	OFF <150mA
	Resistance <22,000 Ohms
	For higher current add external resistor (for example, 2.2k Ω , 0.5W for 12mA) across inputs
Delay	250 μ Sec latency between leading edge of trigger and start of acquisition. Input pulse should be minimum of 1 ms wide.
Status LEDs	Network, Power, User 1, User 2
Communications	
Network	1 Ethernet port, 10/100 BaseT, TCP/IP protocol. Supports DHCP (factory default) or static IP address.
Serial	1 RS-232C port (1200 to 115,200 baud rates)
Protocols	In-Sight, Native Mode and Electroglas
Power	
	24 \pm 10% VDC; 100mA (illumination off) to 175mA (illumination on)
Mechanical	
Material	Black anodized aluminum extrusion, with nickel-plated black end caps
Mounting	M4 threaded holes, 4 each side
Weight	399.8 g (14.1 oz)
Environmental	
Operating temperature	10°C to 45°C (50°F to 113°F)
Operating humidity	10 to 90%, non-condensing
Storage temperature	-10°C to 65°C (14°F to 149°F)
Storage humidity	10 to 90%, non-condensing
Certifications	
	CE, CUL

COGNEX

Vision for Industry®

Corporate Headquarters
Cognex Corporation
One Vision Drive
Natick
MA 01760-2059
USA
Tel: (508) 650-3000
Fax: (508) 650-3344
www.cognex.com

United States www.cognex.com

Eastern Region (508) 652-3880
Natick, Massachusetts

Southern Region (615) 844-6158
Nashville, Tennessee

Central Region (248) 668-5100
Detroit, Michigan

Midwest Region (630) 649-6300
Chicago, Illinois

Western Region (650) 969-4812
Mountain View, California

Primary Sales Offices

Europe www.cognex.net

France +33 1 4777 1550
Germany +49 721 6639 0
Ireland +353 1 825 4420
Italy +39 02 6747 1200
Netherlands +31 402 668 565
Sweden +46 21 14 55 88
Switzerland +41 71 313 06 05
United Kingdom +44 1908 206 000

Canada www.cognex.com
(905) 634-2726

Japan www.cognex.co.jp
+81 3 5977 5400

Southeast Asia www.cognex.net

China +86 21 6407 5835
Korea +82 2 539 9047
Singapore +65 6325 5700
Taiwan +886 3 578 0060