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Dr. Steven Case - In Memoriam



We at CyberOptics are very saddened by the recent loss of our Founder and Chairman, Dr. Steve Case. Steve was a brilliant engineer, whose many inventions and technological breakthroughs not only established the foundation for CyberOptics' success, but also helped transform the surface mount electronics industry. More importantly, Steve was a wonderful friend and colleague to everyone who worked with him. Steve established a strong and capable management team, and we will do what he would want, and that is to continue aggressively pursuing the ideas and

promising opportunities he helped set in motion.

- Kitty Iverson, President/CEO

CyberOptics Corporation

Breaking Metrology News...

Announcing 450 mm WaferSense® Auto Leveling System (ALS) 2 Vertical

The 450 mm ALS2 Vertical reduces particle contamination, increases yield. It is available by special order.

The R&D group at CyberOptics Semiconductor has developed a new 450 mm leveling sensor in conjunction with industry standards to help fabs develop and qualify next-generation processing equipment. The ALS2 Vertical does this via real-time measurements of vertical and horizontal wafer supports such as ion implants and wet-station robots.

The WaferSense® ALS2 Vertical travels as a wafer would through process equipment. It is used by engineers to optimize equipment setup and reduce maintenance time. The device and companion LevelReview™ software help engineers characterize equipment inclination and conduct statistical analysis via log-file data. With LevelReview™ users can also establish uniform metrology standards for process equipment and preventative maintenance (PM) schedules.

The ALS2 Vertical is an alternative to the machinist levels, bubble levels and wired devices often used by engineers to calibrate equipment. "Eyeballing just isn't effective and without good inclination data, engineers will start seeing particulate contamination and lost yield due to misaligned equipment," said Craig C. Ramsey, Ph.D., general manager and CTO of CyberOptics Semiconductor.

CyberOptics worked with representatives of the International Sematech Manufacturing Initiative (ISMI) to develop the 450 mm ALS2 Vertical. The sensor is designed for inclusion in ISMI's 450 mm Interoperability Test Bed where industry researchers have begun studying 450 mm wafers and handling equipment. ISMI's 450 mm roadmap calls for three International SEMATECH manufacturers to build 450

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mm pilot lines capable of 22 nm processing by approx. 2012. The three manufacturers are Intel Corp., Samsung Electronics and Taiwan Semiconductor Manufacturing Co. (TSMC). 450 mm volume production could begin as early as 2014 or 2015, according to Semiconductor International.

The WaferSense ALS2 Vertical's key specifications and features include vertical accuracy of +/-0.05 degrees and vertical range of +/-50 degrees, horizontal accuracy of +/-0.03 degrees within +/-7 degrees, horizontal resolution of +/-0.002 degrees within +/-14 degrees, operating temperature of 20 to 70 degrees Celsius, wireless Bluetooth link, four hour run-time per battery charge and use with Windows 2000, XP and Vista. The ALS2 Vertical is also available in 300 mm and 200 mm form factors.

The WaferSense ALS2 Vertical package includes the leveling wafer, USB-compatible link, LevelView and LevelReview graphical software CD, charging case and suitcase. More info <http://www.cyberopticssemi.com/products/wafersense/als2vertical/>

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New Wireless 450 mm WaferSense® Auto Vibration System (AVS)

CyberOptics Semiconductor

The 450 mm AVS reduces wafer defects and improves die yield. It is available by special order.

The R&D group at CyberOptics Semiconductor has developed a new 450 mm form sensor in conjunction with industry standards. The tool is designed to help fabs develop and qualify next-generation processing equipment via real-time tracking of the acceleration and vibration experienced by wafers.

The [WaferSense® Auto Vibration System \(AVS\)](#)

(<http://www.cyberopticssemi.com/products/wafersense/avs/>) travels through process areas as a wafer does. It reports real-time acceleration data in all three axes (x, y, z) for engineers to identify vibration sources before they impact yield.

CyberOptics worked with representatives of the International Sematech Manufacturing Initiative ([ISMI](#)) (<http://ismi.sematech.org/index.htm>) to develop the 450 mm AVS. The sensor is designed for inclusion in ISMI's 450 mm Interoperability Test Bed where industry researchers have begun studying 450 mm wafers and handling equipment. [ISMI's 450 mm roadmap](#)

(<http://ismi.sematech.org/wafersize/index.htm>) calls for three International SEMATECH manufacturers -- Intel Corp., Samsung Electronics and Taiwan Semiconductor Manufacturing Co. (TSMC) -- to build 450 mm pilot lines capable of 22 nm processing by approx. 2012. Volume production may begin as early as 2014 or 2015, according to Semiconductor International.

"There's a direct relationship between yield and the speed and vibration of equipment across the fab, which is supported by the metrology data," said Craig C. Ramsey, Ph.D., general manager and CTO of CyberOptics Semiconductor. "And with level of automation at 450 fabs and shrinking tolerances, establishing controls for vibration and acceleration will be even more vital to optimizing production."

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Ramsey added that the AVS' companion software, VibeReview™ helps process engineers establish yield-based vibration standards for process equipment and technicians. The software allows engineers to identify links between vibration frequency and likely sources. With the software the user can set acceptable acceleration parameters for equipment.

Engineers use the VibeReview™ software to analyze stored log-file data. With this feature they can compare different run-times, tools and trigger values for acceleration during wafer transfer in x, y and z directions. Users establish ongoing, real-time spec limits or go, no-go values, including RMS. They can also pause and resume data recording, create log-file titles and export data to Excel and MATLAB.

WaferSense AVS' key specifications and features include range of +/- 2G, resolution of +/- 0.01G, frequency response of 0-200Hz, -3dB, operating pressure of 760 to less than 10⁻⁶ Torr, operating temperature of 20 to 70 degrees Celsius, wireless Bluetooth link, four hour run-time per battery charge and use with Windows 2000, XP and Vista. The AVS is also available in 300 mm and 200 mm for factors.

The WaferSense AVS package includes the vibration-sensing wafer, USB-compatible link, VibeView and VibeReview graphical software CD, charging case and suitcase. More info

<http://www.cyberopticssemi.com/products/wafersense/avs/>

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Announcing New WaferSense® Airborne Particle Sensor (APS)

CyberOptics Semiconductor

CyberOptics Demonstrated the New WaferSense® Airborne Particle Sensor (APS) at SEMICON West.

The wafer-processing section at this year's SEMICON West featured engineers from CyberOptics Semiconductor. They discussed the role of a newly developed particle-sensing technology to monitor airborne particles in process equipment. APS is a unique device that reports information in real-time to validate and analyze [wafer contamination](http://www.cyberopticssemi.com/products/wafersense/aps/) (<http://www.cyberopticssemi.com/products/wafersense/aps/>). The wafer-like device is designed to "lower the time and expense of process equipment particle qualification, as well as raise die yields," according to Craig C. Ramsey, Ph.D., CyberOptics Semiconductor's general manager.

The company developed the new wireless particle-sensing technology during the last year. Prototypes of the new [WaferSense® Airborne Particle Sensor \(APS\)](http://cyberopticssemi.com/products/wafersense/aps/) (<http://cyberopticssemi.com/products/wafersense/aps/>) have been demonstrated to fabs and OEMs in preparation for the launch at SEMICON West, according to Ramsey. He says the APS will be ready for purchase order fulfillment before the end of 2009.

The recently qualified APS improves die yield and compresses final wafer inspection. Ramsey observed that fabs which are unable to isolate and mitigate the source of particles in a tool before wafer processing experience reduced die yield due to wafer contamination. The APS allows users to improve die yield by validating and analyzing real-time wafer contamination.

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CyberOptics Semiconductor developed the APS to allow engineers to efficiently detect and classify particles and their exact sources. The wireless design allows the user to qualify each chamber in a process as wafers are transferred, slit valves actuate and chambers are cycled, pumped down and purged, according to Ramsey. APS is compatible with front-ends, coater/developer tracks, deposition and etch equipment.

The APS is designed to help fabs “reduce their overall cost of operation by reducing process equipment downtime, lowering monitor wafer consumption and associated equipment engineering labor,” Ramsey said. Fabs gain efficiencies from reduced surface particle metrology equipment loading. They also run more smoothly when their metrology queues remain short.

“When process engineers have real-time views of particle conditions and can address specific trouble spots -- rather than guess-and-check throughout the whole tool -- they’re far better prepared to pass particle qualifications on the very first attempt,” Ramsey said. “When a tool fails particle qualification, APS can be used to discover where in the process particles were added to monitor wafers.”

Ramsey added that the automation friendly, vacuum-compatible device doesn’t require engineers to open chambers or expose ultra-clean process areas to atmospheric gases. Testing has shown the sensor has the ability to detect 0.1 um particles. The self-contained device uses a fan to pull particle-contaminated gas through a channel as a laser illuminates the gas stream while particles scatter light on to the sensor’s photo-diode detectors.

Fab engineers validate and analyze the particle conditions in process equipment with the device’s companion software, ParticleView™ and ParticleReview™. ParticleView’s GUI displays cumulative or differential particle counts and allows users to mark log files. The marks indicate where, exactly, the device is in a process for real-time partitioning. ParticleReview’s GUI displays log-file data obtained by the APS to allow users to conduct machine-to-machine trend analysis of particle conditions. The software helps users to establish process control and conduct process improvement.

The WaferSense APS’ specifications and features include form factors of 200 and 300 mm, with 450 mm versions available by special order. The APS, like other WaferSense devices, uses a wireless Bluetooth link and is compatible with Windows 2000, XP and Vista.

The WaferSense APS package includes the particle-sensing wafer, USB-compatible link, ParticleView and ParticleReview software, charging clean box and suitcase.

The [WaferSense](http://www.cyberopticssemi.com/products/wafersense/) (<http://www.cyberopticssemi.com/products/wafersense/>) family of devices includes the Auto Vibration System (AVS), Auto Leveling System (ALS2 Vertical), Auto Teaching System (ATS) and Auto Gapping System (AGS). Each device follows the processing life of a wafer and reports real-time metrology data. More info <http://www.cyberopticssemi.com/products/wafersense/aps/>

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Reports from the Fab

Fab Establishes PM Schedules, Improves Die Yield by Monitoring Equipment Vibration in Real-Time -

See p. 6 of this PDF

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Technically Speaking

Using WaferSense Auto Teaching System (ATS) on 200 mm and 300 mm TEL CLEAN TRACK ACT and Mark Tools - See p. 8 of this PDF

Did You Know . . .

>> It's easy to test a WaferSense device through one of our distributors in the U.S.

<http://www.cyberopticssemi.com/contact/domestic/> or across the globe

<http://www.cyberopticssemi.com/contact/international/> .

Inside CyberOptics Semiconductor

>> **Vote for CyberOptics Semiconductor** for the EuroAsia IC Industry Awards. Visit

http://www.euroasiasemiconductor.com/awards_vote.php to vote for our WaferSense® AGS Auto Gapping System (AGS) for the "Subsystems & Components Enhancement Award."

>> CyberOptics Semiconductor's Production Operations Have Moved

CyberOptics Semiconductor's production operations have moved from Portland, OR to Golden Valley, MN on schedule during 2Q09. All WaferSense models are now being built, repaired and calibrated at our Golden Valley facility. Please revise your RMA "ship to" records accordingly.

Our sales and application people are positioned to support our partners and customers everywhere semiconductors are fabricated. R&D projects continue on schedule and we are excited about the innovative APS being field tests at multiple sites as you read this newsletter.

CyberOptics Corporation has no debt and significant cash. We believe the company is well positioned to supply its customers with high quality products and continue development of our innovative product lines. Our people are organized to provide prompt sales and support. Please use the shared email boxes CSsales@cyberoptics.com and CSsupport@cyberoptics.com to ensure that you get consistently fast service.

Where We'll Be Next . . .

SEMICON Taiwan

<http://www.semicontaiwan.org/SCTAIWAN.var>

Sep. 30 - Oct. 2, 2009

Taipei, Taiwan

SEMICON Europa

<http://www.semiconeuropa.org/index.htm>

Oct. 6 - 8, 2009

Dresden, Germany