Electronics and Semiconductor Industry Solutions



more sensors, more solutions



Front End



Soldering Check

Prevent Staff from Bypassing Safety Functions

Courtesy of Steven Engineering, Inc - (800) 258-9200 - sales@steveneng.com - www.stevenengineering.com

Back End

Test

Distribution Center

Communicate Status

page 7

- Status Indication of FOUP Process
- Wafer Deposition Status Indication

Monitor Equipment pages 10-11

- Equipment, Motors, and Machine Temperature and
- Vibration Monitoring
- Chip Shooter Temperature and Humidity Monitoring





Increase Safety page 8 - Battery Foil Slicer Safety

Sensor Solutions



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SELECT -

TEACH ME

BARBAR

Leading Edge Cassette Detection

Challenge

- Q2X reads the front edge of the cassette to make sure it is placed properly for barcode reading and loading
- Provides reliable leading edge detection

Key Features

- Small high-visibility red LED or Class 1 laser emitter for easy alignment
- Industry standard mounting
- Many connection types and output configurations available
- Crosstalk immunity algorithm allows two sensors to be used in close proximity
- Wafer Mapping and Detection

Challenge

- Jigs with Q4Xs installed at the same height move up and down to count wafers, mapping them and ensuring that they are in the correct position
- The Q4X can see the tilted wafer when it is moving up and down
- If the wafer mapping is found tilted, the machine sounds an alarm

Key Features

- Sensing range from 25 mm to 610 mm • Discrete, analog, clear object, IO-Link and
- high resolution models available • IP69K rated with FDA-grade stainless steel
- Rugged design resists mechanical impact, over tightening and extreme vibration

Featured Solution

Featured Solution

Other Solutions • Q5X Series High Power,

Key Benefits

of spaces

Mid-Range Laser Measurement Sensor

small components

detection range

• Q2X Series Miniature Sensor

• Miniature sensor for installation in the smallest

· Precise and reliable position detection of

Exceptional optical performance with long

• Q4X Series Laser Distance Senso

Other Solutions

• Q5X Series High Power, Mid-Range Laser Measurement Sensor

Key Benefits

- Superior performance and capable of detecting sub-millimeter changes in distance
- Clear distance readout from angled four-digit displav
- Easy setup with responsive buttons
- Dual teach mode (intensity + distance) is ideal for error-proofing applications



- · Detect missing, tilted, and multiple IC chips in a nest
- Small, low-profile target
- · High-speed inspections

Key Features

Challenge

- Precise 0.002 mm 0.004 mm resolution and $\pm 0.02 - \pm 0.07$ mm linearity
- · Best-in-class thermal and mechanical stability • Fast 0.5 ms response speed and 0.25 ms sampling rate
- Optional Remote Sensor Display (RSD)

- **Other Solutions**

- failures
- environments



Sensing in a High-Speed Chip Shooter



· Available in an anti-glare model to reliably detect reflective targets







- Challenge and equipment is vital

Key Features

- Small, precise spot

temperature environments

Pouch Color Detection

Challenge

- The wafer cannot be corrected if it is loaded upside down into the FOUP, causing issues down the line

Key Features

• Reliable color detection across the entire range of the sensor







• Q4X Series Laser Distance Sensor

Key Benefits

- Ensures parts meet tight tolerances with fewer
- Achieves high levels of accuracy in challenging
- Reliable performance in high-speed application
- Simplifies setup and monitoring of sensors















Wafer Center Detection

- Preventing damage to the high-priced wafers
- High level of precision required
- Space-constrained deployment area

- Cross talk avoidance algorithm
- Very small, very flexible fiber optic sensors
- PLIS-1 fiber optics are suited for high

Featured Solution

• DF-G2 Series High Speed Amplifier

Other Solutions

• DF-G1 Series General Purpose Amplifier

Key Benefits

- Precise leading edge detection ensures proper placement of wafer is on the robotic arm's end
- Multiple amplifiers can operate in close proximity to each other
- Amplifiers can be installed in a convenient location
- Opposed mode PLIS-1 fiber optics have a very tight beam pattern, allowing for a precise measurement of wafer positioning
- QCM50 sensor reads the color of the top of the raw silicon wafer to determine if the wafer is correctly placed before being loaded into the cassette (FOUP) with other wafers

Featured Solution

• QCM50 High Performance Color Sensor



Key Benefits

- Reliable detection even in extremely challenging color- and contrast-based applications
- Up to 12 colors can be detected with one sensor, which saves inventory costs and enables faster changeover



5

Lighting Solutions



Amber Illumination for Photosensitive Materials

Challenge

- White light negatively affects photosensitive materials during the photolithography processes
- Yellow and amber tinted light can also affect photosensitive materials if the color is achieved with phosphor-converted LEDs

Key Features

- Composed of non-phosphor converted LEDs (AllnGaP)
- LEDs with a spectral output above 560 nm
- Blue wavelength content is less than 0.35%
- Slim, low-profile housing
- · Versatile mounting options
- Process Tool Illumination

Challenge

- Light fixtures must not disrupt the laminar flow of air through the system
- fixture placement options
- impact on system processes

Key Features

- Space-saving, aerodynamic design
- polycarbonate shell
- IEC IP66, IP67 and IP69K rated
- protect from scarring and corrosion

Dock Door Illumination

Challenge

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- Bright, uniform LED light provides illumination for operators
- Durable construction improves reliability in harsh environments

Key Features

- Includes 0–10 V dimming for intensity control and customization
- window
- IEC IP20 rated
- mounting options or accessory brackets
- **Key Benefits** • Increase worker productivity and ergonomics with bright, high-quality,

Featured Solution

• WLB72 LED Strip Light

- uniform light
 - operation and a low total cost of ownership
 - · Diffuse window reduces glare and hotspots, which can cause eye strain

Strip Light

Featured Solution

• WLS15 Series Amber-Colored Low Profile, Low Power LED

Key Benefits

- Dual color capability provides additional versatility in photosensitive applications • Amber and daylight white LEDs enable semiconductor manufacturers to switch between colors as needed
- Clean room can be illuminated with white light for greater visibility during maintenance and cleaning



Key Benefits

- Provide brilliant, even illumination in challenging environments and compact spaces
- The cylindrical shape of the light fixtures will not disrupt the laminar flow of air
- Cost-effective LED light strips will provide vivid, maintenance-free illumination throughout their
- 50,000 hour or more lifespan



Status Indication of FOUP Process

Challenge

- The progress of multiple FOUPs in a single wafer deposition machine must be closely monitored
- Eye strain caused by working near bright lights can result in worker fatigue, increase errors, and decrease productivity
- TLF100 tower lights provide at-a-glance status indication with comfortable light output

Key Features

- Superior indication, advanced animations, and an audible option
- 14 selectable audible tones and audible intensity control
- IO-Link gives access to advanced animations which provide dynamic responses to changing machine conditions
- IP65 and IP69K-rated

- Challenge
- closely monitored

Key Features

- - IP65 and IK07-rated
- · Does not require a controller
- Comes fully assembled, enabling rapid deployment

- Durable metal housing and shatter-resistant
- Fast installation with multiple integrated

Energy-efficient LED lights

- provide years of maintenance-free

- Fully encased in a shatterproof
- Polycarbonate brackets are available to
- Broad range of illumination color options

· Spatial constraints can severely limit light

• Certain colors of light can have a negative

• Lights are exposed to harsh chemicals



Featured Solution

• TLF100 Pro Flush Mount Tower Light (Available in black or cool gray housing)



Key Benefits

- Illuminated LED segments provide easy-to-see operator guidance and indication of equipment status
- Flush mounting allows for easy integration to machines and equipment
- · Rugged, versatile, and easy-to-install

Wafer Deposition Status Indication

- To optimize efficiency and output, FOUPs in single wafer deposition machine must be
- Prolonged exposure to bright light from tower lights can cause eye strain, leading to physical and mental fatigue

- Slim 30 mm cylindrical body
- Banner's most cost-effective tower light

Featured Solution

• TL30 LED Tower Light



Key Benefits

- Easy-to-see status indication improves efficiency and increases output
- Level of light output is comfortable to the human eye, preventing discomfort and eye strain
- LED lights ensure long-term, maintenance-free operation



Safety Solutions

Vision and Barcode Solutions



Battery Foil Slicer Safety

Challenge

- Monitor guard doors and prevent staff from bypassing safety functions
- Safety devices on a semiautomatic tabletop assembly station must be monitored to ensure that they perform reliably and meet required safety standards
- An XS26-ISDd Expandable Safety Controller was able to replace the functionality of three safety relay modules with one cost-effective device offering intuitive operation and advanced capabilities

Key Features

- Program in minutes with intuitive, easy-to-use configuration software
- Up to eight expansion I/O modules can be added as automation requirements grow or change
- Innovative live display feature and diagnostics allow for active monitoring of I/O on a PC and assist in troubleshooting and commissioning
- Ethernet-enabled models can be configured for up to 256 virtual status outputs

Key Features

- 100 mm to 4 m sensing range, with defined areas of 270 mm, 410 mm, 550 mm, or 690 mm
- Low-profile, compact package for smaller production machines
- Highly immune to EMI, RFI, ambient light, weld flash, and strobe light

Key Features

- Easy installation and hookup with no assembly, individual wiring or additional enclosure required
- · Base will flash red when actuated and indicate armed status with either green, vellow, or no illumination
- Rugged design rated to IP65 for use in harsh environments; IP69 cover available

Featured Solution

XS26-ISDd Expandable Safety Controller

Other Solutions

SC10 Safety Controller

Key Benefits

- In-Series Diagnostics (ISD) provides detailed status and performance data from each connected safety device that can be accessed with an HMI or similar device
- Connect to up to 256 ISD devices; expandable up to 394 total safety devices and 68 safety outputs
- Easy to configure with free PC software

Featured Solution

- EZ-SCREEN LP Safety Light Curtain
- **Other Solutions**
- SLC4 Safety Light Curtain

Featured Solution

Emergency Stop Button







assembly

Challenge

environments

QR Code Reader

Challenge

- ABR7000 is needed to read the QR code ID of the FOUP to track its progress through the manufacturing process
- The scanner syncs with the machine to ensure the proper process is taking place

Key Features

- Two compact form factors rated up to IP67 • Resolutions up to 2MP and multiple lighting configurations and lens focal lengths, including autofocus, to fit any application
- Configure over Industrial Ethernet, Serial and USB to simplify device integration and enable lloT data collection

Challenge

- pocket tape
- Frequent product changeover

Key Features

- integrated touchscreen
- - Full runtime editing capability





Soldering Check

- Electronic production and assembly operations often use integrated circuits that include BGAs (ball grid arrays)
- BGAs have solder balls that form the electrical bridge between the package and board
- It is critical that all solder balls in the array exist and that there is no foreign matter that interferes with the circuitry

- · Available with a high resolution 5MP imager • Full runtime editing capability
- Robust metal housing with optional lens covers to achieve IP67 rating for use in harsh
- EtherNet/IP, Modbus/TCP, PROFINET, and Serial RS-232 communication protocols

• Reads a full library of 1D and 2D barcodes

Featured Solution

• VE Series Smart Camera

Other Solutions

iVu Series Image Senso



Key Benefits

- Detects very small details to verify that all components are correctly placed and positioned
- Runtime editing capability reduces costly downtime
- · Software emulator allows for offline building and troubleshooting of applications
- Six optically isolated I/O and the ability to power and control external lighting

Featured Solution

 ABR7000 Series Barcode Reader



Key Benefits

- · Superior decoding capability to solve the most challenging track and trace applications
- Configures in minutes using on-board push buttons or a PC
- Web interface for monitoring, configuring, and reviewing statistics remotely on any network

Integrated Circuit (IC) Chip Orientation

- · Confirm correct orientation of IC chips on
- Space-constrained deployment area

- All-in-one solution with camera, controller, lens, and light included in one compact package
- Setup and manage inspections using Vision Manager PC software, remote touchscreen, or
- EtherNet/IP[™], Modbus/TCP, PROFINET[®], PCCC and Serial RS-232 communication

Featured Solution

 iVu Series Image Sensor with Integrated Touch Screen and Light



Other Solutions • VE Series Smart Camera

Key Benefits

- Simplified installation without the expense of purchasing additional components
- Setup, manage, and monitor inspections on the device or from a convenient location
- Seamless integration with existing equipment and lloT data collection
- Change inspection parameters while inspections are in progress



Wireless Solutions



Chip Shooter Temperature and Humidity Monitoring

Challenge

- Monitor temperature and humidity levels in multiple locations throughout a facility
- Maintain consistent temperature and humidity levels to suppress electrostatic discharge (ESD)
- Automate the collection of temperature and humidity information
- Minimize downtime during installation

Key Features

- Converts Modbus RTU to Modbus TCP/IP or Ethernet I/P
- Compact 70 mm size
- Four PNP outputs (100 mA max at 30 V DC)
- Customizable email and text alerts
- Interactive programmable user interface with LCD and LED indicators

Key Features

- Provides high accuracy temperature and humidity measurements
- Achieves humidity accuracy of ±2% relative humidity
- Achieves temperature accuracy of ±0.3 °C
- Houses the sensor element in a robust stainless steel case
- Includes a red/green LED that can be used to provide local visual indication of change in environmental conditions

Featured Solution

DXM700 Industrial Wireless Controller



Key Benefits

- Real-time monitoring ensures consistent temperature and humidity levels
- Quick, easy device setup and deployment
- Eliminates the hassle and expense of running communication cable
- · Monitors environmental conditions in hard-to-access locations

Featured Solution

• Q45 Temperature and Humidity Node





Equipment, Motors, and Machine Temperature and Vibration Monitoring

Challenge

- Monitoring changes in machine performance allows for corrective action
 to be taken before larger issues arise
- QM30 sensors send temperature and vibration performance data of the motors to DXMR90 IIoT industrial controllers
- These products can withstand high vibration, temperature changes, and work well in demanding environments

Key Features

- Converts wireless nodes to modbus RTU/TCPIP/EIP/Profinet
- User programmable LEDs for local status indication
- Connects to databases (including Banner's Cloud Data Services) over Ethernet or through a cellular enabled DXM Controller

Key Features

- Provides high accuracy vibration and temperature measurements
- Industrial grade sensor with small form factor to fit into tight locations
- Dual-axis vibration detection up to 4 kHz bandwidth
- Manufactured with a sealed aluminum housing

SNAP SIGNAL **IIoT Made Easy**

Monitor Your Factory Data in a Snap

Snap Signal is an easily deployable, complete portfolio of modular IIoT hardware and software that delivers actionable machine data from across your factory. More than just another flavor of IIoT, Snap Signal is an overlay network that can capture data signals from virtually any source. It seamlessly converts these sources to a single industry-standard protocol, then distributes the data for quick and easy consumption. Snap Signal offers you the flexibility to monitor key equipment within one area or monitor your whole facility.

Learn more at snapsignal.bannerengineering.com

Featured Solution

- DXMR90 IIoT Enabling Industrial Controller
- R45C Converter
- S15C Converter

Key Benefits

· Continuously monitor machine health, run time, and detect unexpected machine failures

Featured Solution

• QM30VT Vibration and Temperature Sensors









Banner Engineering manufactures industrial automation products that include sensors, LED lights and indicators, machine safety components, industrial wireless devices, barcode scanners, vision sensors, industrial networks and smart i/o devices, and connectivity products. These products help produce the cars we drive, the food we eat, the medicine we take, and many of the things we touch every day. Headquartered in Minneapolis since 1966, Banner is an industry leader with over 30,000 active products, operations on six continents, and a global footprint of over 5,500 employees, factory and field representatives, and application engineers. Every 3.5 seconds a Banner product is installed somewhere in the world. From adding new capabilities to our existing products or introducing brand-new lloT technology for smart manufacturing, Banner is your trusted partner for durable, dependable solutions.







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