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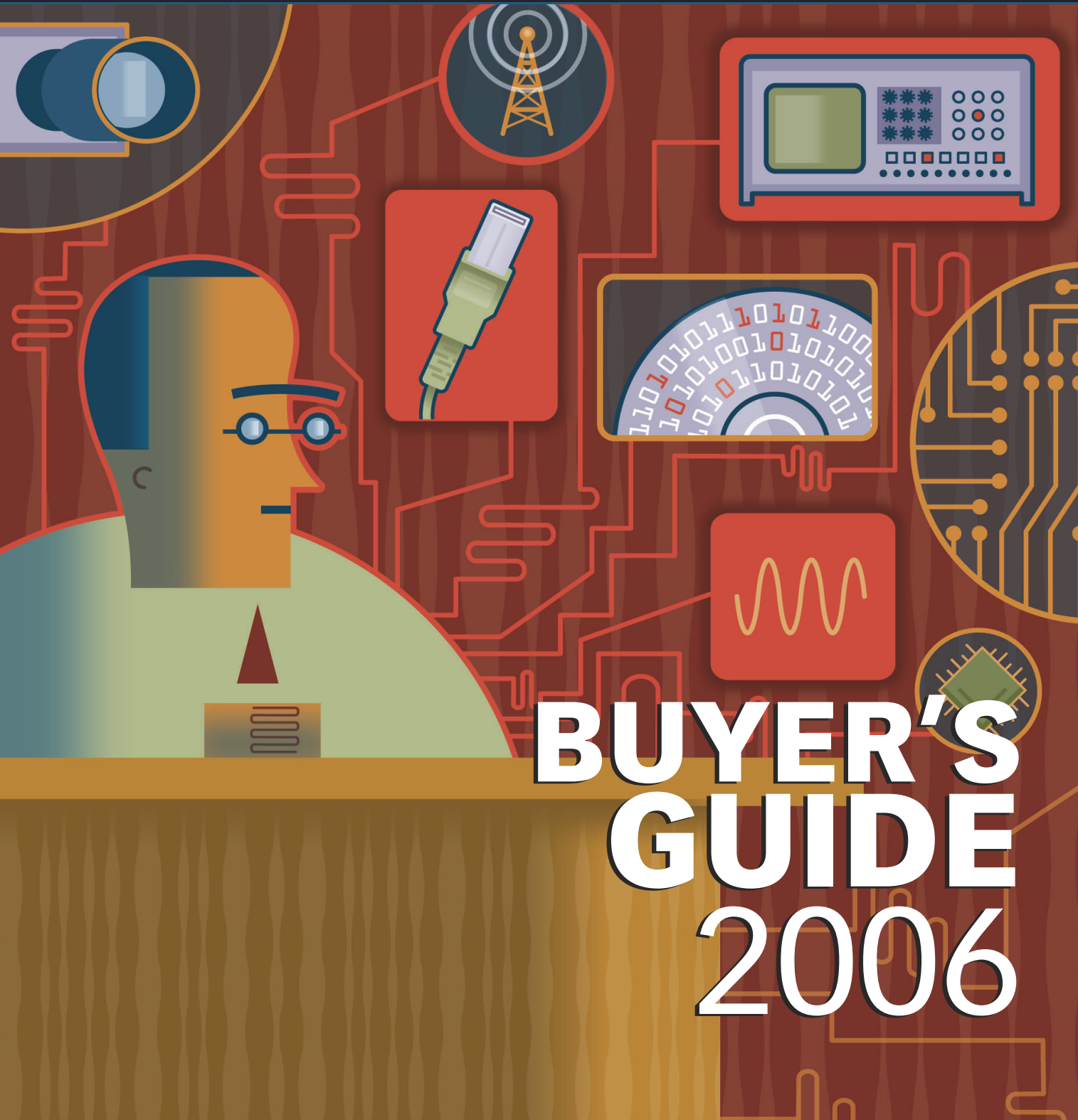
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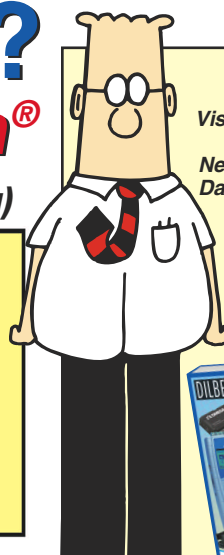
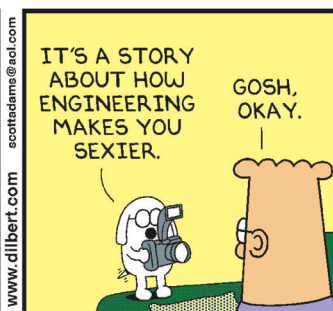
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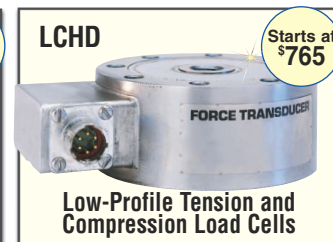
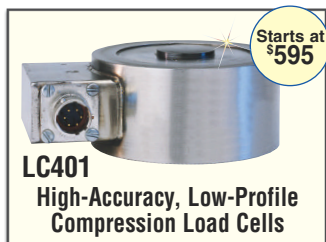
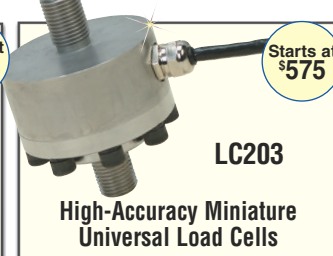
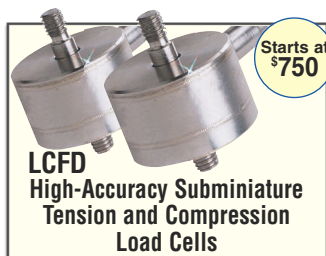
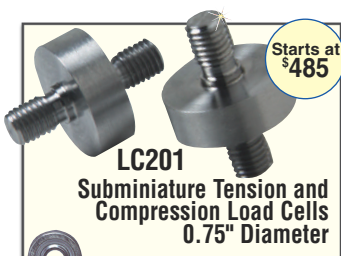
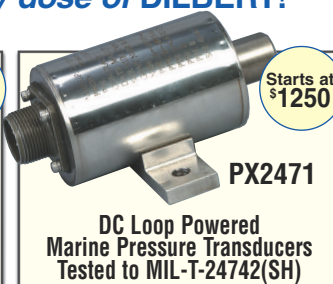
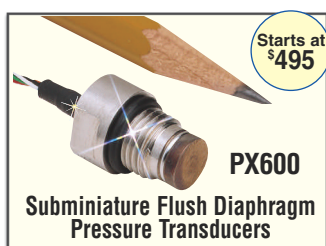
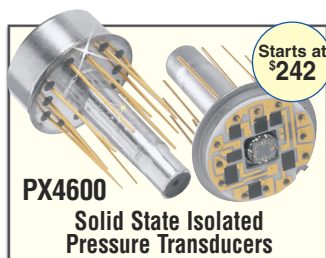
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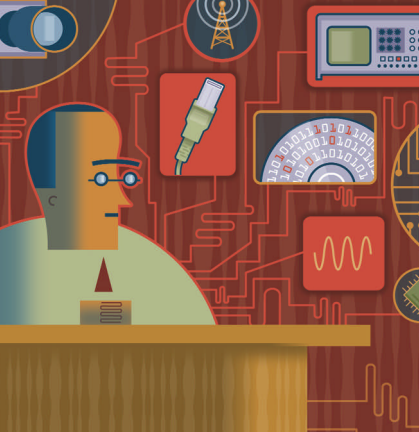
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# Test & MEASUREMENT WORLD®

JULY 2006  
VOL. 26 • NO. 6

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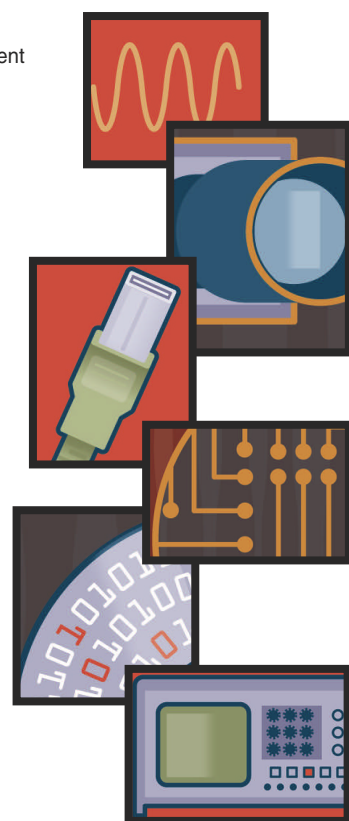
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## Test Engineer of the Year: Final call for nominations

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If you know an outstanding engineer, be sure to nominate him or her for our 4th annual "Test Engineer of the Year" award. Test engineers or design engineers with some test-and-measurement responsibilities are eligible for this award. Please submit your nominations by July 15.

We will announce the finalists in our September issue and ask readers to vote for their favorite candidate. The winner, who will be announced in our March 2007 issue, may designate an engineering education program to receive a \$30,000 grant, courtesy of program sponsors Agilent Technologies, Keithley Instruments, and National Instruments.

[www.tmworld.com/awards](http://www.tmworld.com/awards)

## Online glossary

Confused about acronyms and definitions? Consult *Test & Measurement World's* online glossary, which has been recently updated to reflect changes in communications and test terminology.

[www.tmworld.com/glossary](http://www.tmworld.com/glossary)

## > BLOG COMMENTARIES AND LINKS

### "Rowe's and Columns"

In his new blog, Senior Technical Editor Martin Rowe talks about general-purpose instrumentation, EMC, communications test, and any other topics that come along. Check out his recent posts—and add your comments:

● **Where has VB gone?**

Is anyone using Visual Basic in test applications anymore, or did VB fade away when Microsoft introduced the .NET version?

● **New or recycled?**

Like many engineers, Rowe likes to find ways to keep old products running like new—including his six-year-old cell phone and his Windows 98 computer. What about you?

### "Taking the Measure"

by Rick Nelson, Chief Editor

- The Fermi problem: Solve it and win a book
- Feature creep: The latest in shoe phones
- A modest proposal for CEOs: Offshore them
- A bogus attack on net neutrality
- Design for manufacturability: What, exactly, is it?

### "Education and Careers"

by Amy Laskowski, Editorial Intern

- What can be done to draw more women to engineering?
- American graduates fear (not)?

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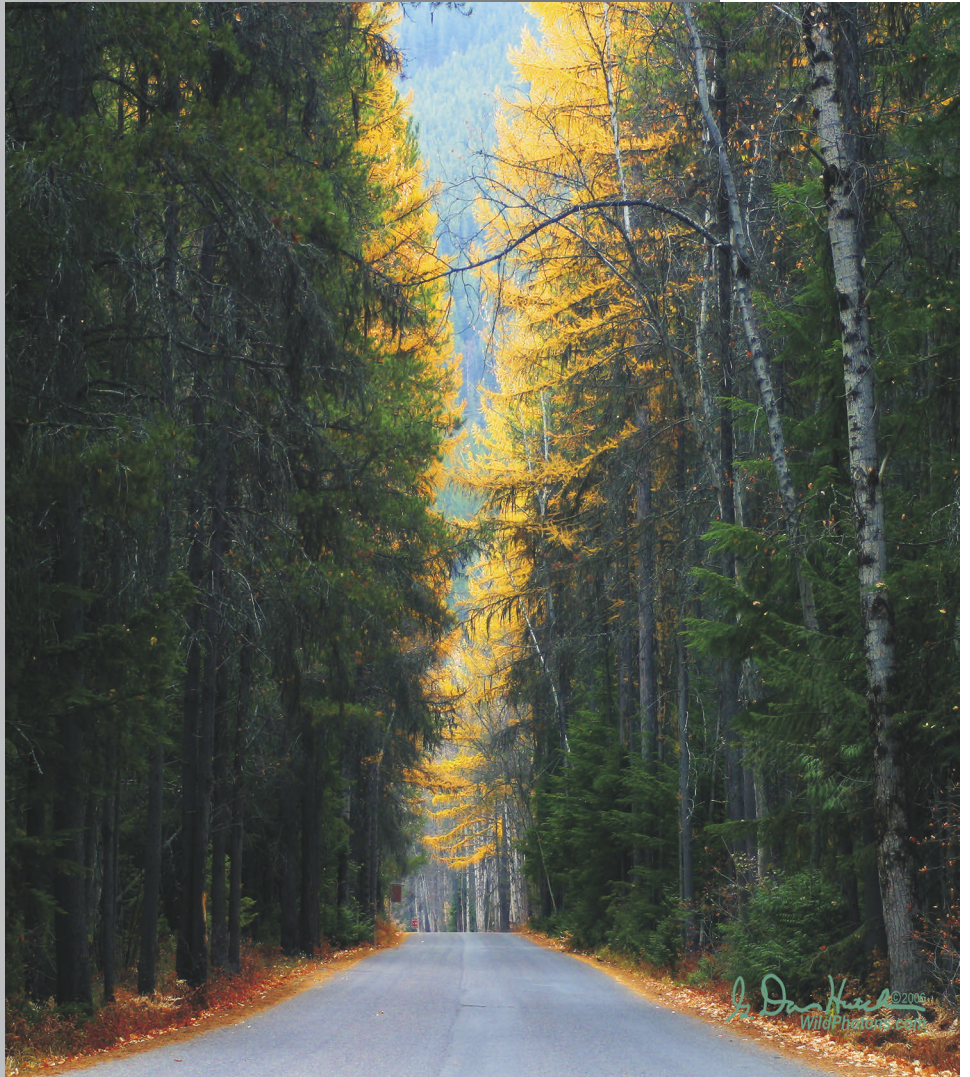
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## Buying back the future

The role of stock markets is to encourage investment in publicly held companies that can raise sufficient funds to undertake research, development, and manufacturing efforts beyond the financial means of typical private companies or individuals.

Unfortunately, this process is breaking down. *USA Today*, in "Some tech companies cut R&D budgets" (June 14, p. 1B), reports that R&D spending among high-tech firms listed on American, Nasdaq, and New York stock exchanges has fallen from 12.7% of revenue in 2001 to 10.4% in 2005. Compa-



**RICK NELSON, CHIEF EDITOR**

nies making R&D cuts include Sun Microsystems, Hewlett-Packard, and Microsoft. In addition, Bell Labs is facing cuts even beyond the ones I commented on in my July 2003 "Editor's Note" ([www.tmworld.com/2003\\_07](http://www.tmworld.com/2003_07)) due to the merger of its parent Lucent Technologies with Alcatel. The US government is not stepping in to fill the gap left by corporate cuts.

What are companies doing with the funds they might otherwise invest in R&D? In many cases, they are repurchasing their own stock, as the *Wall Street Journal* reports in "Big companies put record sums into buybacks" (June 12, p. A1).

Such buybacks can benefit shareholders in that they increase earnings per share outstanding, at least in the short term, and not coincidentally, they boost the earnings of CEOs whose compensation is tied to stock performance—although some CEOs do quite well despite poor stock performance, as columnists writing in the *New York Times* report in "The Corner Office in Bangalore" (June 9, p. 27).

Whatever their positive short-term effects, buybacks can presage a long slump. The *Journal* article notes that Intel's stock has fallen 60% since a \$4.6 billion buyback in 1999, although the company continues to pursue the strategy and repurchased \$10 billion worth of shares in 2005—that at least represents a better bargain than the 1999 purchase.

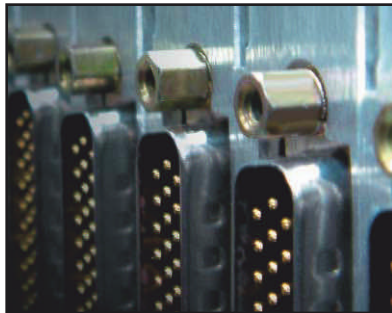
Stock buyback programs can be effective in addressing share prices that don't adequately reflect company worth. But too often, such a program is a declaration by a company that it is out of ideas, that it no longer knows how to innovate. Commenting on cuts in US R&D in the *USA Today* article, Kei Koizumi, a director of the American Association for the Advancement of Science, says, "It's not a good sign for the future innovation capacity of the US economy."

Who will make up that capacity? Sibling publication *R&D Magazine* ("The state of global R&D," September 2005), in conjunction with Battelle, reports that while R&D spending will grow 6% in the US from 2004 to 2006, over the same period it will grow 28% in China. T&MW

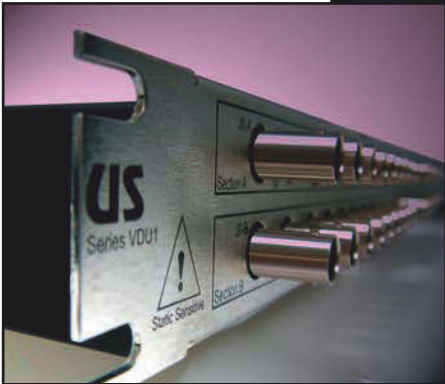
**Too often, a stock buyback program is a company's declaration that it is out of ideas.**

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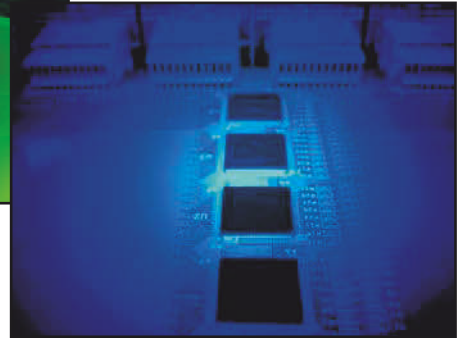
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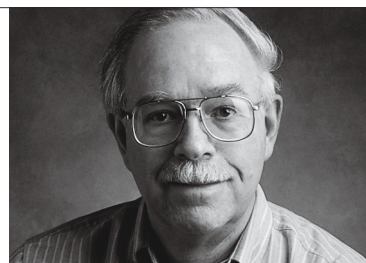
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## Our crumbling infrastructure, Part CXVII

Living on a gravel road and near the end of our utility company's power line, we've grown resigned, but not accustomed, to interruptions of our electricity supply. Aside from the occasional gray squirrel that attempts to bridge

an insulator, most failures occur when a tree or limb falls across a power line. From casual observation, I'd estimate that our utility does



not spend enough time and money trimming trees that abut its lines.

Whether you call it deferred maintenance or neglected infrastructure, chances are you'll encounter examples every day—crumbling highway pavement, faded lane marker lines, broken test probes...test probes? Ever watch a technician use a test lead—sans its probe—to check a power-supply

voltage? I have, and while the tech is still around, the company isn't.

You decide whether failure to maintain test leads and equipment can cause a company's demise, or merely hint at parsimonious management. While you're at it, walk through your work area and look for these telltale signs of infrastructure decay:

- damaged or broken test leads, probes, and connectors;
- power cables with frayed insulation and missing third-wire grounds;
- test equipment shelved due to malfunctions or missing parts;
- fingertip grunge deposits on instruments and keyboards;
- data-acquisition systems in need of operating-system backup;
- absent or out-of-date antivirus software for lab PCs;
- antistatic benchtops and floors that need recertification;
- broken chairs and workbench stools;
- empty or unlabeled bins in supply cabinets; and
- uncalibrated or out-of-calibration instruments.

You can alter or expand the list to suit your work environment, but the last point deserves amplification. Writing in *Test & Measurement World's* May 2006 issue, Martin Rowe reported that the next version of the NCSLI's Recommended Practice document would include a discussion of data-retention requirements. Corporate lawyers are advocating the destruction of calibration data and other proof-of-quality information that might have significance in product liability trials.

Those of us who work in quality assurance and measurement devote our efforts toward finding truth. According to the lawyers, defending truth costs money, and the risk of losing money trumps both truth and the value of a robust infrastructure to society. So, the next time your AC power fails, go ahead and take out your frustration over our crumbling infrastructure by swinging an axe at a tree—but not at a lawyer. And never ask a lawyer to measure high voltage with a broken test lead. T&MW

### FOR FURTHER READING

Check out Martin Rowe's article, "Here come the lawyers," to learn why calibration data makes the legal profession nervous: [www.reed-electronics.com/tmworld/article/CA6328027.html](http://www.reed-electronics.com/tmworld/article/CA6328027.html).

An official survey of power poles conducted by the Florida Public Safety Commission in May 2005 returned favorable results: [www.floridapsc.com/general/publications/powerpoleintegrity05-05.pdf](http://www.floridapsc.com/general/publications/powerpoleintegrity05-05.pdf).

Yet, one Florida utility customer recorded his experience with rotted power poles, excessive line voltage, and flawed ground returns here: [fpl-fraud.com](http://fpl-fraud.com).

Cathodic-protection systems prevent corrosion from attacking pipelines that carry hazardous liquids, but operators rely on long test leads to ensure that the system is functioning as intended. Here's why Conoco received a \$20,000 fine, in part for neglecting test leads on Hoo Hoo Road: [ops.dot.gov/regions/southwest/CONOCO\\_INC\\_420015005.htm](http://ops.dot.gov/regions/southwest/CONOCO_INC_420015005.htm).

To view a series of tutorials on power quality, see: [www.reed-electronics.com/tmworld/article/CA378936](http://www.reed-electronics.com/tmworld/article/CA378936).

For tips on surviving your next AC-power measurement session, read: [www.marcspages.co.uk/pq/4010.htm](http://www.marcspages.co.uk/pq/4010.htm).

Learn safety tips and troubleshooting techniques that may help you safely repair smaller components of your household's crumbling infrastructure: [repairfaq.ece.drexel.edu/REPAIR/F\\_appfaq2.html](http://repairfaq.ece.drexel.edu/REPAIR/F_appfaq2.html).

If you're plagued by power-line interference, this slowly loading site offers an explanation of equipment and methods you can use to track down possible sources: [www.qsl.net/n8dmt/powerline.html](http://www.qsl.net/n8dmt/powerline.html).

### A FOLLOW-UP

I received an inquiry requesting the name of the manufacturer of the microprocessor-based semiconductor analyzer kit that I mentioned in my "Here, kit, kit" column ([www.reed-electronics.com/tmworld/article/CA6292123](http://www.reed-electronics.com/tmworld/article/CA6292123)). For details, visit: [www.m3electronix.com](http://www.m3electronix.com).

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## ATE Load



- Low Cost 300W Programmable DC Electronic Load  
**Model 8500**

The model 8500 is an affordable full-featured Programmable Electronic DC Load. This is a great unit for DC Power Supply and DC-DC Converter testing and calibration.

## 5-in-ONE



- Multi-Function Generator  
**Model 4051**

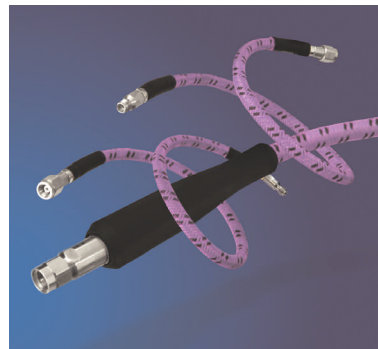
Model 4051 is a programmable multi-function generator that is extremely versatile and affordable. Many features includes function generator, logic probe, power supply, voltmeter & Frequency counter.

## RF enables "mobile living room"

At a press event held June 12 in conjunction with the IEEE MTT-S International Microwave Symposium, participants touted RF products that will point the way to the "mobile living room." Vendors of test and test-related products included Cascade Microtech, which highlighted its M150 DC-to-220-GHz measurement platform, and W.L. Gore, which exhibited its Phaseflex 110-GHz test assemblies (pictured).

Speaker Jim Cable, Peregrine CEO, used the "mobile living room" phrase in his address concluding the event. The mobile living room, Cable said, is enabled by portable devices that enable you to carry with you all the comforts of home: your phone, camera, television, and games, for example. Enabling such mobile devices, he contended, will be products such as his firm's CMOS SOCs. Peregrine used the event to debut RoHS-compliant RF switches.

Another speaker, Jim Norling, marketing director at Freescale, described how his firm will use high-voltage RF power technology combined with low-cost over-molded plastic packaging to expand into industrial, scientific, and medical (ISM) applications. Norling noted that the expansion was spawned by the development of Freescale's 50-V VHV6 RF LDMOS technology (very high-voltage sixth-generation RF laterally diffused metal oxide semiconductor), a 50-V enhancement to Freescale's 28-V LDMOS technology.



## ATI employs Mentor's Modular TestKompress

Mentor Graphics has announced that ATI Technologies has implemented Mentor's TestKompress embedded deterministic test (EDT) tool. ATI used Modular TestKompress, a new block-level implementation of Mentor's EDT methodology that improves compression performance and routing on large, complex devices.

"Working closely with Mentor Graphics, we were able to use the TestKompress product to thoroughly test our new chip at no additional test cost," said Michael Do, design for test (DFT) architect at ATI Technologies.

The Modular TestKompress tool implements an embedded compression scheme at the block level that reduces the size of the test sets required for complex designs, enabling comprehensive test coverage without sacrificing test throughput. Modular TestKompress provides designers with a block-based flow whereby each block, along with associated compression logic, can be implemented and verified independently. The tool simplifies the design flow for large block-based designs and reduces the routing area needed to connect the compression hardware.

The TestKompress tool fits easily into most scan-based design flows and

offers the same at-speed test capabilities as Mentor Graphics' FastScan automatic test pattern generation (ATPG) tool. The TestKompress tool's patented compression capabilities reduce the

amount of test data required for the detection of the speed-related defects that are more prevalent at nanometer process technologies. [www.mentor.com/products/dft](http://www.mentor.com/products/dft).

## Optical tester shrinks

JDSU's T-BERD 6000 performs the same optical measurements as larger units but in a more portable size. The T-BERD 6000 can perform the measurements needed to test optical access networks, metro networks, and core transport networks.

The T-BERD 6000 has built-in measurement functions that include a fault locator, power meter, and optical loss test set. You can add functions from a set of more than 40 measurement modules, including a spectrum analyzer, a polarization-mode dispersion analyzer, a chromatic-dispersion meter, and a very-long-range (VLR) optical time-domain reflectometer (OTDR).

An ultra-long-haul module has a 50-dB dynamic range at 1550 nm. It can store up to 128,000 measurements with an 0.1-s sweep. An optional optical-talkset function lets you communicate along a fiber. And an automatic bidirectional analysis function cuts test time by 50% for OTDR, insertion loss (IL), and optical return loss (ORL) measurements, which otherwise use single-directional testing.

The instrument shows results on an 8.4-in. display (touch screen optional). The main unit can store test results and transfer them to a PC over USB and Ethernet links. PC software lets you analyze and store data offline. The T-BERD is powered by a lithium-ion battery.

Base price: \$2990. JDSU, [www.jdsu.com](http://www.jdsu.com).



Editors' CHOICE



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## NIST works to reduce cell-phone noise

Researchers at the National Institute of Standards and Technology (NIST) along with RF Micro Devices and IBM Semiconductor R&D Center have developed a new method for measuring very faint thermal noise in electronic circuits. The researchers say the technique may help improve the signal range, data rate, and battery life of cell phones and other wireless communications devices.

The researchers have been focusing on inexpensive CMOS transistors, which are used in ICs for wireless devices. The noise levels for CMOS transistors have typically been too low to measure accurately in much of their signal frequency range (1–10 GHz). The technique measures the noise in CMOS devices before they are cut from silicon wafers and packaged. NIST says this may be the first method for on-wafer noise measurements directly linked to national standards for thermal noise power.

The team has also made use of “reverse” noise measurements—focusing on noise emitted from the input of the transistor when incoming signals are re-

## CALENDAR

**EMC Symposium**, August 14–18, Portland, OR. Sponsored by IEEE, EMC Society. [www.emc2006.org](http://www.emc2006.org).

**EOS/ESD Symposium**, September 10–15, Tucson, AZ. Sponsored by ESD Association. [www.esda.org/symposia.html](http://www.esda.org/symposia.html).

**Autotestcon**, September 18–21, Anaheim, CA. Sponsored by IEEE. [www.autotestcon.com](http://www.autotestcon.com).

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flected and scattered—as a tool for checking noise parameters. They say this method can improve precision, particularly of the optimal impedance properties needed in transistors to minimize noise, and that reverse noise measurements also may help improve modeling of CMOS transistors. [www.nist.gov](http://www.nist.gov).

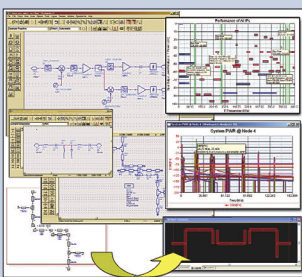
## RF tools get design links

The Advanced Design System (ADS) 2006A high-frequency EDA software features design links from Agilent's Genesys software, which the company acquired with its purchase of Eagleware, to speed the generation of complex, high-frequency system and circuit designs. ADS 2006A also includes system-simulation enhancements that allow wireless designers to move seamlessly among RFIC/package/board design, system design, and test equipment.

The new capabilities in ADS 2006A include WhatIF, an intermediate frequency (IF) planning tool for RF system architects; Spectrasys, a continuous-spectrum RF system simulator with root-cause analysis; and Synthesis, eight design assistants that implement manufacturable circuit-level designs, such as precise image-reject filters for RF boards.

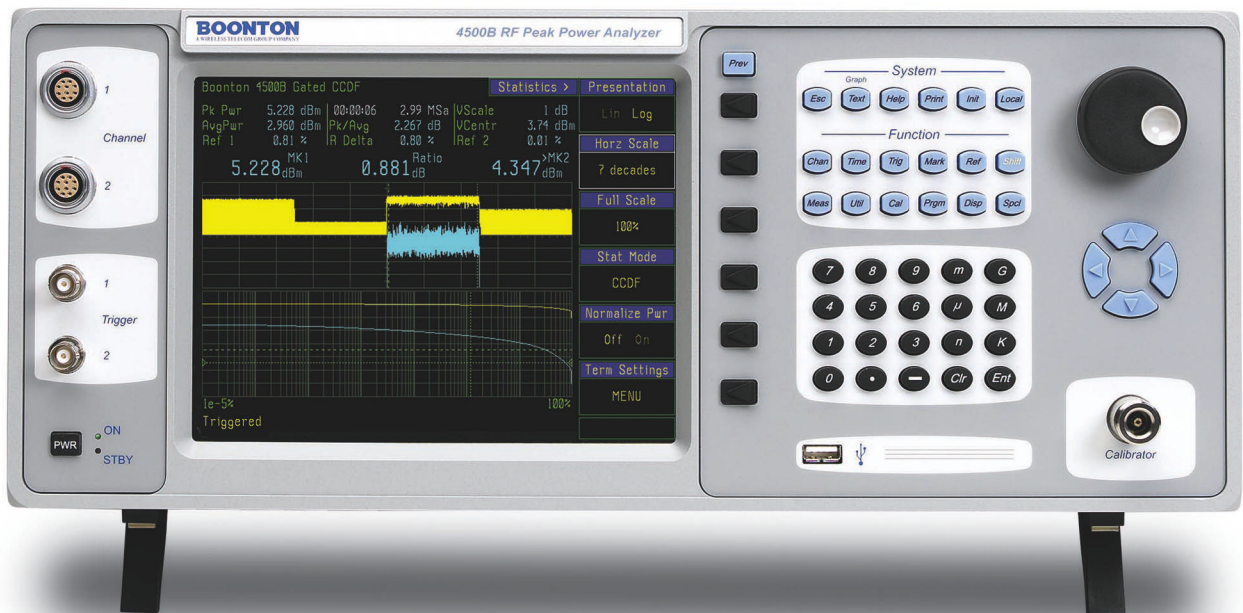
ADS 2006A also includes several enhancements, including accelerated layout connectivity and performance on large monolithic millimeter-wave integrated circuits (MMICs) and reticles, and faster circuit and EM simulators that support 64-bit computer architectures to solve design problems that were too large to compute with 32-bit architectures five years ago.

Base price: \$8400. Available in October. Agilent Technologies, [www.agilent.com](http://www.agilent.com).



Editors' CHOICE

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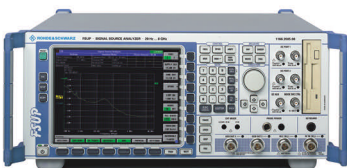
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## All bets are on TV

> > > **Globalcomm** (formerly Supercomm), June 6–8, Chicago, IL, Telecommunications Industry Association (TIA), [www.globalcomm2006.com](http://www.globalcomm2006.com).

IPTV was everywhere at Globalcomm, as network-equipment makers vied to fill network service providers' demand for switches, routers, and other network elements. IPTV, as well as voice and data services, needs test equipment. The telecom test industry was well represented with new products.

**Anritsu** ([www.us.anritsu.com](http://www.us.anritsu.com)) added optical return loss and automatic bidirectional measurement options to its CMA50 line of loss test sets. RL features include measurement to –55 dB, pass/fail thresholds, and real-time readings for fast verification of results. Auto bidirectional features include up to four wavelengths out of a single port (1310/1490/1550/1625 nm) and dynamic range of 50 dB for testing of fibers as long as 200 km. **Ixia** ([www.ixiacom.com](http://www.ixiacom.com)) introduced Aptixia IxLoad 3.10 software, which can assess all aspects of IPTV service infrastructure for quality of experience (QoE). The software works with the company's hardware test platforms. **Spirent Communications** ([www.spirentcom.com](http://www.spirentcom.com)) demonstrated its line of test equipment, which includes broadband test systems, call generators, DSL line simulators, and data generators.

**Agilent Technologies** ([www.agilent.com](http://www.agilent.com)) made three announcements, two of which add IPTV to existing test products. The N2X multi-service tester, which emulates and measures

thousands of subscribers and video clips, measures delay factor and loss using the Media Delivery Index. The company also added IPTV test capabilities to its FrameScope Pro handheld Ethernet performance tester, which can measure performance of video, voice, and data over Ethernet-based networks. Agilent's third announcement was a Distributed Network Analyzer.

**JDSU** ([www.jdsu.com](http://www.jdsu.com)) announced that its HST-3000 handheld triple-play services tester adds testing for VDSL2 at data rates up to 30 Mbps over copper wires. VDSL2 is a physical-layer technology for delivering IPTV to subscriber premises. The company also introduced the MTS/T-BERD 6000 fiber-optic network tester. The instrument measures insertion loss, return loss, and optical power, and it functions as an optical time-domain reflectometer.

**Sparnex** ([www.sparnex.com](http://www.sparnex.com)) demonstrated its own VDSL2 tester. The LSX 2030 can test transmissions on lines up to 26,000 ft of 26 AWG wire. **Yokogawa** ([www.yokogawa.com/us](http://www.yokogawa.com/us)) demonstrated its AQ6370 optical spectrum analyzer. **University of New Hampshire Interoperability Lab** ([www.iol.unh.edu](http://www.iol.unh.edu)), the subject of *T&MW*'s April cover story, "Today's testing, tomorrow's engineers" ([www.tmworld.com/2006\\_04](http://www.tmworld.com/2006_04)), gave presentations on its testing capabilities for Ethernet, DSL, IP, and VoIP. **T&MW**



The FrameScope Pro measures performance on voice, video, and data transfers over Ethernet.

Courtesy of Agilent.

## ZigBee flies higher

> > > **Sensors Expo**, June 7–8, Rosemont, IL, Questex Media Group, [www.sensorsexpo.com](http://www.sensorsexpo.com).

ZigBee, the 250-kbps wireless communications link for sensors, switches, and other devices, was a hot topic at this year's Sensors Expo, where ZigBee Alliance president Bob Heile presented a session on the topic and where companies showing equipment unrelated to sensor measurements appeared in the exhibit hall. For example, **AR Worldwide** ([www.ar-worldwide.com](http://www.ar-worldwide.com)) exhibited its EMI test equipment, including amplifiers and receivers. Engineers designing ZigBee into their products must test receivers for susceptibility to interference and must test transmitters for unintentional harmonics. **Frontline Test Equipment** ([www.fte.com](http://www.fte.com)) demonstrated a ZigBee protocol analyzer.

Traditional sensors and measurement equipment were, though, still quite visible. Accelerometer makers **PCB**

**Piezotronics** ([www.pcb.com](http://www.pcb.com)) and **Kistler** ([www.kistler.com](http://www.kistler.com)) exhibited their accelerometers and signal conditioners. **D&R Technology** ([www.d-r-t.com](http://www.d-r-t.com)) exhibited a line of automotive sensors used in seats for triggering air bags. **Flexpoint** ([www.flexpoint.com](http://www.flexpoint.com)) demonstrated bend sensors that change resistance when bent.

Data-acquisition equipment was also still prevalent at Sensors Expo, although with fewer exhibitors than in years past. **LDS Test and Measurement** ([www.lds-group.com](http://www.lds-group.com)) exhibited oscilloscopes and data recorders. **Measurement Computing** ([www.mccdaq.com](http://www.mccdaq.com)) demonstrated its line of USB and PCI data-acquisition products. **National Instruments** ([www.ni.com](http://www.ni.com)) showed data-acquisition products for PXI and USB, as well as for the proprietary CompactRIO. **T&MW**



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## Audio: Not what it used to be

ONCE UPON a time, the word “audio” conjured up thoughts of high-quality sound delivered by dedicated home-stereo systems. “Portable audio” referred to a transistor radio or a Sony Walkman. Today, it seems like every pocket-sized consumer product has audio, with iPods and MP3 players leading the way. In many homes, the living room stereo is now an iPod placed into a speaker/amplifier system.

The change in consumer audio from analog to digital and from home-based systems to portable units has brought profound changes in the testing of consumer audio products. Cost is now the driving force in audio testing.

“Testing of consumer audio product varies from zero to 100%,” said Bruce Hofer, chairman of Audio Precision. That is, some contract manufacturers of MP3 players may perform numerous tests on production players, while others may not test audio quality at all.

Graham Boswell, sales and marketing director at Prism Sound, echoed Hofer’s sentiments. “There’s enormous price pressure today,” he said. “I’ve seen large companies try to perform audio tests with PC sound cards.” Boswell pointed out that sound cards lack calibration, have limited performance, and have higher noise floors than audio testers. “Noise floors in sound cards can run into tens of millivolts, which is as much as four orders of magnitude higher than on audio testers.”

Audio products such as MP3 players, USB audio devices, and TV set-top boxes rely heavily on digital signal processing. No longer does audio travel as analog signals, but rather as digital data streams. The result: Engineers have less knowledge about analog circuits than they used to.

“Analog isn’t taught the way it once was,” noted Hofer. “People know how to use a scope and a DMM but don’t

appreciate the power of the frequency domain.” Boswell has observed the same trend, but reports some success at getting engineers to look at the frequency domain.

Part of the reason that the FFT is making a comeback is because audio tester software is easier to use than it once was. PCs are now powerful



The APx585 audio tester is designed for ease of use. Courtesy of Audio Precision.

enough to perform frequency analysis in real time, making spectral plots easily attainable. Hofer noted that software helps people set up tests correctly and makes information available to engineers and test operators.

High-quality audio isn’t dead—far from it. “The audio CD raised our expectations for sound quality,” said Hofer. Thus, makers and users of professional audio products and high-end home equipment still perform rigorous audio-quality testing (Ref. 1). The same applies to automotive sound systems (Ref. 2). New cars now have eight or more speakers, each with unique equalization based on model and interior options of a vehicle.

Hofer notes that as people get used to Dolby 5.1 surround sound in home theaters, they may want it in their cars, too. He would not be surprised if some SUV’s began offering movie sound system options in the future. T&MW

### Paper covers fax over IP verification

QualityLogic has released a free white paper on verification of V.34 (color) fax systems. The five-page paper discusses the need for interoperability testing of V.34 faxes transmitted in Internet Protocol (IP) packets over Ethernet. [www.qualitylogic.com/forms/pub\\_download.html](http://www.qualitylogic.com/forms/pub_download.html).

### National Instruments adds online user community

National Instruments has added a user community to its Web site where users can post code examples to share with others. Users who post code get to keep control of their code and post updates. The community site is still in beta, and National Instruments welcomes feedback. [community.ni.com](http://community.ni.com).



### NIST doubles quantum code speed

NIST has developed a quantum key distribution (QKD) system that uses single photons in different orientations to produce a continuous binary code, or “key,” for encrypting information. The system can detect if someone other than the intended recipient tries to intercept the transmission. Researchers produced this key at a rate of more than 4 Mbps over 1 km of optical fiber. [www.nist.gov/public\\_affairs/releases/quantumfiber.htm](http://www.nist.gov/public_affairs/releases/quantumfiber.htm).

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1. Nelson, Rick, “Sound science,” *Test & Measurement World*, November 2004. p. 24. [www.tmworld.com/2004\\_11](http://www.tmworld.com/2004_11).
2. Rowe, Martin, “Music to your ears,” *Test & Measurement World*, February 2004. p. 22. [www.tmworld.com/2004\\_02](http://www.tmworld.com/2004_02).

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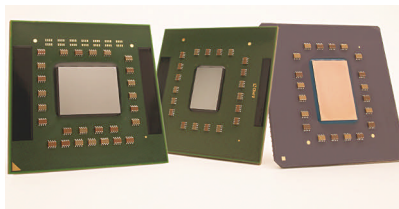
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## Testing diversification

**O**N MAY 16, microprocessor manufacturer Advanced Micro Devices (AMD) announced the end of “boring PCs” (Ref. 1). The company has developed a new line of processors, some of which will include all of the features that can squeeze onto the silicon, while others economize on power consumption and other performance parameters, as well as



The photo shows a lidless dual-core AMD processor (right), a 90-nm single-core version (center), and one manufactured at 130 nm. Courtesy of AMD.

cost. The resulting plethora of microprocessors will spawn an even wider range of new PC products.

For PC OEMs, the benefits are evident. OEMs will select microprocessor features and price points for computer configurations that address specific user priorities. In addition to smaller machines, the new processors will support “thin clients”—PCs without hard drives that rely entirely on networks for software delivery and data storage. These less-than-general-purpose systems will permit simpler designs, less complex surrounding circuitry, and lower cost. Intel appears ready to move in a similar direction.

For the test community, an explosion of this magnitude will add to the programming burden and complicate the process of tracking program flavors and versions. Also, the Balkanization of the PC means that manufacturers will sell fewer of each model, so amortization of nonrecurring engineering costs such as test programs and fixtures will become more difficult.

Today, contract manufacturers who make PCs for several OEMs can re-use major pieces of their test programs to

reduce the startup effort of taking on new customers or releasing new products. Reforming the “boring PC” will mean that less of a test program designed for one PC will be applicable to a PC aimed at a different application. Emulation test techniques would present a particular challenge, since emulator programs (and hardware, if the device pinouts are not the same from model to model) depend greatly on the internal function of the processor itself.

Nevertheless, industry experts remain optimistic. Agilent engineer/scientist Ken Parker remarked, “I see little effect at in-circuit test because most microprocessors that we see are socketed and are not present during test. There will be layout differences, but since the other parts of the boards will be substantially different anyway, each board will still need a different fixture. On the other hand, if the processor re-

sides onboard during ICT, the test will have to exploit any available testability, which could be different for each device type. Including IEEE 1149.1 on all the boards would alleviate much of the problem and eliminate a lot of work.”

Jim Benson, Agilent AXI product engineer added, “It won’t be much of an issue for inspection unless the chips use a new type of solder connection. In most cases, we would simply have to add a new package to the device library.”

Right now we know only what AMD and others intend to do. Much of its impact will depend on the extent of the fragmentation and over what period of time. We need to watch how this plays out. T&MW

### REFERENCE

John Spooner, “AMD Aims to Reform Boring PCs,” *eWeek*, May 16, 2006. [www.eweek.com](http://www.eweek.com).

### Generators deliver up to 40 GHz

Giga-tronics’ Panther 2500 signal generators provide outputs ranging from 100 kHz to 8 GHz, 20 GHz, 26.5 GHz, and 40 GHz with frequency resolution of 0.0001 Hz. Key specs include phase noise of –111 dBc at 10-kHz and 100-kHz offsets on a 10-GHz carrier frequency. Switching times are less than 500  $\mu$ s. The instruments come with Automation Xpress, a PC-based software package designed to enhance ATE programming productivity. [www.gigatronics.com](http://www.gigatronics.com).



### RoHS loophole stays open

The European Commission’s attempts to plug the so-called “control system loophole” in the RoHS directive are not likely to come into effect before 2008 and could be delayed until 2010, reports sibling publication *Electronics Weekly*. This potential loophole has caused confusion among some companies that are still unclear whether it puts their products outside of the legislation. [www.electronicweekly.com](http://www.electronicweekly.com).

### Boundary-scan I/O modules

JTAG Technologies’ JT 2127 series of digital I/O scan modules extend test coverage by connecting to edge connectors, dual-inline memory module (DIMM) sockets, or non-boundary-scan logic. The scan modules exercise a board’s connections or test points in synchronism with boundary-scan enabled devices. For boards not fitted with DIMM sockets, a separate module carrier splits the scan module’s I/O into 32-channel blocks. [www.jtag.com](http://www.jtag.com).



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As you look at the revenues generated by test equipment makers over the course of 2005, one thing becomes clear: Members of the “A team”—made up of Agilent and Advantest—were having things their way. Meanwhile, others who were among the top 10 revenue generators in 2004—notably Teradyne and LTX—saw their fortunes slip. But Agilent started on top and stayed on top and is still big compared to almost anyone else, and Advantest squeezed into a very solid second place. And with Advantest’s year-to-year growth rate of almost 103% in 2004 and of nearly 36% in 2005, Agilent is doubtless casting nervous glances over its shoulder these days.

For now, though, the company says things look pretty rosy. About two-thirds of Agilent’s revenue was generated from outside of the US in fiscal 2005. And with 20,000 employees, the company has managed to give itself a global presence. Of the company’s total net revenue of \$5.1 billion, \$3.3 billion was generated by the Electronic Measurement Group, \$500 million came from the Semiconductor Group (which was sold early this year, and is now called Avago Technologies), and another \$1.4 billion came from the Bioanalytical Measurement Group.

“Agilent is definitely the number one in T&M, but Advantest has come up fast, especially in the past two or three years,” said Kiran Unni, a program manager at Frost & Sullivan, a research and management firm.

Unni said the key for Advantest has been moving away from just memory test, where it has traditionally been very strong—with something like 60% of the market—and into SOC and semiconductor testing. “The margins are small but [the company has] managed to pass Teradyne in market share and revenue,” she noted.

“Advantest has long been the industry leader in memory test,” said R. Keith Lee,

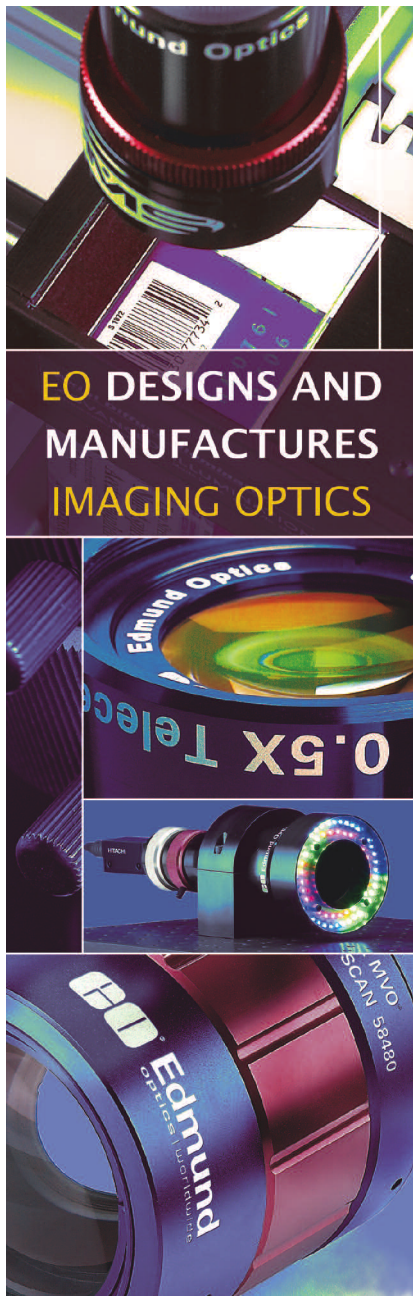


# GAINS AND PAINS

SOME COMPANIES CLEAN UP  
AT THE EXPENSE OF OTHERS.

ALAN R. EARLS, CONTRIBUTING EDITOR



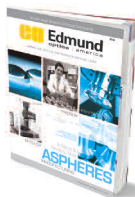


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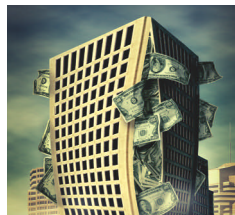
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optics | america

## TOPS IN TEST

president and CEO of the company's Advantest America division. "Now, through the success of the T2000 open-architecture SOC test platform, we are also recognized as a leader in the SOC test market."

Indeed, Lee said cost-effective test and lowering the overall cost of system ownership is important to customers and is "the driver of Advantest's commitment to providing innovative test and handling solutions." In particular, Lee

Looking at the future of the test-and-measurement industry, Lee said, "We are at the cusp of a mammoth business model change, caught between contemporary IC demands that can be summarized as 'more, faster, cheaper, better' and a traditional ATE business model that is no longer viable." In other words, said Lee, "the traditional ATE model fails in today's consumer-driven SOC device environment." Lee said the key for the industry, therefore, is to adopt



### Top 10 test-and-measurement companies in revenue (publicly traded companies)

COMPANY	2005 RANK	2004 RANK	2005 REVENUES (MILLIONS US\$)	2004 REVENUES (MILLIONS US\$)	PERCENT CHANGE
Agilent Technologies	1	1	3,800.0 <sup>a</sup>	3,800.0	0.0
Advantest	2	3	2,230.0	1,640.0	36.0 <sup>b</sup>
Teradyne	3 <sup>c</sup>	2	1,088.0	1,800.0	-39.6
Tektronix	4	4	1,000.0	920.6	8.6
Fluke	5	5	945.5	800.0	18.2
Anritsu	6	6	783.0	741.8	5.6 <sup>b</sup>
National Instruments	7	7	571.8	514.0	11.2
Aeroflex	8	9	463.4	414.1	11.9
Credence Systems	9	8	429.3	439.8	-2.4
LTX	10	10	135.0	255.8	-47.2

<sup>a</sup> Agilent Technologies' revenues shown here include only electronic measurement and automated test operations. Total test-and-measurement revenue is \$7.2 billion.

<sup>b</sup> Because of currency fluctuations, percent increases in yen for Advantest and Anritsu were slightly higher.

<sup>c</sup> Privately held Rohde & Schwarz reported annual sales of 1.1 billion euros (about \$1,540 million) in November 2005, representing 20% sales growth, and would place third on a list that included private and public test companies.

cited the success of the T2000, which is an ATE platform based on the OpenStar specifications introduced in 2004 by the Semiconductor Test Consortium (STC). Lee said the future of the T2000 looks very positive. "We have good momentum and good interest from potential customers."

Lee also cited another aspect of Advantest that he said has contributed to the company's growth. "Advantest differs from most ATE companies because we view manufacturing as a strategic core competency and so we keep our manufacturing in-house," he said. In turn, he added, "Our manufacturing capabilities allow us to deliver high-quality systems that lead the industry in accuracy and reliability."

an open-architecture approach. "Advantest believes that a single platform, open architecture is the future, and that shapes our perspective on the industry," he said.

Unni at Frost & Sullivan said beyond the huge success of Agilent and Advantest, 2005 also saw continued strength for Tektronix, in third place among publicly traded test-and-measurement companies, though the company's ability to make a real impact beyond its traditional strength in oscilloscopes remains elusive. Beyond that, Unni said, everyone should watch for bio/pharm instrumentation to emerge as a continued source of growth. "Perkin-Elmer, Thermo Electron, and Waters all made strong moves toward pharma and life sciences last year," she added. T&MW



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## IN THIS SECTION:

- ▷ RF/Microwave and Wireless Communications Test Equipment, below
- ▷ Telecom/Datacom Test Equipment, below
- ▷ Fiber-Optic/Electro-Optic Test Equipment, p. 29
- ▷ Third-Party Suppliers, p. 32
- ▷ Services/Labs/Test Houses, p. 33

## RF/MICROWAVE AND WIRELESS COMMUNICATIONS TEST EQUIPMENT

### Calibration Sets, Microwave

Boonton Electronics  
Cascade Microtech  
Focus Microwaves  
Rohde & Schwarz  
Storm Products—  
Microwave

### Calibrators, Antenna

A.H. Systems

### Channel Simulators

Anite Group  
Azimuth Systems  
Micronetics

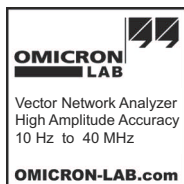
### Frequency Counters, RF/Microwave

Aeroflex  
Agilent Technologies  
Anritsu  
B&K Precision  
Fluke  
Instek America  
National Instruments  
Pendulum Instruments  
Precision Test Systems  
Protek Test and Measurement  
Racal Instruments  
Tabor Electronics  
Tektronix

### Network Analyzers, RF/Microwave

Agilent Technologies  
Anritsu  
Cascade Microtech  
Giga-tronics

JDSU  
CommTest  
National Instruments  
Omicron Electronics



PXIT  
Rohde & Schwarz  
Tektronix

### Power Meters, RF/Microwave

Aeroflex  
Agilent Technologies  
Anritsu  
AR Worldwide  
Bird Electronic  
Boonton Electronics  
ETS-Lindgren  
Focus Microwaves  
Giga-tronics  
Micronetics  
National Instruments  
Ophir RF  
Praxsym  
Precision Test Systems  
Protek Test and Measurement  
Racal Instruments  
Rohde & Schwarz  
Schomandl  
Suss MicroTec  
Tektronix

### RF Field Strength Meters

AR Worldwide  
Bird Electronic  
ETS-Lindgren

Lake Shore  
Cryotronics  
Precision Test Systems  
Sencore  
Tektronix

### Signal Analyzers, RF

Aeroflex  
Agilent Technologies  
Anritsu  
Boonton Electronics  
ICS Sensor Processing  
Keithley Instruments  
MI Technologies  
National Instruments  
Opticom  
Precision Test Systems  
Protek Test and Measurement  
Rohde & Schwarz  
Sencore  
Tektronix

### Signal Sources, RF/Microwave

Aeroflex  
Agilent Technologies  
Anritsu  
Chase Scientific  
Giga-tronics  
ICS Sensor Processing  
Instek America  
MI Technologies  
Micro Lambda  
Wireless  
Micronetics  
National Instruments  
Noise Com  
Nova Engineering  
Novatech Instruments  
Pentek  
Picosecond Pulse Labs  
Praxsym

Precision Test Systems  
Racal Instruments  
Ramsey Electronics  
Rohde & Schwarz  
Schomandl  
Tabor Electronics  
Tektronix

### Spectrum Analyzers, RF/Microwave

Aeroflex  
Agilent Technologies  
Anritsu  
Berkeley Varitronics Systems  
ICS Sensor Processing  
Instek America  
JDSU  
CommTest  
Morrow Technologies  
National Instruments  
Pendulum Instruments  
Precision Test Systems  
Rohde & Schwarz  
Sencore  
Tektronix  
Willtek  
Communications

### Switching Matrices, RF/Microwave

ASCOR  
Colby Instruments  
Cytec  
Ducommun  
Geotest - Marvin Test Systems  
JFW Industries  
Keithley Instruments  
National Instruments  
Pickering Interfaces  
Racal Instruments  
Rohde & Schwarz  
Symtx  
Universal Switching  
VXI Technology

### Wireless Communications Testers

Aeroflex  
Agilent Technologies  
Anite Group  
Anritsu  
Azimuth Systems  
CIMTEK  
Colby Instruments

Comarco Wireless Test Solutions  
ICS Sensor Processing  
Instrumentation Engineering  
Ixia  
Keithley Instruments  
MI Technologies  
Micronetics  
Mitutoyo America  
National Instruments  
Noise Com  
Praxsym  
Precision Test Systems  
Racal Instruments  
RADCOM  
Rohde & Schwarz  
Spectracom  
Tektronix  
Willtek  
Communications  
Ztec

## TELECOM/DATACOM TEST EQUIPMENT

### Bit-Error-Rate Testers

Aeroflex  
Agilent Technologies  
Anritsu  
Catalyst Enterprises  
Connecticut Technology Products  
CTC Union Technologies  
EXFO  
Finisar  
GL Communications  
Innocor  
International Data Sciences  
Ixia  
JDSU  
CommTest  
JDSU  
Test & Measurement  
Noise Com  
PXIT  
Spirent  
Communications  
SyntheSys Research  
Tektronix

Telinc  
Wavecrest

### Communication Cable Testers (Metal and Optical)

AEMC Instruments  
Anritsu  
Catalyst Enterprises  
CTC Union Technologies  
EXFO  
Fluke Networks  
Instrumentation Engineering  
JDSU  
CommTest  
PXIT  
Tektronix

### DSL Line Simulators

Fluke Networks  
Genesys IBS  
RADCOM

### Modem Testers, Cable/xDSL

Agilent Technologies  
Broadframe  
CTC Union Technologies  
Genesys IBS  
Instrumentation Engineering  
Ixia  
JDSU  
CommTest  
JDSU  
Test & Measurement  
Noise Com  
RADCOM  
Spirent  
Communications  
Symtx  
Teradyne  
Assembly Test Div.  
Tracespan  
Communications

continued >



## > TELECOM/DATACOM TEST EQUIPMENT *continued*

### Network Test Software, Third Party

EdenTree Technologies

### Packet Generators

Anritsu  
GL Communications  
Innocor  
Ixia  
RADCOM  
Spirent Communications  
Tektronix  
Warwick Control Technologies

### Protocol Analyzers, LAN and WAN

Agilent Technologies  
Anritsu  
Benedict Computer Broadframe

Connecticut Technology Products  
CTC Union Technologies  
EXFO  
Finisar  
Fluke Networks  
Frontline Test Equipment  
GL Communications  
Innocor  
International Data Sciences  
Ixia  
JDSU  
CommTest  
JDSU  
Test & Measurement  
Network Instruments  
QualityLogic  
RADCOM  
Spirent Communications  
Tektronix  
Telinc  
Warwick Control Technologies

### Return-Loss Testers

AMREL  
American Reliance  
Anritsu  
DiagnoSYS Systems  
EXFO  
Fluke Networks  
Genesys IBS  
GL Communications  
JDSU  
CommTest  
JDSU  
Test & Measurement  
Microtronix Systems  
Spirent Communications  
Tektronix

### SDH/PDH/SONET Testers

Agilent Technologies  
Anritsu  
EXFO  
GL Communications  
Innocor

Instrumentation Engineering  
Ixia  
JDSU  
CommTest  
JDSU  
Test & Measurement  
Pendulum Instruments  
RADCOM  
Spirent Communications  
Tektronix  
Teradyne  
Assembly Test Div.

### Telecom Switch/Router Testers

Agilent Technologies  
DiagnoSYS Systems  
EXFO  
GL Communications  
Gordon Kapes  
Instrumentation Engineering  
Ixia  
RADCOM

Spirent Communications  
Symtx  
Tektronix  
Teltone


### Telephone Line Simulators


Advent Instruments  
Catapult Communications  
DiagnoSYS Systems  
Fluke Networks  
Genesys IBS  
GL Communications  
Gordon Kapes  
Micro Seven  
Microtronix Systems  
RADCOM  
Spirent Communications  
Telinc  
Teltone

### Transmission Testers

Agilent Technologies  
AMREL  
American Reliance  
Anritsu  
Applied Signal Technology  
B&K Precision  
Connecticut Technology Products  
CTC Union Technologies  
DiagnoSYS Systems  
Instrumentation Engineering  
JDSU  
CommTest  
JDSU  
Test & Measurement  
Microtronix Systems  
PXIT  
Spirent Communications  
Tektronix

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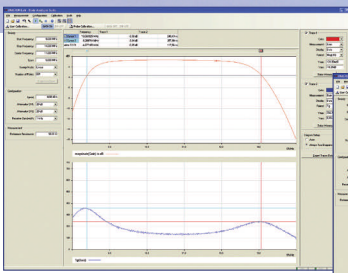
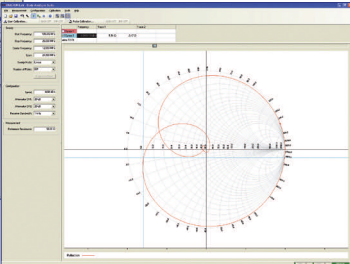
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### VoIP & IPTV & MPEG Testers

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Anritsu  
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GL Communications  
Instrumentation Engineering  
Ixia  
JDSU  
CommTest

JDSU  
Test & Measurement  
Microtronix Systems  
Network Instruments  
Opticom  
Prism Sound  
RADCOM  
Rohde & Schwarz  
Spirent  
Communications  
Tektronix

### FIBER-OPTIC/ELECTRO-OPTIC TEST EQUIPMENT

#### Display Testers

GOEPEL Electronics  
Instrument Systems  
Integral Vision  
Keithley Instruments  
Klein Instruments  
Microvision  
National Instruments  
Optomistic Products  
Radiant Imaging

JDSU  
Test & Measurement  
Oz Optics  
Symtx

#### Fiber-Optic Laser Sources

Agilent Technologies  
Anritsu  
Berkeley Nucleonics  
Calmar Optcom  
dBm Optics  
EXFO  
Fiber Instrument Sales  
Fluke Networks  
ILX Lightwave  
JDSU  
CommTest  
JDSU  
Test & Measurement  
Newport  
Noyes Fiber Products  
OptoTest  
Oz Optics  
Princeton  
Radiant Imaging  
StockerYale  
Terahertz Technologies  
Ultrafast Sensors

#### Electro-Optics Testers

CIMTEK  
EXFO  
Gigahertz-Optik  
Instrumentation Engineering  
JDSU  
Test & Measurement  
Keithley Instruments  
National Instruments  
Newport  
Racal Instruments  
Symtx  
Vektrex Electronic Systems

#### Fault Locators

AEMC Instruments  
Anritsu  
EXFO  
Fiber Instrument Sales  
JDSU  
Test & Measurement  
Oz Optics  
Princeton  
Symtx

#### Fiber-Optic Attenuators

EXFO  
Fiber Instrument Sales

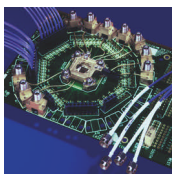
#### Fiber-Optic Power Meters

Anritsu  
CTC Union Technologies  
EXFO  
Fiber Instrument Sales  
Fluke Networks  
Gigahertz-Optik  
JDSU  
CommTest

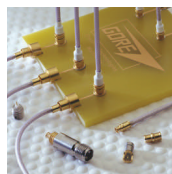
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JDSU  
Test & Measurement  
Newport  
OptoTest  
Oz Optics  
Terahertz  
Technologies

Newport  
Noyes Fiber Products  
OptoTest  
Photon  
Radiant Imaging  
Symtx  
Wavecrest

PerkinElmer  
Optoelectronics  
QIOTIQ Imaging  
Solutions  
StockerYale  
Terahertz  
Technologies

JDSU  
Test & Measurement  
Newport  
Nomadics  
Oz Optics  
Photon  
Princeton  
PXIT  
Racal Instruments  
Symtx  
VXI Technology

### Fiber-Optics Testers

Agilent Technologies  
Anritsu  
CableTest Systems  
dBm Optics  
DIT-MCO  
International  
EXFO  
Fiber Instrument Sales  
Fluke Networks  
Instrumentation  
Engineering  
Ixia  
JDSU  
CommTest  
JDSU  
Test & Measurement  
Luna Technologies  
National Instruments

### Light and Illumination Meters

EXFO  
Gigahertz-Optik  
Klein Instruments  
Newport

### Light/Laser Sources

Anritsu  
EXFO  
Fiber Instrument Sales  
Fluke Networks  
Geotest - Marvin Test  
Systems  
Moritex  
OptoTest  
Oz Optics

### Loss Test Sets

Anritsu  
EXFO  
Fiber Instrument Sales  
Fluke Networks  
JDSU  
Test & Measurement  
OptoTest  
Oz Optics  
Terahertz  
Technologies

### Optical Attenuators

Agilent Technologies  
CTC Union  
Technologies  
dBm Optics  
EXFO  
Fiber Instrument Sales

### Optical Detectors

dBm Optics  
Edmund Industrial  
Optics  
EXFO  
Gigahertz-Optik  
International Light  
JDSU  
CommTest  
Keithley Instruments  
Newport  
PerkinElmer  
Optoelectronics  
Radiant Imaging  
Ultrafast Sensors

### Optical Dispersion Testers

Agilent Technologies  
Anritsu  
dBm Optics  
EXFO  
JDSU  
Test & Measurement  
Luna Technologies

### Optical Power Meters

Agilent Technologies  
Anritsu  
CTC Union  
Technologies  
dBm Optics  
Edmund Industrial  
Optics  
EXFO  
Fiber Instrument Sales  
Fluke Networks  
Gigahertz-Optik  
ILX Lightwave  
JDSU  
CommTest  
JDSU  
Test & Measurement

Newport  
Nomadics  
Omron Electronics  
Pickering Interfaces  
Piezosystem Jena  
Racal Instruments  
Symtx  
Teradyne  
Assembly Test Div.  
VXI Technology

### Optical Time Domain Reflectometers

Agilent Technologies  
Anritsu  
EXFO  
Fiber Instrument Sales  
JDSU  
CommTest  
JDSU  
Test & Measurement  
Luna Technologies  
Noyes Fiber Products

### Photometers & Radiometers

Agilent Technologies  
EXFO  
Gigahertz-Optik  
Instrument Systems  
International Light  
Klein Instruments  
Newport  
Photon  
Pyrometer Instrument  
Radiant Imaging  
Terahertz  
Technologies

### Wavelength Meters

Agilent Technologies  
EXFO  
Newport

### Optical Spectrum Analyzers

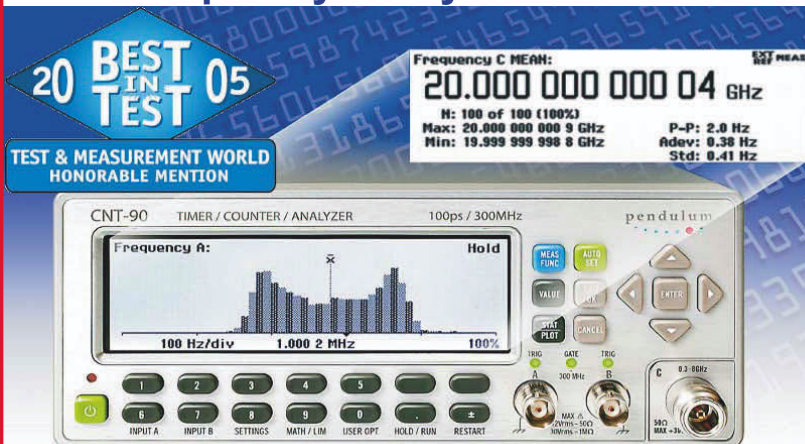
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Anritsu  
dBm Optics  
EXFO  
Instrument Systems  
JDSU  
Test & Measurement  
Newport

### Optical Switches

Cytec  
dBm Optics  
EXFO  
Fiber Instrument Sales  
ILX Lightwave  
Ixia  
JDSU  
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Keithley Instruments

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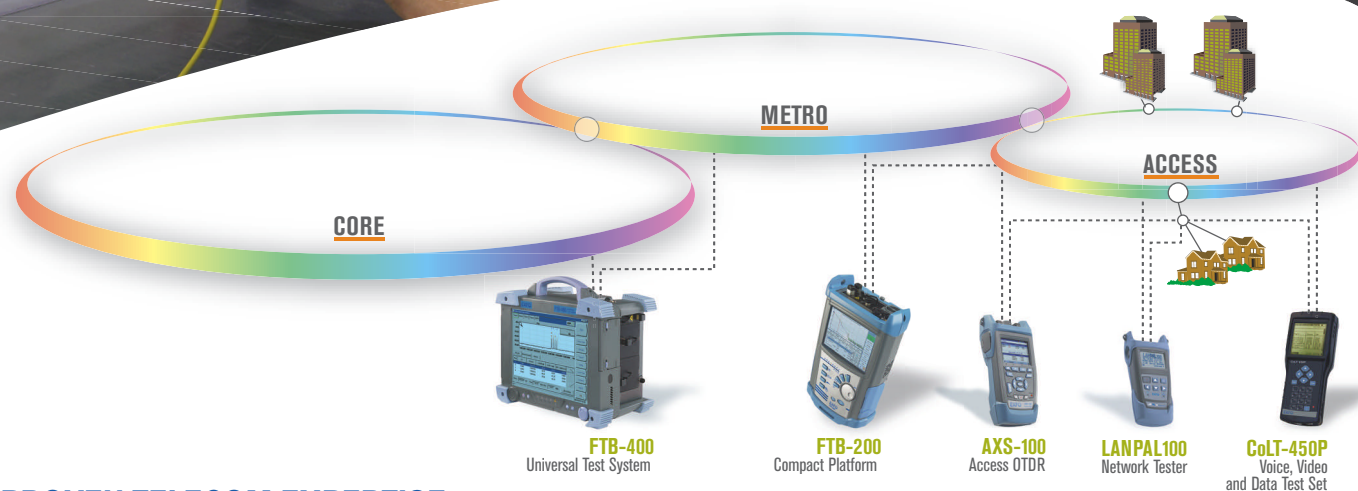
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### Distributors— RF/Microwave/ Wireless Test

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Agilent Technologies  
Allied Resources  
Avalon Equipment  
Bell Electronics NW  
Digi-Key  
Direct Industry  
Emulation Technology  
MetricTest

PTL Test Equipment  
S.R.S. Market Solutions  
Stanley Supply & Services  
Suss MicroTec  
TestEquity  
TestMart  
Tucker Electronics

### Distributors— Telecom/ Datacom Test

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Allied Resources  
Avalon Equipment  
Digi-Key  
Direct Industry  
Huntron  
MetricTest  
S.R.S. Market Solutions  
Stanley Supply & Services  
TestEquity  
TestMart  
Transcat  
Tucker Electronics

### Rental/Lease— FO/EO Test Products

Allied Resources  
Continental Resources  
Electro Rent  
Fiber Instrument Sales  
Industrial Resources  
MetricTest  
Microlease  
ORIX USA  
PTL Test Equipment  
TechRecovery  
Test Equipment Connection  
Trek Equipment  
TRS-RenTelco  
Tucker Electronics  
Tyrosys

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Advanced Test Equipment  
Allied Resources

Atlantic Coast Instruments  
Avalon Equipment  
Bell Electronics NW  
Continental Resources  
Electro Rent  
Industrial Resources  
MetricTest  
Microlease  
Noise Com  
ORIX USA  
PTL Test Equipment  
TechRecovery  
Test Equipment Connection  
Test Equipment Solutions Today  
TestEdge  
TestEquity  
Trek Equipment  
TRS-RenTelco  
Tucker Electronics  
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### Rental/Lease— Telecom/ Datacom Test

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Allied Resources  
AssetRelay  
Atlantic Coast Instruments  
Avalon Equipment  
Bell Electronics NW  
Continental Resources  
Electro Rent  
GL Communications  
Industrial Resources  
MetricTest  
Microlease  
ORIX USA  
TechRecovery  
Test Equipment Connection  
Test Equipment Solutions Today  
TestEquity  
Trek Equipment  
TRS-RenTelco  
Tucker Electronics

### Training— FO/EO Test

A.T.E. Solutions  
Bloomy Controls  
EXFO  
Fiber Instrument Sales

Instrumentation Engineering  
Tektronix

### Training— RF/Microwave/ Wireless Test

A.T.E. Solutions  
Instrumentation Engineering  
MI Technologies  
Rohde & Schwarz  
Tektronix  
Willtek Communications

### Training— Telecom/ Datacom Test

A.T.E. Solutions  
EXFO  
Instrumentation Engineering  
Opticom  
Spirent Communications  
Tektronix  
Wavecrest

### Used Equipment— FO/EO Test Products

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Atlantic Coast Instruments  
Bizi International  
Creative Devices  
Electro Rent  
EXFO  
Fiber Instrument Sales  
Industrial Resources  
LabX  
MetricTest  
Microlease  
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PTL Test Equipment  
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Allied Resources  
Atlantic Coast Instruments  
Avalon Equipment  
Bell Electronics NW  
Bizi International  
Continental Resources  
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If you're developing or deploying telephony applications, access to T1, E1, and analog circuits for testing is critical. But even actual circuits won't offer the wide range of operating parameters presented in the "real world." The System 930 Telephony Simulator does what "live" circuits can't, providing the features of a central office, channel bank, test generator, and analyzer in one compact, easy-to-use package. You decide how your test circuits perform!

- Two 1.544 (T1) or 2.048 (E1) interfaces
- Available digital protocols include Robbed Bit, ISDN, GR-303 & Q.SIG
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- Extensive protocol & call progress monitoring
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TRS-RenTelco  
Tucker Electronics  
Tyrosys  
Willtek  
Communications

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Equipment  
Allied Resources  
AssetRelay  
Atlantic Coast  
Instruments  
Avalon Equipment  
Bell Electronics NW  
Continental Resources  
Electro Rent  
EXFO  
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Solutions Today  
TestEquity  
TestMart  
Trek Equipment  
TRS-RenTelco  
Tucker Electronics

## SERVICES/LABS/TEST HOUSES

### Fiber-Optic Testing Services

Agilent Technologies  
Amkor Technology  
Bloomy Controls  
EXFO  
Mindready Solutions  
National Technical  
Systems  
Symtx

### Telecom Testing Services

Agilent Technologies  
Bloomy Controls  
CKC Laboratories  
D.L.S. Electronic  
Systems



Elite Electronic  
Engineering  
EXFO  
Genesys IBS  
GL Communications  
Mindready Solutions  
National Technical  
Systems  
QualityLogic  
Symtx  
Sypris Test &  
Measurement  
TestEdge  
TUV America  
TUV Rheinland of  
North America  
VI Technology

### Wireless Testing Services

Agilent Technologies  
Amkor Technology  
CKC Laboratories

D.L.S. Electronic  
Systems



dBm Engineering  
Elite Electronic  
Engineering



GL Communications  
Instrumentation  
Engineering  
LTX  
MI Technologies

Mindready Solutions  
National Technical  
Systems  
QualityLogic  
TestEdge  
TUV America  
VI Technology

T&MW

## RF Solutions

- Fixed Attenuators & Terminations
- Programmable Attenuators
- Rotary Attenuators
- RF Switches
- Power Dividers
- Programmable RF Test Systems
- Matrix Switches
- RF Test Accessories



ISO 9001:2000



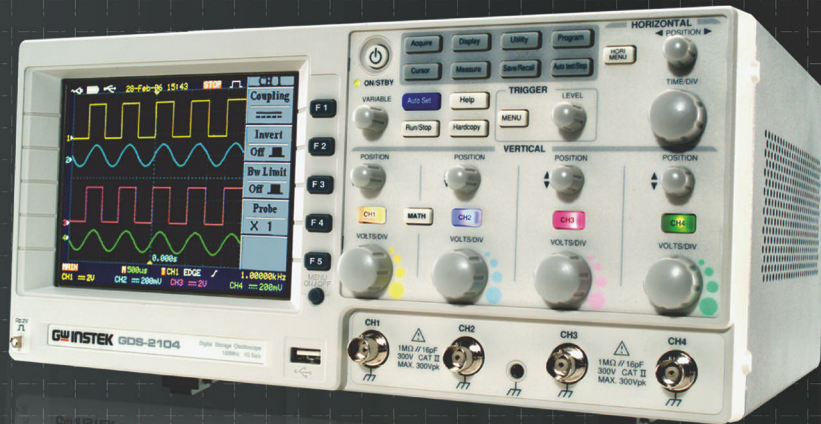
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or send an email to... [sales@jfwindustries.com](mailto:sales@jfwindustries.com)



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The GDS-2000 series is the latest addition to the value priced line of digital storage oscilloscopes offered by GW Instek. With standard features like 1 GS/s real time sampling, USB (host/device), vibrant color TFT display, and the competitive Instek price, the GDS-2000 series is assured to be the perfect solution, not only for your test bench, but also for your budget.

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## IN THIS SECTION:

- ▷ Stand-Alone Test Instruments, below
- ▷ Modular Instruments, p. 46
- ▷ Sensors, p. 56
- ▷ Software, p. 57
- ▷ Accessories, p. 59
- ▷ Third-Party Suppliers, p. 60
- ▷ Services/Labs/Test Houses, p. 61

## STAND-ALONE TEST INSTRUMENTS

### Analyzers, Logic and Bus

Agilent Technologies  
AIM USA  
Catalyst Enterprises  
Condor Engineering  
FuturePlus Systems  
Global Specialties  
GOEPEL Electronics  
Interface Technology  
LeCroy  
MCC  
Tektronix  
Thurlby-Thandar Instruments (TTI)  
VMETRO  
Warwick Control Technologies

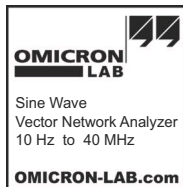
### Analyzers, Time Interval

Fluke  
GuideTech  
Pendulum Instruments  
Photon  
Racal Instruments  
Stanford Research Systems  
Tektronix  
Wavcrest  
Yokogawa Corp. of America

### Analyzers, Waveform/Signal

Agilent Technologies  
Analogic  
Anritsu  
Audio Precision  
Berkeley Nucleonics  
Boonton Electronics  
Briel & Kjaer, North America

Clarke-Hess Communication Research  
Data Physics  
Dewetron  
Fluke  
GHI Systems  
Global Specialties  
GOEPEL Electronics  
Hioki USA  
Hi-Techniques  
JDSU  
CommTest  
Krohn-Hite  
LDS Test and Measurement  
LeCroy  
LMS Instruments



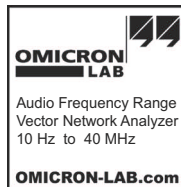
OROS  
Racal Instruments  
Sencore  
Signal Recovery  
Stanford Research Systems  
SyntheSys Research  
Tektronix  
Vibration Research  
Wavcrest  
Yokogawa Corp. of America

### Attenuators, Electronic

Alligator Technologies  
JFW Industries

### Audio Test Sets

Agilent Technologies  
Audio Precision  
AudioControl Industrial  
Boonton Electronics  
Briel & Kjaer, North America  
LMS Instruments



Opticom  
Prism Sound  
Racal Instruments  
Rohde & Schwarz  
Sencore  
Tegam  
Tektronix

### Calibration Standards

Agilent Technologies  
Analogic  
Anritsu  
Beamex  
Boonton Electronics  
Clarke-Hess Communication Research  
Fluke  
Gigahertz-Optik  
Guideline Instruments  
IET Labs  
Krohn-Hite  
Micronetics  
Newport Electronics  
Noise Com  
North Atlantic Industries  
Novatech Instruments

Owens Design  
Pacific Instruments  
Pendulum Instruments  
Picosecond Pulse Labs  
Precision Test Systems  
Pyrometer Instrument  
Ross Engineering  
Rotek Instrument  
Spectracom  
Symmetricom  
Tegam  
Unholtz-Dickie  
VLSI Standards

### Calibrators, Multifunction

Beamex  
Clarke-Hess Communication Research  
Data Physics  
Exttech Instruments  
Fluke  
GMC Instruments  
Newport Electronics  
Omega Engineering  
Owens Design  
Rotek Instrument  
Tecpel  
Tegam  
Total Temperature Instrumentation  
Xitron Technologies  
Yokogawa Corp. of America

### Calibrators, Sound

Data Physics  
Exttech Instruments  
IET Labs  
Monarch Instrument  
Sencore  
Tecpel

### Calibrators, Temperature

Beamex  
Everest Interscience  
Exttech Instruments  
Fluke  
Hart Scientific  
Lake Shore  
Cryotronics  
Newport Electronics

Omega Engineering  
Pyrometer Instrument  
Sun Electronic Systems  
Tecpel  
ThermaCal  
Total Temperature Instrumentation  
Xitron Technologies  
Yokogawa Corp. of America

### Counters/Timers

Aeroflex  
Agilent Technologies  
B&K Precision  
Exttech Instruments  
Fluke  
Global Specialties  
Instek America  
Microlmage Video Systems  
Monarch Instrument  
Newport Electronics  
Pendulum Instruments  
Racal Instruments  
Spectracom  
Stanford Research Systems  
Tabor Electronics  
Tegam  
Tektronix  
Thurlby-Thandar Instruments (TTI)  
Total Temperature Instrumentation  
Wavcrest  
Yokogawa Corp. of America

### Current Meters, Clamp-on

AEMC Instruments  
Flex-Core  
Global Specialties  
Meterman Test Tools  
Sypris Test & Measurement  
Tamura Corp. of America  
Tecpel



### Data-Acquisition Systems, Networked

ACCES I/O Products  
Advantech  
Astro-Med  
Burke E. Porter Machinery  
Campbell Scientific  
Computer Aided Solutions  
Conduant  
Dalsa Coreco  
DAQ Systems  
Data Physics  
Dataq Instruments  
dataTaker  
Dewetron  
Fluke  
Hi-Techniques  
ICS Sensor Processing  
IMC DataWorks  
Intelligent Instrumentation  
IOtech  
Keithley Instruments  
Lawson Labs  
LDS Test and Measurement  
Measurement Computing  
Microstar Laboratories  
Monarch Instrument  
Moxa Technologies  
National Instruments  
Neff Instrument  
R.C. Electronics  
TAL Technologies  
United Electronic Industries  
Vibration Research  
VXI Technology

### Data-Acquisition Systems, Requiring PC

ACCES I/O Products  
Acqiris USA  
Advantech  
Alligator Technologies  
Analogic  
Applied Signal Technology  
B & B Electronics  
B & B Technologies

continued >

## > STAND-ALONE TEST INSTRUMENTS *continued*

Burke E. Porter  
Machinery  
Carltext International  
Chase Scientific  
Computer Aided  
Solutions  
Conduant  
DAQ Systems

Data Physics  
Data Translation  
Dataforth  
Dataq Instruments  
dataTaker  
Dewetron  
Fiberbyte  
Fluke

GHI Systems  
GOEPEL Electronics  
Hi-Techniques  
ICS Sensor Processing  
IMC DataWorks  
Innovative Integration  
Intelligent  
Instrumentation

IOtech  
JDSU  
CommTest  
Keithley Instruments  
Lawson Labs  
LDS Test and  
Measurement  
LeCroy

LMS Instruments  
Measurement  
Computing  
MI Technologies  
Microstar Laboratories  
Monarch Instrument  
Moxa Technologies  
National Instruments  
Neff Instrument  
Nomadics  
Novx  
OROS  
Pacific Instruments  
Photon  
Pico Technology  
Racal Instruments  
Saelig  
Scientific Solutions  
TAL Technologies  
United Electronic  
Industries  
Vibration Research  
VXI Technology

GOEPEL Electronics  
Graphtec America  
Hioki USA  
Hi-Techniques  
ICS Sensor Processing  
IMC DataWorks  
Innovative Integration  
Instrumented Sensor  
Technology  
Intelligent  
Instrumentation  
IOtech  
Lawson Labs  
LDS Test and  
Measurement  
LMS Instruments  
Macro Sensors  
Microstar Laboratories  
Monarch Instrument  
Onset Computer  
Pace Scientific  
Pacific Instruments  
Pico Technology  
R.C. Electronics  
Sony Precision  
Technology America  
Summit Instruments  
Tecpel  
Yokogawa Corp. of  
America

## Data-Acquisition Systems, Stand-Alone

Advantech  
Alligator Technologies  
Analogic  
Applied Signal  
Technology  
Astro-Med  
B & B Electronics  
B & B Technologies  
Burke E. Porter  
Machinery  
Bustec  
Campbell Scientific  
Carltext International  
Computer Aided  
Solutions  
Condor Engineering  
Conduant  
Dalsa Coreco  
DAQ Systems  
Data Physics  
Data Translation  
Dataq Instruments  
dataTaker  
Daytronic  
Dewetron  
DGH  
Fluke

## Dataloggers and Event Recorders

ACR Systems  
Advantech  
AEMC Instruments  
Analogic  
Astro-Med  
Beamex  
Burke E. Porter  
Machinery  
Campbell Scientific  
Carltext International  
Computer Aided  
Solutions  
Conduant  
DAQ Systems  
Data Physics  
Dataq Instruments  
dataTaker  
DCC Corp.  
Dewetron  
Diversified Technical  
Systems  
Extex Instruments



# Compact Data Recorders For Capturing Dynamic Environments

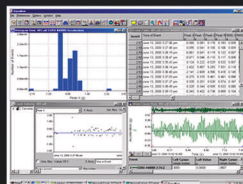
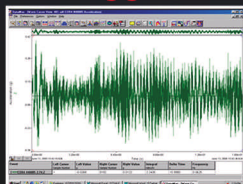
## Measures and Records:

- Tri-axial Acceleration
- Shock / Drop / Impact
- Vibration / Stress / Strain
- Angular Rates
- Roll / Pitch / Yaw
- Atmospheric Conditions
- Temperature / Humidity
- Atm Pressure
- Intrinsically Safe
- Flight Qualified
- Digitization to 50kHz / Ch
- Onboard Memory to 108MB+
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*continued* >



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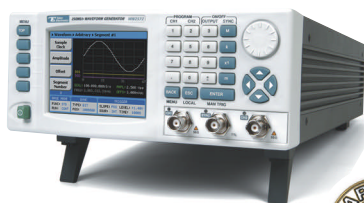


## Compare!

### Tabor's 2571/2 Waveform Generators The Best of Both Worlds

Tabor's unique design combines two technologies, making use of the best qualities from each of the types of generators. While being a true arbitrary waveform generator (AWG), memory-based with all the memory management capabilities to create complex waveforms, it implements a DDS to create all the standard modulation formats and frequency agility capabilities. Ranging from 50MS/s to 1.2GS/s, Tabor's Wonder Wave Series is designed to solve a myriad of applications from the simplest need to the most demanding requirement and challenging waveforms - all this at an affordable price tag.

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**Celebration**

*Leading The Way*  
 In Waveform Generation

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**TABOR ELECTRONICS Inc.**  
 Since 1971

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 just from **\$4,495** till 30.6.2006

MODEL	TABOR WW2571/ 2	Agilent 33250a
Channels	1 / 2	1
Type	True Arb Implementing DDS	DDS Based AFG
WaveformType	All Standard, Arbitrary and Real- life waveform	Standard and only limited Arbitrary
Sample Clock Rate	1.5S/ s to 250MS/ s	200MS/ s
Memory Size	1 Meg (2 Meg optional)	64k
Memory Management (Sequences/ Steps)	10 / 16,000	N/ A
Vertical Resolution	16 bits	12 bits
Modulation	AM, FM, FSK, ASK, (n)PSK, Frequency Hops, sweep and more	AM, FM, PM, PWM, FSK and sweep
Max Frequency (Sine/Square/others)	100MHz/ 100MHz/ 32MHz	80MHz/ 80MHz/ 1MHz
Max Amplitude	16Vp- p	10Vp- p
Digital Outputs	16 Bit LVDS parallel	N/ A
Connectivity	LAN, USB and GPIB	GPIB, RS232
Warranty	5	1
Price Starts at	\$4,495 *	\$4,553

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Specification compiled from Tabor 2571/2 data sheet and Agilent 33250a data sheet 5968-8807EN, March 14, 2005. Prices are taken from the vendors websites. Exclude VAT.

## > STAND-ALONE TEST INSTRUMENTS *continued*

Fluke

Givens Control  
Engineering

GMC Instruments

GOPEL Electronics

Graphtec America

Heim Data Systems

Hioki USA

Hi-Techniques

IMC DataWorks

Innovative Integration

Instrumented Sensor  
Technology

Intelligent  
Instrumentation

IOtech

Keithley Instruments

Kipp & Zonen

LDS Test and  
Measurement

Linseis

M/RAD

Measurement  
Computing

Mitutoyo America

Monarch Instrument

National Instruments

Newport Electronics

Nomadics

Omega Engineering

Onset Computer

OptoTest

Pace Scientific

Pacific Instruments

Photron

Pico Technology

Rotronic Instrument

Saelig

SOLTEC

Sony Precision  
Technology America

TEAC America

Tecpel  
*see ad, next column*

Telatemp

Total Temperature  
Instrumentation

VMETRO



VXI Technology

Yokogawa Corp. of  
America

### DMMs, Benchtop/ System

Agilent Technologies

B&K Precision

Fluke

GMC Instruments

Hioki USA

Instek America

Keithley Instruments

Meterman Test Tools

Protek Test and  
Measurement

Signal Recovery

Tegam

Thurlby-Thandar  
Instruments (TTi)

Yokogawa Corp. of  
America

### DMMs, Handheld

A.W. Sperry  
Instruments

AEMC Instruments

AMREL

B&K Precision

Exttech Instruments

Fluke

GMC Instruments

Hioki USA

Instek America

Linseis

Meterman Test Tools

Newport Electronics

Omega Engineering

Protek Test and  
Measurement

Tecpel



Tegam

### Electronic Filters

Alligator Technologies

DL Instruments

Frequency Devices

Interpower

JDSU

CommTest

Kemo

Krohn-Hite

Micro Lambda  
Wireless

Pacific Instruments

Picosecond Pulse  
Labs

Precision Filters

Signal Recovery

Stanford Research  
Systems

### Electronic Loads

Advanced Power  
Designs

AMREL

Autotest

C&D Technologies

California Instruments

Chroma ATE

Instek America

Keithley Instruments

TDI-Dynaload

### Generators, Pulse, Function, Arbitrary

Agilent Technologies

AMREL

Analogic

*continued* >

## Why is dScope Series III making waves in audio test?

- ✓ Intuitive feature rich software
- ✓ Accurate rapid results
- ✓ Responsive expert support



...and surprisingly affordable at \$11,305.00

These are some of the reasons why companies including Bose, Blaupunkt, Mitac, Samsung, Philips and Sony are choosing dScope Series III for their R&D, verification and production test needs.

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Email: [sales@prismsound.com](mailto:sales@prismsound.com)

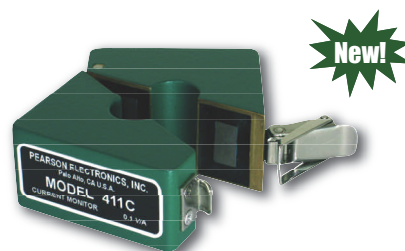


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THE EXPERTS IN AUDIO TEST

## Wide Band Clamp-on Current Monitor



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The model 411C, typical of the group, has a sensitivity of 0.1 V/A, a 3dB bandwidth from 25 Hz to 20 MHz, and a 5,000 amp peak current rating. Pulse rise times down to 20 nanoseconds can be viewed. Accuracy of 1%, or better, is obtainable across the mid-band.

Other models feature a 2.0 nanosecond rise time, or droop as low as 0.003% per microsecond.

Contact Pearson Electronics for application information.



**Pearson Electronics**

4009 Transport St. Palo Alto, CA 94303 USA  
Telephone: (650) 494-6444 FAX: (650) 494-6716  
[www.pearsonelectronics.com](http://www.pearsonelectronics.com)



# We Dare You...

**TABOR'S NEW**  
**WW**  
WONDER WAVE  
SERIES

## Compare!

### Tabor's 1281 Waveform Generator The Best of Both Worlds

Tabor's unique design combines two technologies, making use of the best qualities from each of the types of generators. While being a true arbitrary waveform generator (AWG), memory-based with all the memory management capabilities to create complex waveforms, it implements a DDS to create all the standard modulation formats and frequency agility capabilities. Ranging from 50MS/s to 1.2GS/s, Tabor's Wonder Wave Series is designed to solve a myriad of applications from the simplest need to the most demanding requirement and challenging waveforms - all this at an affordable price tag.

For more information or to schedule a demo,  
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[www.taborelec.com](http://www.taborelec.com)



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**Celebration**

*Leading The Way*  
In Waveform Generation

**~~\$13,685~~**

\*Now on Special Promotion Starting  
just from **\$12,495** till 30.6.2006

MODEL	TABOR WW1281	Tektronix AWG520
Channels	Differential, Channel 1 Normal and Channel 2 Inverse	2
Type	True Arb Implementing DDS	True Arb
WaveformType	All Standard, Arbitrary and Real- life waveform	All Standard, Arbitrary and Real- life waveform
Sample Clock Rate	50S/ s to 1.2MS/ s	50KS/ s to 1GS/ s
Memory Size	8 Meg (16 Meg optional)	4 Meg
Memory Management (Sequences/ Steps)	1 / 4,096	1 / 8,000
Vertical Resolution	12 bits	10 bits
Modulation	FM, FSK, PSK, sweep and more	N/A
Max Frequency (Sine/Square/others)	125MHz/ 125MHz/ 125MHz	100MHz/ 100MHz/ 100MHz
Max Amplitude	2Vp- p	2Vp- p
Connectivity	LAN, USB and GPIB	LAN and GPIB
Warranty	5	1
Price Starts at	\$12,495 *	\$32,400

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Specification compiled from Tabor 1281 data sheet and Tektronix AWG520 data  
sheet 76W\_11846, August 26, 2004. Prices are taken from the vendors websites.  
Exclude VAT.

**T**  
**TABOR ELECTRONICS Inc.**  
Since 1971

## > STAND-ALONE TEST INSTRUMENTS *continued*

Anritsu  
Applied Signal Technology  
Avtech Electrosystems  
B&K Precision  
Beamex  
Berkeley Nucleonics  
Chase Scientific  
Data Physics  
Directed Energy  
Fluke  
Frequency Devices  
Geotest - Marvin Test Systems  
Global Specialties  
Highland Technology  
Hioki USA  
Instek America  
Keithley Instruments  
Krohn-Hite  
Madell Technology  
Meterman Test Tools  
Micronetics  
Noise Com

Picosecond Pulse Labs  
Signal Recovery  
Stanford Research Systems  
Tabor Electronics  
Tecpel  
Tegam



Tektronix  
Thurlby-Thandar Instruments (TTI)  
Wavecrest  
Yokogawa Corp. of America

### Hipot/Insulation Breakdown Testers

AEMC Instruments  
Associated Research  
B&K Precision  
Cablescon  
CableTest Systems  
Chroma ATE  
Cirris Systems  
Clare Instruments  
Compliance West USA  
DIT-MCO International  
Electronic Systems of Wisconsin  
Glassman High Voltage  
GMC Instruments  
Hioki USA  
Hipotronics  
Instek America  
QuadTech  
Ross Engineering

Sefelec  
Slaughter  
Tecpel

### Instrumentation Amplifiers

Alligator Technologies  
Avtech Electrosystems  
C&D Technologies  
Power Electronics Division  
Data Physics  
Dataq Instruments  
Dewetron  
DL Instruments  
Frequency Devices  
Keithley Instruments  
Kemo  
Kistler Instrument  
Microstar Laboratories  
MSI Sensors  
Pacific Instruments  
PCB Piezotronics  
Picosecond Pulse Labs

Precision Filters  
R.C. Electronics  
Ross Engineering  
Signal Recovery  
Stanford Research Systems  
Tabor Electronics  
Tegam  
Trek

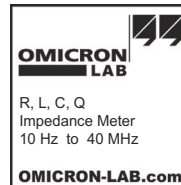
### Intermittent Fault Testers/Analyzers

CableTest Systems  
Photron  
Sovtest

### LCR Meters/Bridges

Agilent Technologies  
AMREL  
B&K Precision  
Boonton Electronics  
Chroma ATE

Clarke-Hess Communication Research  
Exttech Instruments  
Fluke  
Global Specialties  
Hioki USA  
IET Labs  
Instek America  
Keithley Instruments  
Meterman Test Tools



Protek Test and Measurement  
QuadTech  
Stanford Research Systems

*continued* >

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Electromigration Studies ~ Actuator Tests*

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- \* AV-156A-B, 5 Amps, 15V compliance (25V opt.), 10 us - 10 ms, 4 us rise time
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- \* AV-156H-B, 30 Amps, 30V compliance, 0.3 - 30 ms, 50 us rise time
- \* AV-156J-B, 30 Amps, 30V compliance, 0.3 - 30 ms, 50 us rise time, floating

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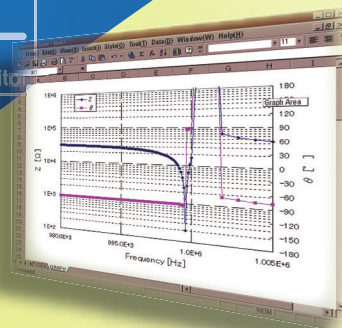
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# LCR Meters

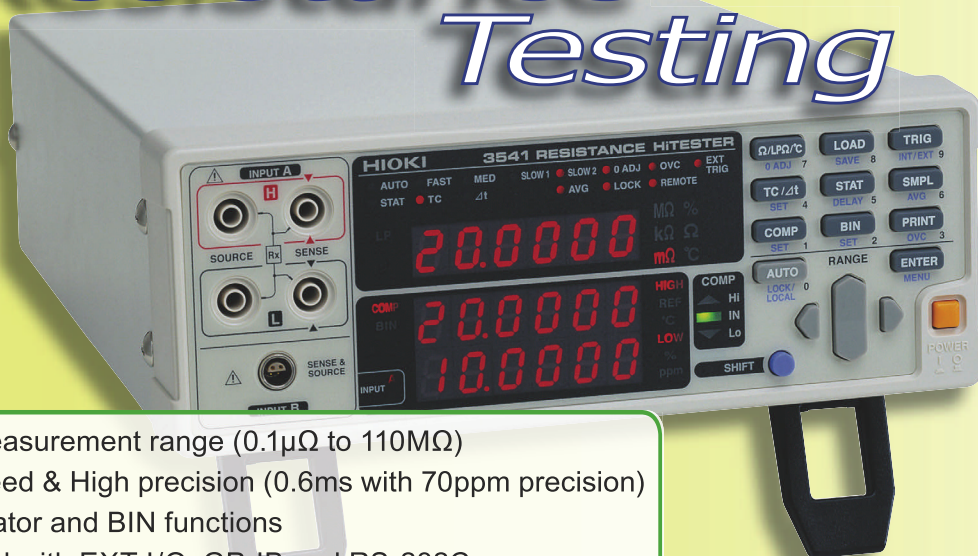


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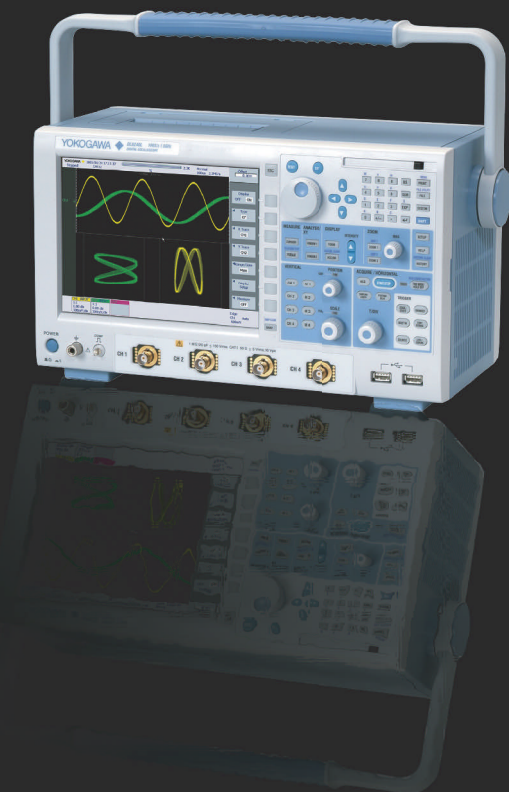
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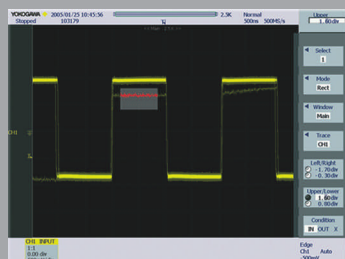
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More **value** and more **performance**

Our ultra-fast continuous waveform acquisition rate of 25,000 waveforms/second combined with our unique 2,000 acquisition "super history" memory ensures that even the rarest abnormal signals can be both captured and individually analyzed.

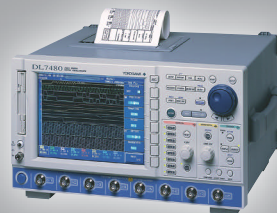


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- Clear 8.4 inch XGA dot density display
- Acquisition rates up to 2.5M waveforms/sec
- Real-time math and digital filters
- USB, Ethernet, PC card, Video out

To discover more about Yokogawa's scopes, please visit [promo.us.yokogawa.com](http://promo.us.yokogawa.com) and enter key code **AD7621**

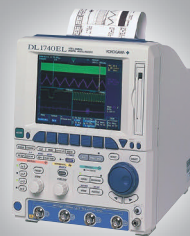
FAMILY

**DL7400**



- 4 or 8 channels + 16 logic inputs @ 500 MHz
- CAN, I<sup>2</sup>C, SPI & FlexRay triggering/analysis

**DL1700**



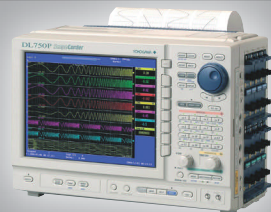
- 4 channels @ 500MHz
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- Up to 16 analog + 16 logic inputs
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Tegam

### Magnetic Field (Gauss/Tesla) Meters

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Systems

GMW Associates

Lake Shore  
Cryotronics

Magnetic Shield

Sypris Test &  
Measurement

Tecpel

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Fluke

Huntron

Navatek Engineering

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Agilent Technologies

B&K Precision

Fluke

Global Specialties

Instek America

Leader Instruments

Madell Technology

Protek Test and  
Measurement

Tecpel

### Oscilloscopes, Benchtop, Digital, 1 GHz and Above

Agilent Technologies

B&K Precision

LeCroy

SyntheSys Research

Tektronix

Wavecrest

Yokogawa Corp. of  
America

### Oscilloscopes, Benchtop, Digital, Below 1 GHz

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Data Physics

Fluke

Hameg Instruments

Hi-Techniques

Instek America

LDS Test and  
Measurement

LeCroy

Madell Technology

Tektronix

Yokogawa Corp. of  
America

### Oscilloscopes, Handheld

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Data Physics

Fluke

Saelig

Tektronix

### Pattern Generators, Digital

Agilent Technologies

Anritsu

Chroma ATE

Interface Technology

Klein Instruments

MicrolImage Video  
Systems

SyntheSys Research

Tabor Electronics

Tektronix

VMETRO

### Phase Meters/ Phase Angle Voltmeters

Agilent Technologies

Audio Precision

Clarke-Hess

Communication  
Research

Colby Instruments

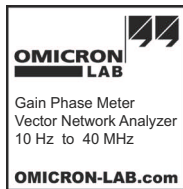
Exttech Instruments

Flex-Core

Hioki USA

Krohn-Hite

North Atlantic  
Industries



Signal Recovery

Tecpel

Tektronix

Xitron Technologies

Yokogawa Corp. of  
America

### Power Amplifiers

AR Worldwide

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Industrial

California Instruments

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Clarke-Hess

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Dynamic Solutions

Krohn-Hite

Ophir RF

Tabor Electronics



Trek

Unholtz-Dickie

### Power Monitors/ Analyzers

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Bird Electronic

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Clarke-Hess

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Exttech Instruments

Flex-Core

Fluke

GMC Instruments

GMW Associates

Hioki USA

IOtech

Magtrol

Marsh Bellofram

National Instruments

Ross Engineering

Spectrum Control

Tektronix

Xitron Technologies

Yokogawa Corp. of  
America

### Power Sources & Conditioners

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Electronics

Advanced Power  
Designs

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Agilent Technologies

AMREL

Autotest

B&K Precision

Behlman Electronics

C&D Technologies

California Instruments

Chroma ATE

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Research

Electron Tubes

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Geotest - Marvin Test  
Systems

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Kepco

Lake Shore  
Cryotronics

Lambda Americas

MSI Sensors

Pacific Power Source

Pulizzi Engineering

Spectrum Control

Superior Electric

Tamura Corp. of  
America

Tecpel

Tektronix

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Vektrex Electronic Systems  
Vicor  
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Catalyst Enterprises  
Connecticut Technology Products  
EXFO  
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GOPEL Electronics  
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Ixia  
LeCroy  
Symtx  
SyntheSys Research  
Tektronix  
VMETRO  
Wavecrest

### Signal Conditioners

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Briel & Kjaer, North America  
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Dataforth  
Dataq Instruments  
Dewetron  
Endevco  
Flex-Core  
Frequency Devices  
Futek Advanced Sensor Technology  
Hi-Techniques  
IMC DataWorks  
Krohn-Hite  
LDS Test and Measurement  
Macro Sensors  
Measurement Computing  
Microstar Laboratories  
National Instruments

Neff Instrument  
Newport Electronics  
Omega Engineering  
Pacific Instruments  
PCB Piezotronics  
Pico Technology  
Precision Filters  
R.C. Electronics  
Spectrum Control  
Unholtz-Dickie  
Yokogawa Corp. of America

### Sound/Audio Level Meters

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Briel & Kjaer, North America  
Casella USA  
Exttech Instruments  
IET Labs  
Monarch Instrument  
Protek Test and Measurement  
Sencore

Tecpel



Tektronix  
Yokogawa Corp. of America

### Spectrum Analyzers, Audio

Agilent Technologies  
Audio Precision  
AudioControl Industrial  
Briel & Kjaer, North America  
Casella USA  
Data Physics  
Dewetron  
Electronic Systems of Wisconsin  
Global Specialties

LDS Test and Measurement  
LMS Instruments  
Opticom  
OROS  
Sencore  
Stanford Research Systems  
Tektronix

### Tachometers

A.W. Sperry Instruments  
AEMC Instruments  
Data Physics  
IET Labs  
LDS Test and Measurement  
Marsh Bellofram  
Monarch Instrument  
Polytec  
Protek Test and Measurement  
Tecpel

### Temperature Meters, Bench

Beamex  
Fluke  
Keithley Instruments  
Lake Shore Cryotronics  
Monarch Instrument  
National Instruments  
Newport Electronics  
Omega Engineering  
Pyrometer Instrument  
Stanford Research Systems  
Xitron Technologies

### Temperature Meters, Handheld

A.W. Sperry Instruments  
AEMC Instruments  
Beamex  
Casella USA

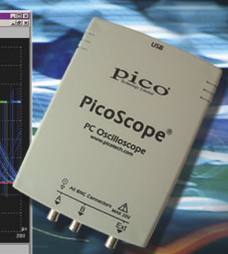
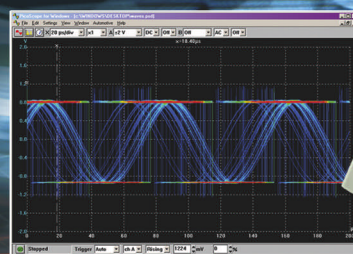
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# PicoScope 3000 Series PC Oscilloscopes

The PicoScope 3000 series oscilloscopes are the latest offerings from the market leader in PC oscilloscopes combining high bandwidths with large buffer memories. Using the latest advances in electronics, the oscilloscopes connect to the USB port of any modern PC, making full use of the PCs' processing capabilities, large screens and familiar graphical user interfaces.

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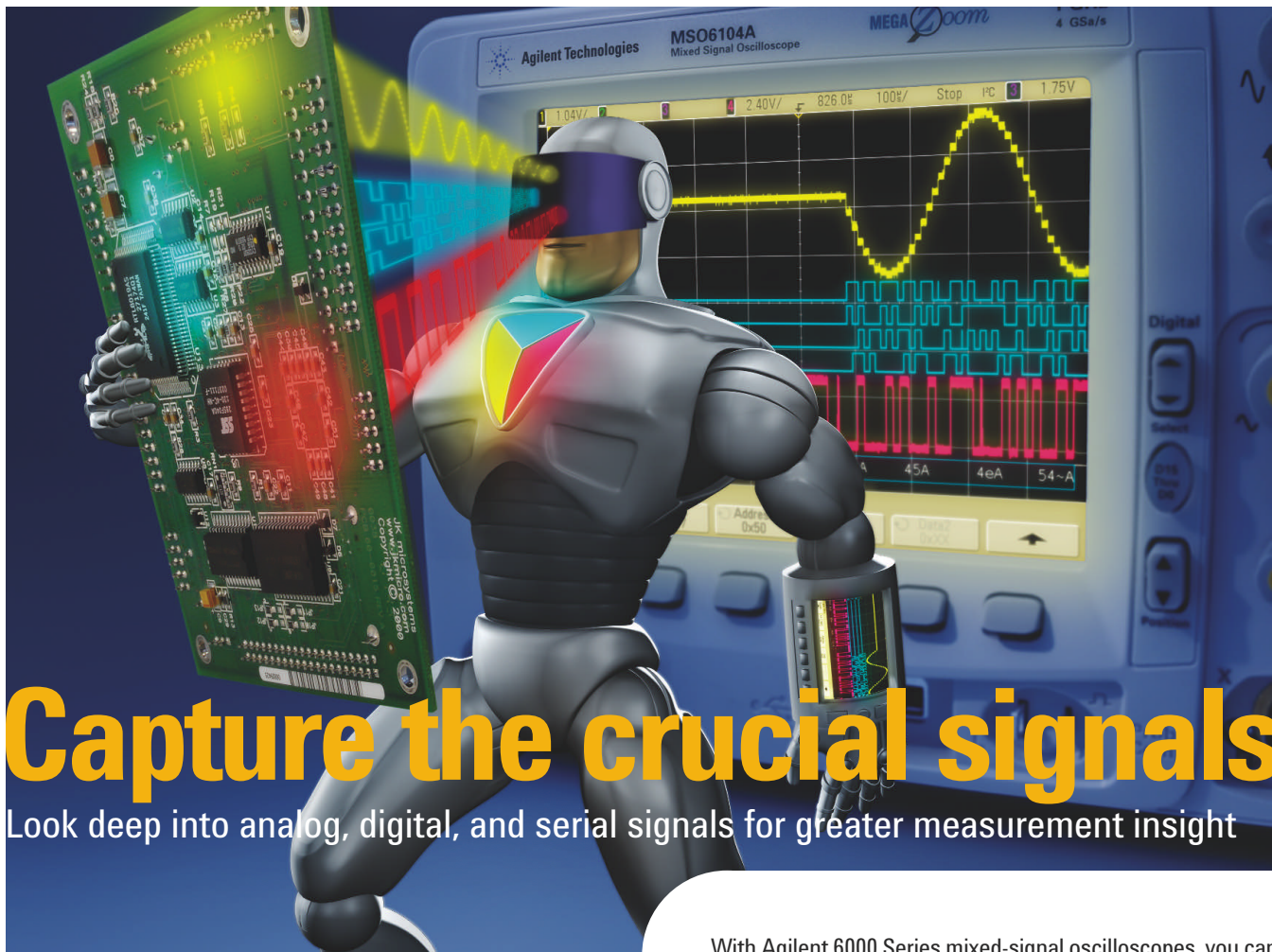
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PicoScope	3204	3205	3206
Bandwidth	50MHz	100MHz	200MHz
Sampling rate (repetitive)	2.5GS/s	5GS/s	10GS/s
Sampling rate (single shot)	50MS/s	100MS/s	200MS/s
Channels	2+Ext trigger	2+Ext trigger/Sig gen	2+Ext trigger/Sig gen
Oscilloscope timebases	5ns/div to 50s/div	2ns/div to 50s/div	1ns/div to 50s/div
Timebase accuracy	50ppm	50ppm	50ppm
Spectrum ranges	0 to 25MHz	0 to 50MHz	0 to 100MHz
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Resolution / accuracy	8 bits / 3%		
Ranges	±100mV to ±20V		
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Technology Limited





# Capture the crucial signals

Look deep into analog, digital, and serial signals for greater measurement insight



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| <b>Digital</b> | <ul style="list-style-type: none"> <li>• 16 digital timing channels, time correlated</li> <li>• Pattern and mixed-signal triggering</li> <li>• FPGA Dynamic Probe application</li> </ul>  |
| <b>Serial</b>  | <ul style="list-style-type: none"> <li>• Serial bus decode and trigger for I<sup>2</sup>C, SPI, CAN, and LIN; trigger only for USB</li> <li>• Up to 8Mpts of MegaZoom deep memory</li> </ul>  |

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### > STAND-ALONE TEST INSTRUMENTS *continued*

Computer Aided Solutions  
dataTaker  
Everest Interscience  
Extch Instruments  
Fluke  
Hart Scientific  
Hioki USA

Linseis  
Meterman Test Tools  
Monarch Instrument  
National Instruments  
Newport Electronics  
Nomadics  
Omega Engineering  
Prostat  
Protek Test and Measurement  
Pyrometer Instrument  
Rotronic Instrument  
Saelig

Tecpel



Tegam  
Telatemp  
Testo  
Yokogawa Corp. of America

#### Time/Frequency/Phase Standards

Agilent Technologies  
Clarke-Hess Communication Research  
Colby Instruments  
Guildline Instruments  
Newport Electronics

Novatech Instruments  
Pendulum Instruments  
Spectracom  
Stanford Research Systems  
Symmetricom  
Tabor Electronics  
Xitron Technologies

#### Transformer Testers

Chroma ATE  
Clarke-Hess Communication Research  
Hipotronics  
QuadTech  
Xitron Technologies

#### Video Test Sets

Agilent Technologies  
B&K Precision  
Chroma ATE

Fluke  
MicrolImage Video Systems  
Noise Com  
Photron  
Quantum Data  
Radiant Imaging  
Sencore  
SyntheSys Research  
Tektronix

#### Wattmeters

Bird Electronic  
Boonton Electronics  
Chroma ATE  
Clarke-Hess Communication Research  
Flex-Core  
Global Specialties  
Tecpel  
Xitron Technologies

### MODULAR INSTRUMENTS

#### Bus Interfaces & Extenders

ACCES I/O Products  
Adlink Technology  
Advanced Vehicle Technologies  
Advantech  
Agilent Technologies  
ASSET Intertech  
B & B Electronics  
Capital Equipment  
Concurrent Computer  
Curtiss-Wright Controls  
Elan Digital Systems  
FuturePlus Systems  
Geotest - Marvin Test Systems  
GOEPEL Electronics  
ICS Electronics  
ines  
IOtech  
JTAG Technologies  
Keithley Instruments  
M3 Electronics  
Measurement Computing  
MEN Micro  
Moxa Technologies  
National Instruments  
Pickering Interfaces

Saelig  
Scientific Solutions  
Sealevel Systems  
TAL Technologies  
VMETRO

#### CompactPCI/PXI Analog I/O Cards

ACCES I/O Products  
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Adlink Technology  
Advantech  
Alligator Technologies  
Analogic  
C&H Technologies  
Computer Aided Solutions  
Concurrent Computer  
DaqScribe Technology  
Exacq Technologies  
Frequency Devices  
GaGe  
Geotest - Marvin Test Systems  
GOEPEL Electronics  
ICS Sensor Processing  
Innovative Integration  
KineticSystems  
Measurement Computing  
MEN Micro

National Instruments  
North Atlantic Industries  
Strategic Test  
Tabor Electronics



Teradyne  
Assembly Test  
United Electronic Industries

#### CompactPCI/PXI Arbitrary Waveform Generators

Adlink Technology  
Advanced Power Designs  
Advantech  
Agilent Technologies  
C&H Technologies  
DaqScribe Technology  
Exacq Technologies  
Geotest - Marvin Test Systems  
GOEPEL Electronics

ICS Sensor Processing  
LeCroy  
National Instruments  
Pickering Interfaces  
PXIT  
Strategic Test  
Tabor Electronics  
United Electronic Industries  
Ztec

#### CompactPCI/PXI Counters/Timers

ACCES I/O Products  
Acromag  
Adlink Technology  
Advantech  
B & B Electronics  
Concurrent Computer  
Exacq Technologies  
Geotest - Marvin Test Systems  
KineticSystems  
MEN Micro  
National Instruments  
Signametrics  
Spectracom  
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Take a closer look at the new XTR. You will quickly discover it delivers the value you've come to expect from an industry leader. Contact Xantrex or one of its representatives today for a demonstration.

Find your nearest representative and download full specifications at [www.xantrex.com/XTR](http://www.xantrex.com/XTR)

#### Highlights

- ▶ 12 models at 850 W
- ▶ RS-485 interconnect standard
- ▶ RS-232 and USB 2.0 standard
- ▶ GPIB & LAN interfaces optional
- ▶ Soft switching
- ▶ Power Factor Correction (PFC)
- ▶ Universal AC input (85-265V)
- ▶ 5-year warranty

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	22	1 MS/s
	20	5 MS/s
	18	10 MS/s
	16	15 MS/s
High resolution, high speed	12	100 MS/s
	14	200 MS/s
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	8	250 MS/s
Low cost, high speed	8	100 MS/s

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To view an online demo of the PXI-5922 flexible-resolution digitizer, visit [ni.com/oscilloscopes](http://ni.com/oscilloscopes).

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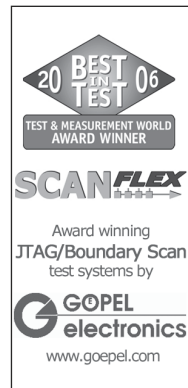
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2006-6630-101-D

## INSTRUMENTATION

### > MODULAR INSTRUMENTS *continued*

#### CompactPCI/PXI Digital I/O Cards

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Adlink Technology  
Advantech  
Analogic  
C&H Technologies  
Computer Aided Solutions  
Condor Engineering  
Conduant  
Exacq Technologies  
Frequency Devices  
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GOEPEL Electronics



Innovative Integration  
JTAG Technologies  
KineticSystems  
Measurement Computing  
MEN Micro  
National Instruments  
Navatek Engineering  
Pickering Interfaces  
PLD Applications  
Strategic Test  
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United Electronic Industries

#### CompactPCI/PXI Digitizers/ Oscilloscopes

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Advantech  
DaqScribe Technology  
Exacq Technologies  
GaGe  
Geotest - Marvin Test Systems

KineticSystems  
LeCroy  
Measurement Computing  
National Instruments  
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Strategic Test  
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Exacq Technologies  
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MEN Micro  
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#### CompactPCI/PXI DSP Cards

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Exacq Technologies  
ICS Sensor Processing  
Innovative Integration  
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Advantech  
Analogic  
Ballard Technology  
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Exacq Technologies  
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Innovative Integration  
KineticSystems

National Instruments  
PLD Applications  
Sealevel Systems  
Teradyne Assembly Test  
United Electronic Industries  
VMETRO

#### CompactPCI/PXI RF Measurement Cards

DaqScribe Technology  
Innovative Integration  
National Instruments  
Pickering Interfaces  
Ztec

#### CompactPCI/PXI Signal Conditioners

Alligator Technologies  
Analogic  
DaqScribe Technology  
Frequency Devices  
Innovative Integration  
MEN Micro  
National Instruments  
Pickering Interfaces  
Teradyne Assembly Test  
United Electronic Industries

#### CompactPCI/PXI Spectrum Analyzers

Exacq Technologies  
ICS Sensor Processing  
National Instruments

#### CompactPCI/PXI Switches/ Multiplexers

Adlink Technology  
Advantech  
ASCOR  
Chroma ATE  
Cytac  
Digalog Systems  
Exacq Technologies  
Geotest - Marvin Test Systems  
GOEPEL Electronics  
KineticSystems  
MEN Micro  
National Instruments

Pickering Interfaces  
Signametrics  
Teradyne Assembly Test

#### CompactPCI/PXI Time and Frequency Measurement Cards

Exacq Technologies  
Geotest - Marvin Test Systems  
KineticSystems  
MEN Micro  
National Instruments  
Signametrics  
Spectracom  
Symmetricom  
United Electronic Industries

#### Instrument Cards, Analog I/O

ACCES I/O Products  
Acromag  
Adlink Technology  
Advantech  
Alligator Technologies  
Analogic  
C&H Technologies  
Computer Aided Solutions  
Concurrent Computer  
Curtiss-Wright Controls  
DaqScribe Technology  
Data Translation  
Dataq Instruments  
Diamond Systems  
Elan Digital Systems  
Exacq Technologies  
Frequency Devices  
GaGe  
Geotest - Marvin Test Systems  
GOEPEL Electronics  
Highland Technology  
ICS Electronics  
ICS Sensor Processing  
ines  
Innovative Integration  
Intelligent Instrumentation  
IOtech  
Keithley Instruments  
KineticSystems

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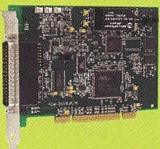
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## > MODULAR INSTRUMENTS *continued*

Lawson Labs  
LMS Instruments  
Measurement Computing  
MEN Micro  
Microstar Laboratories  
National Instruments  
Neff Instrument  
Pacific Instruments  
Pentek  
Pico Technology  
Racal Instruments  
Scientific Solutions  
Sealevel Systems  
Strategic Test  
United Electronic Industries  
VMETRO

Concurrent Computer  
DaqScribe Technology  
Data Translation  
Diamond Systems  
Elan Digital Systems  
Exacq Technologies  
Frequency Devices  
GaGe  
Geotest - Marvin Test Systems  
GOEPEL Electronics  
ICS Electronics  
ines  
Innovative Integration  
Intelligent Instrumentation  
IOtech  
JTAG Technologies  
Keithley Instruments  
KineticSystems  
Manufacturing Technology  
Measurement Computing  
MEN Micro  
Microstar Laboratories  
National Instruments  
Navatek Engineering  
Neff Instrument  
Pacific Instruments  
Pentek  
Racal Instruments  
Scientific Solutions  
Sealevel Systems  
Strategic Test  
United Electronic Industries  
Viewpoint Systems  
VMETRO

### Instrument Cards, Counter/Timer

ACCES I/O Products  
Acromag  
Adlink Technology  
Advantech  
Bustec  
C&H Technologies  
Concurrent Computer  
Exacq Technologies  
Geotest - Marvin Test Systems  
KineticSystems  
Measurement Computing  
MEN Micro  
National Instruments  
Neff Instrument  
Racal Instruments  
Scientific Solutions  
Sealevel Systems  
Strategic Test  
United Electronic Industries  
Viewpoint Systems  
VMETRO

ACCES I/O Products  
Acromag  
Adlink Technology  
Advantech  
AIM USA  
Analogic  
Bustec  
C&H Technologies  
Computer Aided Solutions  
Ztec

### Instrument Cards, Digital I/O

ACCES I/O Products  
Acromag  
Adlink Technology  
Advantech  
AIM USA  
Analogic  
Bustec  
C&H Technologies  
Computer Aided Solutions

Acqiris USA  
Adlink Technology  
Alacron  
Analogic  
Bustec  
Chase Scientific  
Dewetron  
Exacq Technologies  
GaGe  
Geotest - Marvin Test Systems  
Keithley Instruments  
KineticSystems

Measurement Computing  
MEN Micro  
National Instruments  
Pacific Instruments  
Pickering Interfaces  
Pico Technology  
PXIT

Racal Instruments  
Saelig  
Strategic Test  
TiePie engineering  
United Electronic Industries  
Ztec

### Instrument Cards, DMM

Data Translation  
Exacq Technologies  
Geotest - Marvin Test Systems  
ines  
Keithley Instruments

MEN Micro  
National Instruments  
Pickering Interfaces  
Racal Instruments  
Signametrics

*continued* >

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- GX7100A - 14-slot, 3U / 6U PXI
- GX7000A - 20-slot, 6U PXI

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**Agilent Technologies**

## INSTRUMENTATION

### > MODULAR INSTRUMENTS *continued*

#### Instrument Cards, DSP

Applied Signal Technology  
Computer Aided Solutions  
Concurrent Computer  
DaqScribe Technology  
Data Translation  
Exacq Technologies  
ICS Sensor Processing  
Innovative Integration  
LMS Instruments  
MEN Micro  
Microstar Laboratories  
National Instruments  
Pentek  
Ztec

#### Instrument Cards, Freq., Time, Synchro-Resolver

C&H Technologies  
Concurrent Computer  
Exacq Technologies  
Geotest - Marvin Test Systems  
GuideTech  
Highland Technology  
Keithley Instruments  
KineticSystems  
Measurement Computing  
MEN Micro  
North Atlantic Industries  
Pacific Instruments  
Racal Instruments  
Signametrics  
Spectracom  
Symmetricom

#### Instrument Cards, Logic Analyzers

Exacq Technologies  
Geotest - Marvin Test Systems  
National Instruments  
NCI Logic Analyzers

#### Instrument Cards, MIL-STD-1553/ ARINC

AIM USA  
Ballard Technology  
Bustec  
Condor Engineering

Curtiss-Wright Controls  
Geotest - Marvin Test Systems  
KineticSystems  
Pickering Interfaces

#### Instrument Cards, Prototype

C&H Technologies  
Geotest - Marvin Test Systems  
Innovative Integration  
Interface Technology  
KineticSystems  
MEN Micro  
National Instruments  
Pacific Instruments  
Pickering Interfaces  
Racal Instruments

#### Instrument Cards, Signal Sources

Adlink Technology  
Analogic  
C&H Technologies  
Chase Scientific  
Data Physics  
Data Translation  
Exacq Technologies  
Frequency Devices  
Geotest - Marvin Test Systems  
Highland Technology  
Keithley Instruments  
LMS Instruments  
Measurement Computing  
MEN Micro  
National Instruments  
Novatech Instruments  
Pacific Instruments  
Pentek  
Pickering Interfaces  
Racal Instruments  
Signametrics  
Strategic Test  
United Electronic Industries

#### Instrument Cards, Spectrum Analyzers

Data Physics  
Dewetron  
Exacq Technologies  
Morrow Technologies

National Instruments  
Pico Technology  
Saelig

#### Instrument Cards, Switches, Multiplexers

Adlink Technology  
Advantech  
Analogic  
Bustec  
C&H Technologies  
Chroma ATE  
Cytec  
Exacq Technologies  
Geotest - Marvin Test Systems  
ICS Electronics  
Keithley Instruments  
KineticSystems  
Manufacturing Technology  
National Instruments  
Neff Instrument  
Pacific Instruments  
Pickering Interfaces  
Racal Instruments  
Signametrics  
Universal Switching  
VXI Technology

#### Instrument Cards, Video Test

Acqiris USA  
Exacq Technologies  
National Instruments  
Racal Instruments  
Videology Imaging Solutions

#### Instrument Controllers/ Computers

Acromag  
Adlink Technology  
Agilent Technologies  
Bustec  
Geotest - Marvin Test Systems  
Innovative Integration  
IOtech  
KineticSystems  
MEN Micro  
National Instruments  
Newport Electronics  
Onset Computer

PFU Systems  
Racal Instruments  
Tektronix  
United Electronic Industries

#### Instrument Mainframes/ Chassis

Acqiris USA  
Adlink Technology  
Agilent Technologies  
Dewetron  
ELMA Electronic  
Frequency Devices  
GaGe  
Geotest - Marvin Test Systems  
Hi-Techniques  
IMC DataWorks  
Keithley Instruments  
KineticSystems  
Manufacturing Technology  
Neff Instrument  
Pacific Instruments  
Pickering Interfaces  
Precision Filters  
Racal Instruments  
Tektronix  
Tracewell Systems  
United Electronic Industries

#### LXI Instruments

Agilent Technologies  
Elgar Electronics  
Keithley Instruments  
Pickering Interfaces  
Rohde & Schwarz  
VXI Technology

#### PC Card (PCMCIA) Modules

ACCES I/O Products  
Alligator Technologies  
B & B Electronics  
Ballard Technology  
Condor Engineering  
Data Physics  
Data Translation  
FuturePlus Systems  
GOEPEL Electronics  
ICS Electronics  
Keithley Instruments

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- N8212A 20 GHz Performance Vector Upconverter
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[www.agilent.com/find/openlxi](http://www.agilent.com/find/openlxi)

The light's gone on for even easier system integration—and Agilent has flipped the switch. Agilent Open now includes devices based on LAN eXtensions for Instrumentation (LXI), and you can use this new standard to accelerate your system development and deployment.

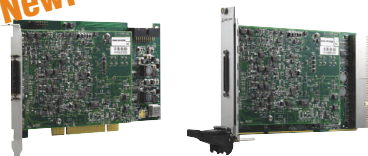
The versatility of LXI utilizes Ethernet to enable local and remote measurements, monitoring, and control—and eliminates costly cardcages and proprietary interfaces. With more than 40 member companies supporting the LXI Consortium, the growing number of LXI devices will have you well-equipped to take the next step beyond GPIB.

LXI is one more way Agilent Open continues to simplify system creation. Our products are system ready, can be integrated into your test-software environment, and provide USB, GPIB, and LAN I/O options. Enlighten your whole testing process—get details about LXI and Agilent Open at [www.agilent.com/find/openlxi](http://www.agilent.com/find/openlxi).



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**PXI-2016**

### Features

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- Scatter-Gather DMA for Both Analog Inputs and Outputs
- Two-Channel 12-bit Multiplying Analog Outputs with Waveform Generation
- 24-Channel TTL Digital Input/Output
- Two-Channel 16-bit Timer/Counter on-board

### PXI-2016

- PXI Specifications Rev. 2.2 Compliant and CompactPCI Compliant (PICMG 2.0 R3.0)

### DAQ-2016

- Supports a 32-bit 3.3 V or 5 V PCI Bus



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## INSTRUMENTATION

### > MODULAR INSTRUMENTS *continued*

Measurement Computing  
National Instruments  
Sealevel Systems  
TAL Technologies

Daq Instruments  
Dewetron  
DGH  
Endevco  
Frequency Devices  
Highland Technology  
ICS Electronics  
ICS Sensor Processing  
IMC DataWorks

Highland Technology  
KineticSystems  
Pentek  
Racal Instruments  
Summit Instruments  
VXI Technology

Analogic  
Bustec  
KineticSystems  
Racal Instruments  
Teradyne Assembly Test  
VXI Technology  
Ztec

### PXI Embedded Controllers

ACCES I/O Products  
Conduant  
Geotest - Marvin Test Systems  
GOEPEL Electronics  
KineticSystems  
MEN Micro  
National Instruments  
United Electronic Industries

Innovative Integration  
Intelligent Instrumentation  
IOtech  
Keithley Instruments  
KineticSystems  
Krohn-Hite  
Lawson Labs  
Measurement Computing

### VXIbus Analyzers, Spectrum, Logic, Network

Agilent Technologies  
Data Physics  
Morrow Technologies  
Racal Instruments  
VMETRO

### VXIbus Frequency or Time Measurement Instruments

Agilent Technologies  
ASCOR  
Bustec  
C&H Technologies  
Highland Technology  
Interface Technology  
KineticSystems  
Racal Instruments  
Signametrics  
Spectracom  
Symmetricom  
VXI Technology  
Ztec

### PXI Mainframe Interconnects (Receivers)

Geotest - Marvin Test Systems  
MAC Panel  
National Instruments  
Virginia Panel

Microstar Laboratories  
National Instruments  
Neff Instrument  
Newport Electronics

### VXIbus Communication Modules

Agilent Technologies  
AIM USA  
C&H Technologies  
Condor Engineering  
ICS Electronics  
KineticSystems  
North Atlantic Industries  
Pentek  
Racal Instruments  
Teradyne Assembly Test  
VXI Technology

### VXIbus Mainframes/Chassis

Agilent Technologies  
ASCOR  
B & B Technologies  
Chroma ATE  
ELMA Electronic  
ICS Electronics  
KineticSystems  
MAC Panel  
National Instruments  
Racal Instruments  
Teradyne Assembly Test  
Tracewell Systems  
Virginia Panel  
VXI Technology

### PXI System Mainframes

Adlink Technology  
Chroma ATE  
Digalog Systems  
ELMA Electronic  
Geotest - Marvin Test Systems  
KineticSystems  
National Instruments  
Pickering Interfaces  
Teradyne Assembly Test  
Tracewell Systems  
United Electronic Industries

North Atlantic Industries  
Pacific Instruments  
Pentek  
Pickering Interfaces  
Pico Technology  
Precision Filters  
R.C. Electronics  
Racal Instruments  
Sealevel Systems  
Teradyne Assembly Test  
United Electronic Industries  
VXI Technology

### VXIbus Digital I/O

Agilent Technologies  
ASCOR  
Bustec  
C&H Technologies  
ICS Electronics  
Interface Technology  
JTAG Technologies  
KineticSystems  
Manufacturing Technology  
Pentek  
Racal Instruments  
Teradyne Assembly Test  
VXI Technology

### VXIbus Power Meters and Power Supplies

Advanced Power Designs  
Agilent Technologies  
Boonton Electronics  
Chroma ATE  
Giga-tronics

### Signal-Conditioning Modules & Boards

ACCES I/O Products  
Acromag  
Advantech  
Alligator Technologies  
Analogic  
Bustec  
DaqScribe Technology  
Data Translation  
Dataforth

### VXIbus Amplifiers, Attenuators

Agilent Technologies  
Alligator Technologies  
Frequency Devices  
Kemo  
KineticSystems  
North Atlantic Industries  
Racal Instruments  
VXI Technology  
Alligator Technologies  
C&H Technologies  
Frequency Devices

### VXIbus Digitizers, Oscilloscopes

Acqiris USA  
Agilent Technologies

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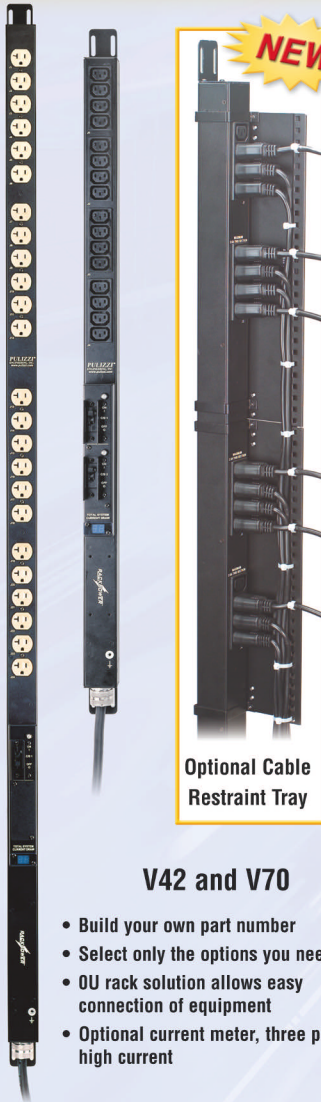


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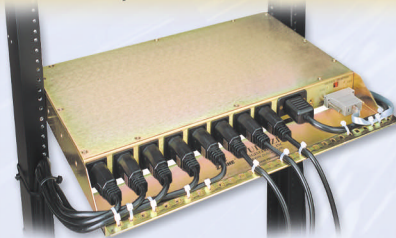
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KIT-CABLES-02

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TPC4100

- Inputs three phase and outputs single phase 120 or 208 volt
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- TPC4100-C outputs 72 amps single phase 120 volt
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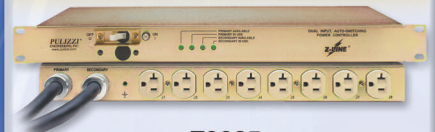
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- Brown-out monitoring with fast transfer time
- Transfers between "out of phase" sources
- 120 volt, 208 volt up to 30 amps available

Voltage Regulation  
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- Protects equipment from voltage brown-outs/sags
- Over current circuit breaker
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eAutomation

## INSTRUMENTATION

### > MODULAR INSTRUMENTS *continued*

Highland Technology  
Kepco  
Tracewell Systems

#### VXIbus Signal Sources

Aeroflex  
Agilent Technologies  
Analogic  
C&H Technologies  
Frequency Devices  
Giga-tronics  
Highland Technology  
Interface Technology  
KineticSystems

Noise Com  
Racal Instruments  
Signametrics  
Symmetricom  
Teradyne  
Assembly Test  
VXI Technology

#### VXIbus Switches, Multiplexers

Agilent Technologies  
Analogic  
ASCOR  
Bustec  
C&H Technologies

Cytec  
KineticSystems  
Manufacturing  
Technology  
Pickering Interfaces  
Racal Instruments  
Teradyne  
Assembly Test  
Universal Switching  
VXI Technology

#### VXIbus System Controllers, Slot 0

Agilent Technologies  
Bustec

KineticSystems  
National Instruments  
Racal Instruments  
VXI Technology

#### VXIbus Telecommunicati on-Test Instruments

Agilent Technologies  
Noise Com  
Pentek  
Racal Instruments  
Teradyne  
Assembly Test

## SENSORS

### Accelerometers

Bruel & Kjaer, North America  
Endevco  
Honeywell Sensotec  
IMV  
Instrumented Sensor Technology  
Kistler Instrument  
MSI Sensors  
Omega Engineering  
PCB Piezotronics  
Polytec  
Robert A. Denton  
Summit Instruments

Honeywell Sensotec  
Kistler Instrument  
MSI Sensors  
Newport Electronics  
Omega Engineering  
PCB Piezotronics  
Robert A. Denton  
Sensor Products  
SOLTEC  
Tekscan

### Humidity Sensors

AEMC Instruments  
Campbell Scientific  
MSI Sensors  
Newport Electronics  
Omega Engineering  
Onset Computer  
Pace Scientific  
Reinhardt System und Messelectronic  
Rotronic Instrument  
Saelig  
SensArray

### Current Sensors

A.H. Systems  
AEMC Instruments  
Campbell Scientific  
ETS-Lindgren  
Flex-Core  
GMC Instruments  
GMW Associates  
Hioki USA  
Ion Physics  
Marsh Bellofram  
Pace Scientific  
Pearson Electronics  
Sypris Test & Measurement  
Tecpel

### Magnetic Field Sensors

ETS-Lindgren  
GMW Associates  
Ion Physics  
Lake Shore  
Cryotronics  
Magnetic Shield  
Sypris Test & Measurement

### Force & Strain Sensors

Campbell Scientific  
Futek Advanced  
Sensor Technology

### Position Sensors

GMW Associates  
Macro Sensors  
MSI Sensors  
North Atlantic Industries  
PerkinElmer  
Optoelectronics  
Polytec  
Robert A. Denton  
Sypris Test & Measurement  
Ultrafast Sensors

### Pressure Sensors

American Sensor Technologies  
Brue & Kjaer, North America  
Campbell Scientific  
Endevco  
Futek Advanced  
Sensor Technology  
Kistler Instrument  
Marsh Bellofram  
MSI Sensors  
Newport Electronics  
Omega Engineering  
Pace Scientific  
PCB Piezotronics  
Pressure Systems  
Sensor Products  
Sensortech  
Tekscan

### Sound Sensors

AEMC Instruments  
Brue & Kjaer, North America

### Temperature Sensors

AEMC Instruments  
B & B Electronics  
BetaTHERM Sensors  
Electronic Development Labs  
Everest Interscience  
Extech Instruments  
FLIR Systems  
Hioki USA  
Kurz Instruments  
Lake Shore  
Cryotronics  
Marsh Bellofram  
National Instruments  
Newport Electronics  
Nomadics  
Omega Engineering  
Onset Computer  
Pace Scientific  
PerkinElmer  
Optoelectronics  
Pico Technology  
Pyrometer Instrument  
Reinhardt System und Messelectronic  
Rotronic Instrument  
SensArray  
Sensor Products  
Tecpel  
Telatemp  
Thermo Electric  
Total Temperature Instrumentation



## SOFTWARE

### Audio Test Software

Data Physics  
SigmaQuest

### C/C++ Libraries

Agilent Technologies  
Dalsa Coreco  
Data Translation  
EPIX  
Euresys  
Exacq Technologies  
Geotest - Marvin Test Systems  
GOEPEL Electronics  
ICS Electronics  
Innovative Integration  
Intelligent Instrumentation  
JTAG Technologies  
Matrox Imaging  
Measurement Computing

MVtec Software  
National Instruments  
Pacific Instruments  
Pentek  
Pleora Technologies  
Rad-icon Imaging  
Scientific Solutions  
Symtx  
TAL Technologies  
United Electronic Industries  
Vektrex Electronic Systems  
VI Technology

### Calibration Management Software

Advint  
American Quality Systems  
AssetSmart  
Beamex

Blue Mountain Quality Resources  
Cascade Microtech  
CyberMetrics  
Euresys  
Instrumentation Engineering  
Symtx

### Calibrator-Control Software

Advint  
Beamex  
Euresys  
Fluke  
Instrumentation Engineering  
Novx  
Symtx

### Data-Analysis Software

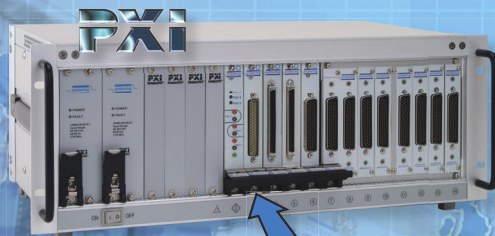
Advantech  
Alligator Technologies  
Analogic  
Applied Signal Technology  
Aptech Systems  
Autotest  
Condor Engineering  
Credence Systems  
Dalsa Coreco  
Data Physics  
Data Translation  
Dataq Instruments  
Dewetron  
DSP Development  
DYNAFLOW  
GaGe  
Geotest - Marvin Test Systems  
GHI Systems

Givens Control Engineering  
GOEPEL Electronics  
Golden Software  
GraphPad Software  
Graphtec America  
Hi-Techniques  
IMC DataWorks  
ines  
Innovative Integration  
Integrated Sciences Group  
IOtech  
JMP  
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LDS Test and Measurement  
LMS Instruments  
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Measurement Computing  
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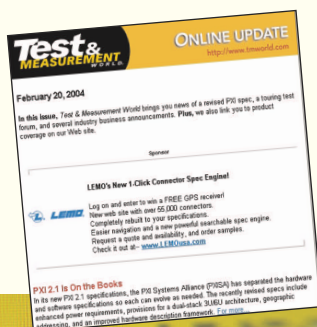
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Tektronix  
Test Advantage  
TestEdge  
UGS  
Unholtz-Dickie  
VI Technology  
Wavecrest

#### **EMC Test Software**

AR Worldwide  
RF/Microwave  
Instrumentation  
ETS-Lindgren  
Mentor Graphics  
Novx  
Quantum Change  
Rohde & Schwarz  
TDK RF Solutions  
Tektronix

#### **Instrument Control Software, Stand-Alone Executables**

Advint  
Analogic  
Autotest  
Capital Equipment  
Dewetron  
Geotest - Marvin Test Systems  
Giga-tronics  
Graphtec America  
ICS Electronics  
Instrumentation Engineering  
Intelligent Instrumentation  
IOtech  
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KineticSystems  
Materials Development  
Measurement Computing  
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National Instruments  
Neff Instrument  
Novx  
Pace Scientific  
Pacific Instruments  
Quantum Change  
Racal Instruments  
SigmaQuest  
Symtx  
TAL Technologies  
Tektronix  
TransEra  
TYX  
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Vektrex Electronic Systems  
VXI Technology

#### **Software, Distributors**

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#### **Statistical Process-Control Software**

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GOEPEL Electronics  
ICS Electronics  
IET Labs  
IMC DataWorks  
ines  
Instrumentation  
Engineering  
Integral Vision  
Intelligent  
Instrumentation

Keithley Instruments  
Kuka Real Time  
Products  
m + p international  
Matrox Imaging  
Measurement  
Computing  
National Instruments  
Pacific Instruments  
Racal Instruments  
Scientific Solutions  
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TAL Technologies  
United Electronic  
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A.T.E. Solutions  
Advint  
Northwest Analytical  
Racal Instruments  
SigmaQuest  
Statit Software  
TestEdge  
UGS  
VI Technology

#### ACCESSORIES

##### Connectors/ Clips/Cables

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Interconnections  
Advint  
Agilent Technologies  
Aries Electronics  
B & B Electronics  
Brueel & Kjaer, North  
America  
Cablescon  
Cal Test Electronics  
Capital Equipment  
Components Corp.  
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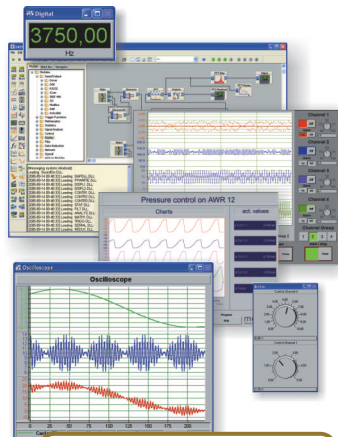


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Ross Engineering  
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KineticSystems  
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company  
MetricTest  
Miller Industrial  
PTL Test Equipment  
S.R.S. Market Solutions  
Stanley Supply &  
Services  
Terra Universal  
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TestMart  
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### Distributors— Stand-Alone Test Instruments

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Carltext International  
Circuit Specialists  
Continental Resources  
dataTaker  
Digi-Key  
Direct Industry  
Emulation Technology  
GMW Associates  
Huntron  
Madell Technology

### Manuals

Manuals Plus  
PTL Test Equipment  
Tektronix  
W.J. Ford Surplus  
Enterprises

### Online Auction Sites

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DoveBid Test &  
Measurement Group  
eBay  
LabX  
TestMart

### Training— PC-Based Instruments

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Rohde & Schwarz  
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Warwick Control  
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### Rental/Lease— Stand-Alone Test Instruments

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Allied Resources  
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Instruments  
Avalon Equipment  
Bell Electronics NW  
Continental Resources  
Electro Rent  
Industrial Resources  
Krohn-Hite  
Lake Shore  
Cryotronics  
MetricTest  
Microlease  
Noise Com



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PTL Test Equipment  
QuadTech  
Spectratest  
TechRecovery  
Test Equipment Connection  
Test Equipment Solutions Today  
TestEdge  
TestEquity  
Trek  
Trek Equipment  
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Cincinnati Sub-Zero  
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Envirotronics  
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Fluke  
Instrumentation Engineering  
Keithley Instruments  
MetricTest  
Mindready Solutions  
Mitutoyo America  
Nevada Automotive Test Center  
Newport Electronics  
Noise Com  
OptoTest  
Pikes Peak Test Labs

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Ross Engineering  
Symtx  
Sypris Test & Measurement  
Test Equipment Connection  
Thunder Scientific  
Total Temperature Instrumentation  
Tucker Electronics  
VLSI Standards

#### Repair Services

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Cincinnati Sub-Zero  
Comware Technical Services  
Data Physics  
Dynamic Solutions  
Environment Associates  
Envirotronics  
ETS-Lindgren  
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TUV America  
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#### Standards Documents

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Sypris Test & Measurement

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## IN THIS SECTION:

- ▷ ATE/QA/Production Test Equipment, below
- ▷ ATE/DFT/BIST Software, p. 66
- ▷ Accessories, p. 68
- ▷ Third-Party Suppliers, p. 72
- ▷ Services/Labs/Test Houses, p. 74

## ATE/QA/PRODUCTION TEST EQUIPMENT

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JDSU  
Keithley Instruments  
National Instruments  
QualiTau  
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GOEPEL Electronics  
Huntron  
Instrumentation Engineering  
JTAG Technologies  
Landrex Technologies  
Luther & Maelzer  
Manufacturing Technology  
Micro Control  
National Instruments

Navatek Engineering  
Owens Design  
Racal Instruments  
Reinhardt System und Messelectronic  
Seica  
SPEA  
Symtx  
Teradyne Assembly Test  
Test Research  
Testronics  
Thermotron Industries  
VI Technology  
VXI Technology  
W.M. Hague  
Y-tek

### ATE, Semiconductor

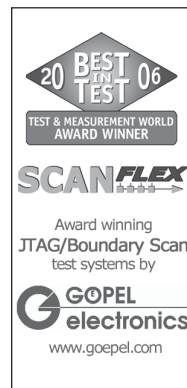
Advantest  
Agilent Technologies  
Boonton Electronics  
BP Microsystems  
Chroma ATE  
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DiagnoSYS Systems  
Eagle Test Systems  
ETEC  
Geotest - Marvin Test Systems  
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CheckSum  
Cirris Systems  
Digitaltest  
Everett Charles Technologies  
Luther & Maelzer  
Seica  
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### Boundary-Scan Test Tools

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ASSET Intertech  
CIMTEK  
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Flynn Systems  
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Huntron  
Intellitech  
JTAG Technologies  
Rcreations  
Seica  
Teradyne Assembly Test

### Cable/Harness Testers

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Cablescan  
CableTest Systems  
CAMI Research  
CheckSum  
Cirris Systems  
DIT-MCO International  
Dynalab Test Systems  
Hipotronics  
Instrumentation Engineering  
OptoTest  
QuadTech  
Reinhardt System und Messelectronic  
Slaughter  
Symtx

### Device Programmers

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Data I/O  
Digitaltest  
GOEPEL Electronics  
JTAG Technologies  
Stag Programming Solutions

### Discrete Component Testers

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CableTest Systems  
Corelis  
Eagle Test Systems  
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Geotest - Marvin Test Systems  
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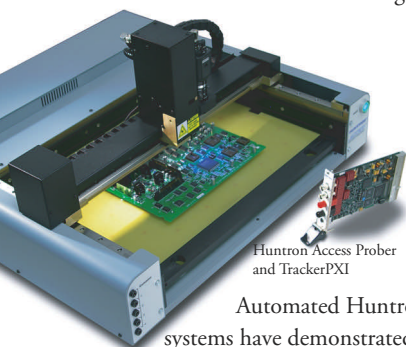
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> ATE/QA/PRODUCTION TEST EQUIPMENT *continued*

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CIMTEK  
Digitaltest  
Electronic Systems of Wisconsin  
Geotest - Marvin Test Systems  
GOEPEL Electronics  
Instrumentation Engineering  
Landrex Technologies  
Microsys Technologies  
National Instruments  
Racal Instruments  
Seica  
Symtx  
Teradyne  
Assembly Test  
Thermotron Industries  
VI Technology  
Y-tek

### Handlers/Sorters

Advantest  
Electroglas  
ic automation  
Micro Component Technology  
Multitest  
Elektronische Systeme  
Zmation

### Memory Testers

Advantest  
BP Microsystems  
Geotest - Marvin Test Systems  
Micro Control  
Tanisys Technology  
Verigy

### Power Sources, Frame-Mounted

ABSOPULSE Electronics  
AMREL  
Autotest  
Behlman Electronics  
Chroma ATE

Glassman High Voltage  
Keithley Instruments  
Lambda Americas  
Pacific Power Source  
Pickering Interfaces  
Pulizzi Engineering  
Tamura Corp. of America  
Tracewell Systems  
Vektrex Electronic Systems  
Vicom  
Xantrex Technology

### Power Supply Testers

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Advanced Power Designs  
Autotest  
California Instruments  
Chroma ATE  
Elgar Electronics  
Geotest - Marvin Test Systems  
Hipotronics

Instrumentation Engineering  
Keithley Instruments  
National Instruments  
Pacific Power Source  
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Reinhardt System und Messelectronic  
SPEA  
Symtx  
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### Probe Stations & Accessories

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Aehr Test Systems  
Cascade Microtech  
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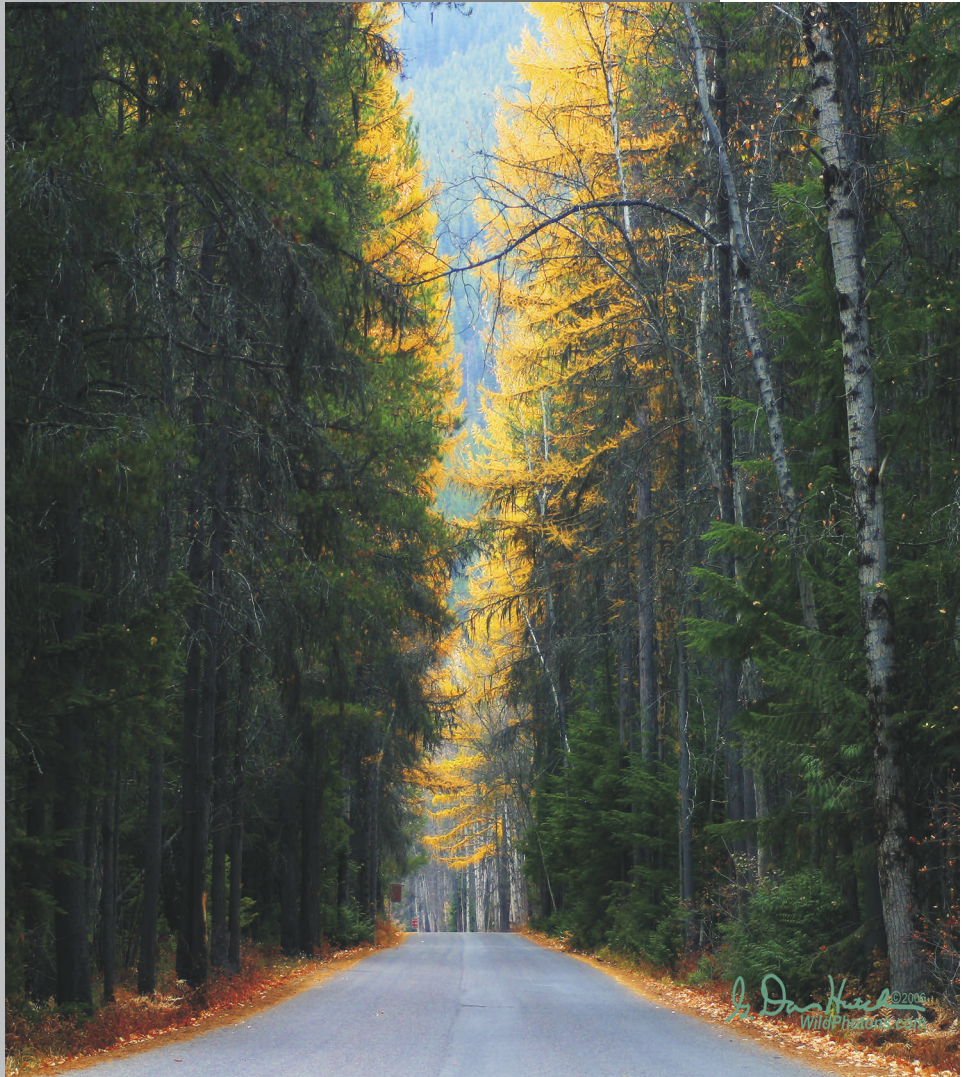
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Cytec  
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Systems  
JDSU  
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Keithley Instruments  
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Precision Filters  
Racal Instruments  
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Micro Lambda Wireless  
Micromanipulator  
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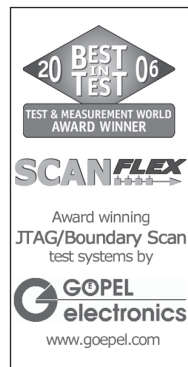
## ATE/DFT/BIST SOFTWARE

### BIST Software

A.T.E. Solutions  
Acculogic  
Credence Systems  
JTAG Technologies  
LogicVision  
Mentor Graphics  
SynTest Technologies

### Boundary-Scan Software

Acculogic  
Acugen Software  
Agilent Technologies  
ASSET Intertech  
CIMTEK  
Corelis  
Flynn Systems  
GOEPEL Electronics



Intellitech  
JTAG Technologies  
LogicVision  
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Ricreations  
Synopsis

SynTest Technologies  
Teradyne  
Assembly Test

### Design Verification Software

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Autotest  
Cadence  
Credence Systems  
Geotest - Marvin Test  
Systems  
GOEPEL Electronics  
Inovys  
Intellitech  
Intusoft  
LPKF Laser and  
Electronics  
Mentor Graphics  
National Instruments  
Novas Software  
OptEM Engineering  
PDF Solutions  
Router Solutions  
SigmaQuest  
Synopsis  
Teradyne  
Assembly Test  
UGS  
VI Technology

### Device Defect- Analysis Software

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Credence Systems  
Geotest - Marvin Test  
Systems  
GOEPEL Electronics

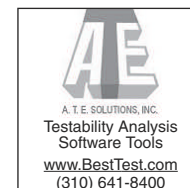
Inovys  
LogicVision  
LPKF Laser and  
Electronics  
Mentor Graphics  
Rudolph Technologies  
SigmaQuest  
Test Advantage  
VI Technology

### DFM/DFY Software

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### DFT Board Software

A.T.E. Solutions



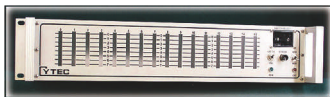
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Router Solutions  
SPEA

*continued* >



# PROGRAMMABLE SWITCHING SYSTEMS FOR AUTOMATED TEST, DATA ACQUISITION AND COMMUNICATIONS

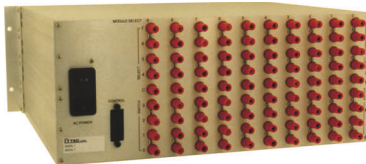
## General Purpose Test



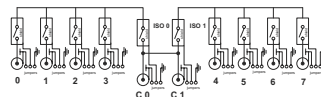
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- Modular Systems
- Mux, Matrix and Discrete Modules
- LED Display of Switch Points
- Many configuration options
- Custom systems with low NRE!

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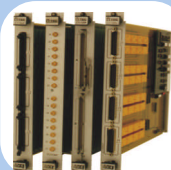


## Low Leakage, Low Current

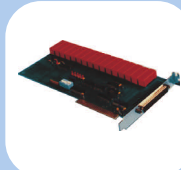


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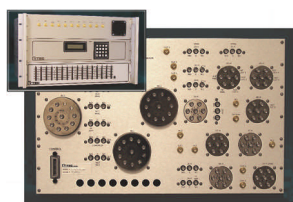
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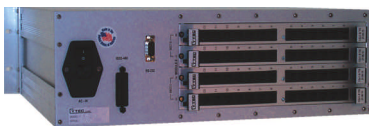
### Microwave, RF, Video



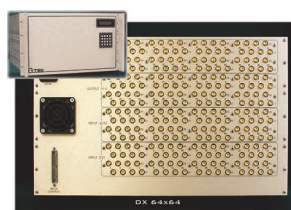
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- NxM Microwave Matrices
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Cadence

Credence Systems  
Flynn Systems  
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ANSOFT  
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GOEPEL Electronics

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Mentor Graphics  
National Semiconductor  
OptEM Engineering  
Texas Instruments

### Electronic Simulation Software, Device

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Acugen Software  
ANSOFT  
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Geotest - Marvin Test Systems  
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Teradyne  
Assembly Test  
Teradyne Semiconductor Test  
Test Advantage  
TransEra  
TYX  
UGS  
Unisoft  
Vektrex Electronic Systems

### Programming Languages

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Acugen Software  
Agilent Technologies  
Aptech Systems  
ASSET Intertech  
Autotest  
Capital Equipment  
Corelis  
Credence Systems  
Data Translation  
Dewetron  
DSP Development  
Exacq Technologies  
Flynn Systems  
Geotest - Marvin Test Systems  
GOEPEL Electronics  
IMC DataWorks  
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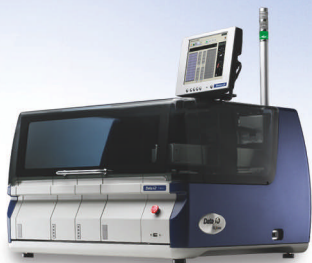
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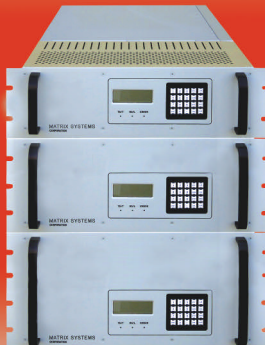
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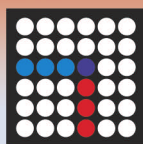
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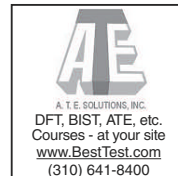
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Systems  
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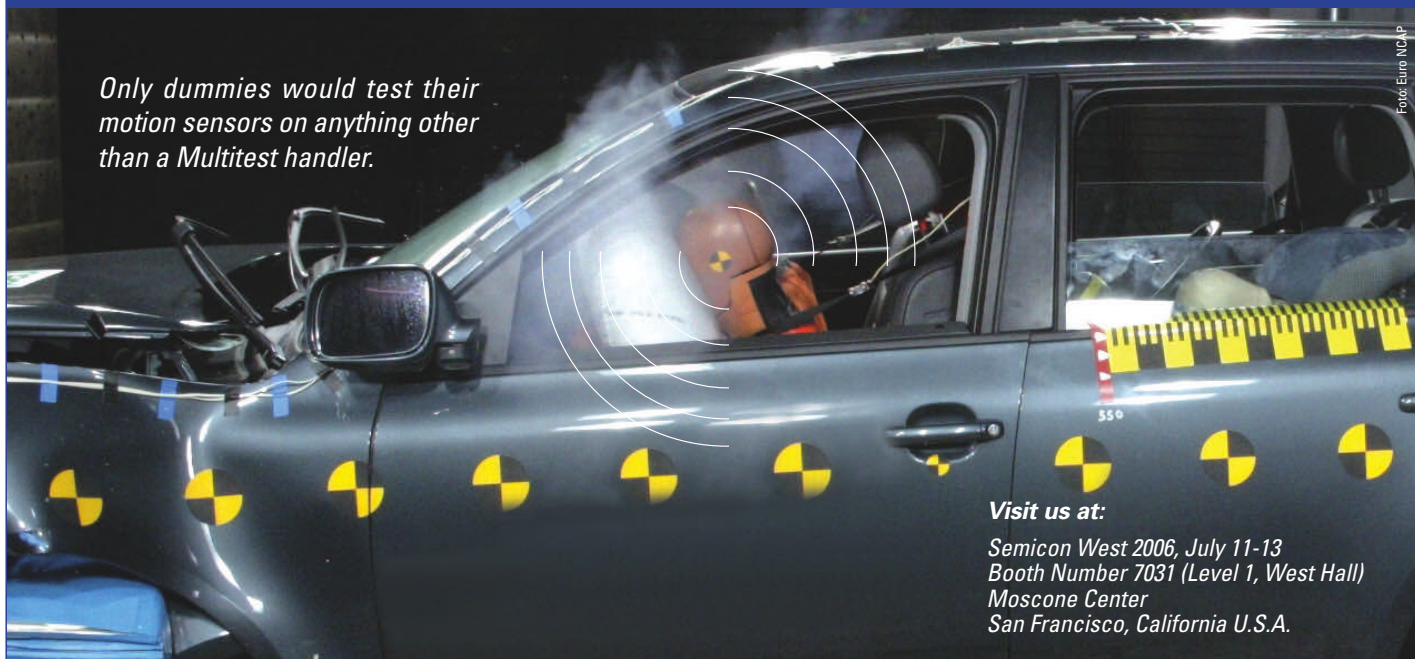
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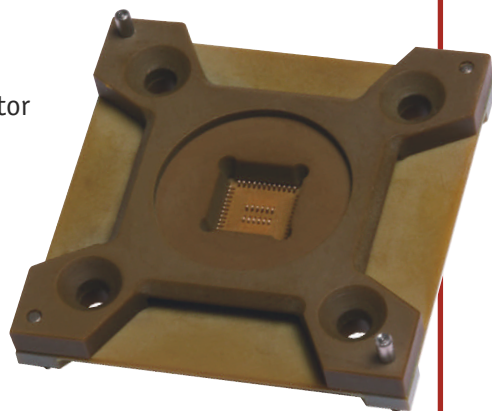
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***The Right Contacts***<sup>®</sup>  
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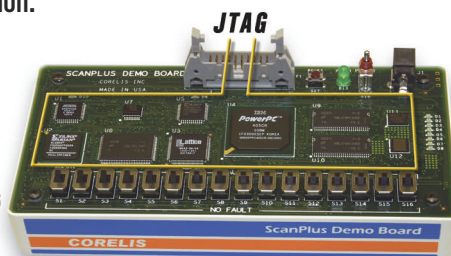
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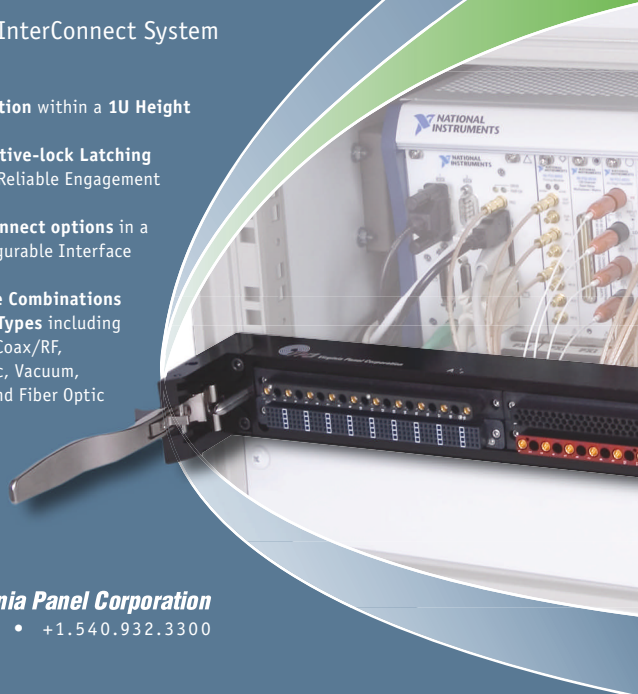
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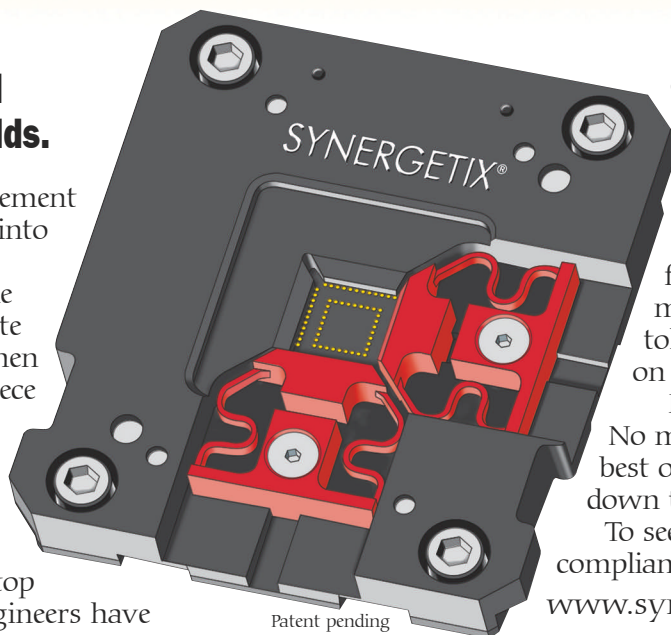
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# MACHINE VISION & INSPECTION

## IN THIS SECTION:

- ▷ Machine-vision & Inspection Equipment, below
- ▷ Machine-Vision Software, p. 84
- ▷ Third-Party Suppliers, p. 85
- ▷ Services/Labs/Test Houses, p. 85

## MACHINE-VISION & INSPECTION EQUIPMENT

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JAI Pulnix  
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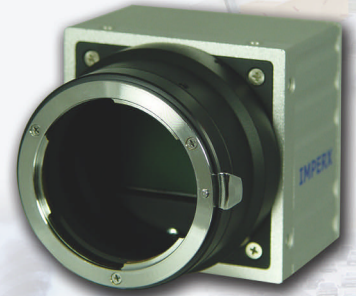
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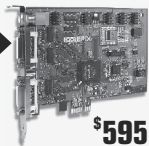
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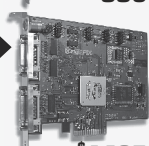
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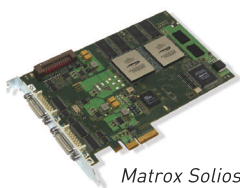


## FPGAs take a load off the host.

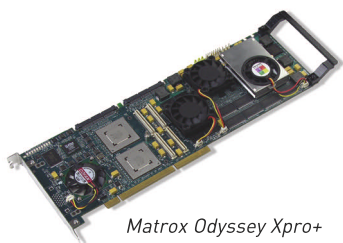
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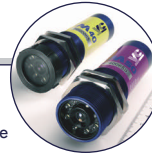
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**Vision Components**  
The Smart Camera People

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### Inspection Targets/Grids

Microlmage Video  
Systems  
Redlake

### Lenses, Camera

Camera Lenses  
Frame Grabbers  
Vision Systems

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**Active Silicon**

COMPUTER IMAGING PRODUCTS

Carl Zeiss  
Microlmaging  
The Imaging Source  
LINOS Photonics  
Melles Griot Optics  
Group  
Navitar  
Photron  
QIOPTIQ Imaging  
Solutions  
Rolyn Optics  
Sentech America  
Tamron USA

Volpi USA  
WESCO

### Lenses, Microscope

Anchor Optical  
Carl Zeiss  
Microlmaging  
Connect2it  
Infinity Photo-Optical  
Meiji Techno America  
Melles Griot Optics  
Group  
Mitutoyo America  
Navitar  
Nikon Instruments  
Olympus Industrial  
America  
QIOPTIQ Imaging  
Solutions  
Rolyn Optics  
RVSI Inspection  
Sciencscope  
International  
Unitron  
WESCO

### Lighting, Machine-Vision

Advanced Illumination  
Fiberoptic Systems  
The Imaging Source  
Integral Vision  
Monarch Instrument  
PerkinElmer  
Optoelectronics  
Phlox  
QIOPTIQ Imaging  
Solutions  
RVSI Acuity CiMatrix  
Schott North America  
StockerYale  
Sunnex  
Tamar Technology  
Volpi USA  
WESCO  
Wintriss Engineering

### Lighting, Microscopy

Carl Zeiss  
Microlmaging  
Meiji Techno America

QIOPTIQ Imaging  
Solutions  
Schott North America  
Sciencscope  
International  
StockerYale  
Sunnex  
Tamar Technology  
Volpi USA  
WESCO

### Magnifiers

GEI International  
QIOPTIQ Imaging  
Solutions  
Sunnex  
Vision Engineering

### Microscopes, Accessories

Carl Zeiss  
Microlmaging  
Geller Microanalytical  
Lab  
Infinity Photo-Optical  
Meiji Techno America  
Mitutoyo America

Piezosystem Jena  
Prior Scientific  
QIOPTIQ Imaging  
Solutions  
Rolyn Optics  
Schott North America  
Sciencscope  
International  
Sunnex  
Tamar Technology  
Unitron  
Vision Engineering  
WESCO  
Zygo

### Microscopes, Electron

FEI  
JEOL USA

### Microscopes, Emission

Hamamatsu Photonic  
Systems  
Micromanipulator  
QIOPTIQ Imaging  
Solutions

### Microscopes, Optical

Anchor Optical  
Carl Zeiss  
Microlmaging  
Chroma ATE  
Credence Systems  
Edmund Industrial  
Optics  
Fiber Instrument Sales  
GEI International  
Infinity Photo-Optical  
Klein Instruments  
Meiji Techno America  
Metron Optics  
Mitutoyo America  
Nikon Instruments  
Olympus Industrial  
America  
Optical Gaging  
Products  
Prior Scientific  
QIOPTIQ Imaging  
Solutions  
RAM Optical  
Instrumentation

*continued* >

## Macro Zoom Vision Systems

Analog, IEEE 1394, CameraLink, and More!!

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COST



SOLUTIONS

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# MACHINE VISION & INSPECTION

## > MACHINE-VISION & INSPECTION EQUIPMENT *continued*

Rolyn Optics  
Rudolph Technologies  
Sciencscope  
International  
Solarius Development  
Unitron  
Vision Engineering  
WESCO  
WiTec Instruments  
Zygo

### Microscopes, Scanning Probe

Ambios Technology  
JEOL USA  
Multiprobe  
OptoMetrix  
QIOPTIQ Imaging  
Solutions  
Ultrafast Sensors  
WiTec Instruments

### Optical Comparators

GEI International  
Metron Optics  
Micro-Vu  
Mitutoyo America  
Nikon Instruments  
Nomadics  
Optical Gaging  
Products  
QIOPTIQ Imaging  
Solutions  
Rudolph Technologies  
Smart Sonic  
Vision Engineering

### Positioning Stages and Tables

Aerotech  
CIMTEK  
Dynamic Solutions  
EXFO  
MI Technologies  
Micromanipulator

Piezosystem Jena  
Prior Scientific  
Suss MicroTec  
Tamar Technology  
TDK RF Solutions  
Zmation

### Sample Preparation Equipment

JEOL USA

### Surface-Analysis/ Profiling Equipment

Ambios Technology  
Carl Zeiss  
Microlmaging  
FEI  
JEOL USA  
Mitutoyo America  
Olympus Industrial  
America  
Optical Gaging  
Products

QIOPTIQ Imaging  
Solutions  
Solarius Development  
Tamar Technology  
Ultrafast Sensors  
Wintriss Engineering  
Zygo

### Vision Sensors

Cognex  
Dalsa  
Integral Vision  
Omron Electronics  
PPT Vision  
QIOPTIQ Imaging  
Solutions  
Rockwell Scientific  
RVSI Acuity CiMatrix  
Sentech America  
Vision Components  
Wintriss Engineering  
Zmation

## MACHINE-VISION SOFTWARE

### Image-Analysis Software

BitFlow  
Carl Zeiss  
Microlmaging  
Cognex  
Comet North America  
FeinFocus  
Dalsa Coreco  
Data Translation  
DRS Technologies -  
Data & Imaging  
Systems  
DSP Development  
EPIX  
Euresys  
Golden Software  
Integral Vision  
Ircon  
KAPPA opto-  
electronics  
L-3 Titan Group  
Landrex Technologies  
The MathWorks

Matrox Imaging  
Micromanipulator  
Microsys Technologies  
MVTec Software  
National Instruments  
NorPix  
Olympus Industrial  
America  
Radiant Imaging  
Sensor Products  
Test Advantage

### Machine-Vision Software

Adlink Technology  
BitFlow  
CIMTEK  
Cognex  
Dalsa Coreco  
Data Translation  
EPIX  
Euresys  
GOEPEL Electronics

DALSA Machine Vision

## Tools /

### SEARCH /

Position accuracy  
up to 1/50<sup>th</sup> of a pixel

Tolerates Low  
Contrast Images

Angle accuracy up  
to 1/80<sup>th</sup> of a degree

Supports area or edge  
base algorithms

### BARCODE /

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and 2-D scanning

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and scale invariant

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mitigates lighting  
variations

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ECC200 and QR Codes

# vision at work

CAMERAS

FRAME GRABBERS

PROCESSORS

SOFTWARE

SYSTEMS



Ircon

L-3 Titan Group

Landrex Technologies



Matrox Imaging

MVTec Software

National Instruments

NorPix

Pleora Technologies

Radiant Imaging

ScanCAD

International

UGS

Viscom

## THIRD-PARTY SUPPLIERS

### Distributors— Inspection Equipment

Aegis Electronic  
Group

Creative Devices

Firstsight Vision

Image Labs  
International

Infrared USA

Madell Technology

Miller Industrial

Mitutoyo America

NET USA

Silicon Imaging

Stanley Supply &  
Services

Terra Universal

Industrial Resources

ORIX USA

TRS-RenTelco

### Training— Inspection

A.T.E. Solutions

Matrox Imaging

Sypris Test &  
Measurement

### Used Equipment— Inspection

Agilent Technologies

Comet North America  
FeinFocus

Creative Devices

FLIR Systems

Industrial Resources

K & Us Equipment

NEA

Olympus Industrial  
America

ORIX USA

Teradyne  
Assembly Test Div.

TRS-RenTelco

### Rental/Lease— Inspection Equipment

Advanced Test  
Equipment

Agilent Technologies

## SERVICES/LABS/TEST HOUSES

### Inspection Services

Agilent Technologies

Comet North America  
FeinFocus

Geller Microanalytical  
Lab

Glenbrook  
Technologies

GOEPEL Electronics

Nevada Automotive  
Test Center

Oneida Research  
Services

phoenix x-ray Systems  
+ Services

Pikes Peak Test Labs

Premier  
Semiconductor  
Services

Product Safety  
Consulting

QIOPTIQ Imaging  
Solutions

Reliability Analysis  
Laboratory  
Raytheon

Southwest Research  
Institute

Sypris Test &  
Measurement

TUV America

TUV Rheinland of  
North America

V.J. Electronix

Vision Systems  
International

X-TEK Group

Zygo

T&MW

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extraction

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# ELECTRICAL & PHYSICAL ENVIRONMENTAL TEST

## IN THIS SECTION:

- ▷ EMC Test Equipment, below
- ▷ Environmental Test Equipment, at right
- ▷ ESD Control/Protection, p. 88
- ▷ Third-Party Suppliers, p. 90
- ▷ Services/Labs/Test Houses, p. 91

## EMC TEST EQUIPMENT

### Anechoic Chambers/GTEM/TEM Cells

AR Worldwide  
Cumming Lehman Chambers  
ETS-Lindgren  
Schaffner EMC  
TDK RF Solutions

### Antennas/Masts

A.H. Systems  
AR Worldwide  
Electro-Metrics  
ETS-Lindgren  
Rohde & Schwarz  
Schaffner EMC  
TDK RF Solutions  
Tektronix

### Electrostatic Discharge Generators

AR Worldwide  
Electro-Tech Systems  
HV Technologies  
Noise Laboratory  
Ross Engineering  
Schaffner EMC  
Thermo Electron

### EMI Receivers

Agilent Technologies  
AR Worldwide  
ETS-Lindgren  
Rohde & Schwarz  
Schaffner EMC  
Tektronix

### EMI Susceptibility Testers

AR Worldwide  
HV Technologies  
Noise Com  
Noise Laboratory  
Quantum Change

Schaffner EMC  
TDK RF Solutions  
Tektronix  
Thermo Electron

### Harmonics & Flicker Testers

AR Worldwide  
California Instruments  
Elgar Electronics  
Hioki USA  
HV Technologies  
Xitron Technologies  
Yokogawa Corp. of America

### Precompliance Test Kits

A.H. Systems  
Electro-Metrics  
ETS-Lindgren  
Hameg Instruments  
Noise Laboratory  
Quantum Change  
TDK RF Solutions

### Resistivity Test Systems

Electronic Systems of Wisconsin  
Electro-Tech Systems  
ESD Systems  
Hipotronics  
Keithley Instruments  
Lake Shore  
Cryotronics  
Monroe Electronics  
QualiTau  
Static Solutions  
Trek

### RF Field Intensity Meters (EMC)

Anritsu  
AR Worldwide  
Bird Electronic  
Boonton Electronics

ETS-Lindgren  
JDSU  
CommTest  
Schaffner EMC  
Tektronix

### RF Power Amplifiers

AR Worldwide  
Krohn-Hite  
Mini-Circuits  
Ophir RF  
Precision Test Systems

### Screen Rooms/Shielding Materials

ETS-Lindgren  
Laird Technologies  
Magnetic Shield  
MuShield  
Saelig  
Swift Textile Metalizing  
TDK RF Solutions  
W.L. Gore & Associates

### Shielded-Enclosure Leak Detectors

ETS-Lindgren

### Surge Testers

Compliance West USA  
Electronic Systems of Wisconsin  
HV Technologies  
Noise Laboratory  
Schaffner EMC  
Thermo Electron

## ENVIRONMENTAL TEST EQUIPMENT

### Burn-In Trays/Sockets

Aehr Test Systems  
Aries Electronics  
Armel Electronics  
Emulation Technology  
Ironwood Electronics  
Micro Control  
3M Electronics  
Plastronics  
Sharetree Systems  
UMD Advanced Test Technologies  
Yamaichi Electronics USA

### Burn-In/Screening Equipment

Aehr Test Systems  
Associated Environmental Systems  
Burnsco Technologies  
C&H Technologies  
Chart Industries  
CIMTEK  
Cincinnati Sub-Zero



Despatch Industries  
Dynamic Solutions  
Environment Associates  
ESPEC



Geotest - Marvin Test Systems  
GOEPEL Electronics  
HALT&HASS Systems  
Instrumentation Engineering  
Integrated Technology Corp.  
LR Environmental Equipment  
m + p international

Micro Control  
Racal Instruments  
Sharetree Systems  
Sigma Systems  
Sun Electronic Systems  
Symtx  
Temptronics  
Thermal Product Solutions  
Thermonics  
Thermotron Industries  
Vektrex Electronic Systems  
VXI Technology

### Humidity Test Equipment

AEMC Instruments  
Associated Environmental Systems  
Campbell Scientific  
Carltext International  
Cincinnati Sub-Zero



Computer Aided Solutions  
Despatch Industries  
Electro-Tech Systems  
Environment Associates  
Environmental Specialties  
Envirotronics  
ESPEC



Monarch Instrument  
Q-Panel Lab Products  
Rotronic Instrument  
Saelig  
Sharetree Systems  
Sigma Systems  
Symtx  
Telatemp  
Terra Universal

Thermal Product Solutions  
Thermotron Industries

### Pressure Test Equipment

Cincinnati Sub-Zero  
Envirotronics  
EST Testing Solutions  
Monarch Instrument  
Neff Instrument  
Symtx  
Thermal Product Solutions  
Thermotron Industries

### Radiation Test Equipment

Berkeley Nucleonics  
Q-Panel Lab Products

### Temperature Test Equipment

Aehr Test Systems  
AEMC Instruments  
Associated Environmental Systems  
Burnsco Technologies  
Campbell Scientific  
Carltext International  
Chart Industries  
Cincinnati Sub-Zero



Computer Aided Solutions  
Despatch Industries  
Dynamic Solutions  
Electro-Tech Systems  
Environment Associates  
Environmental Specialties  
Envirotronics  
ESPEC



continued >

## > ENVIRONMENTAL TEST EQUIPMENT *continued*

EST Testing Solutions  
FTS Systems  
HALT&HASS Systems  
IOtech  
LR Environmental Equipment  
Materials Development  
Monarch Instrument  
Neff Instrument  
Nevada Automotive Test Center  
Nomadics  
Q-Panel Lab Products  
QualiTau  
Rotronic Instrument  
Saelig  
Sharetree Systems  
Sigma Systems  
Sovtest  
Sun Electronic Systems  
Suss MicroTec  
Symtx  
Telatemp  
Temptronic  
Terra Universal

TestEquity  
Thermal Product Solutions  
Thermionics  
Thermotron Industries  
Trio-Tech International

### Vibration Test Equipment

Agilent Technologies  
Associated Environmental Systems  
B&W Engineering  
Bruel & Kjaer, North America  
CableTest Systems  
Campbell Scientific  
Chart Industries  
Data Physics  
Despatch Industries  
Dewetron  
Dynamic Solutions  
Electronic Systems of Wisconsin  
Environment Associates

Envirotronics  
EST Testing Solutions  
GHI Systems  
HALT&HASS Systems  
IMV  
Instron Structural Testing Systems  
Instrumentation Engineering  
Instrumented Sensor Technology  
IOtech  
L.A.B. Equipment  
LDS Test and Measurement  
Ling Electronics  
m + p international  
M/RAD  
Monarch Instrument  
MTI Instruments  
National Instruments  
Neff Instrument  
OROS  
Photron  
Polytec

Sciometric Instruments  
Signalysis  
Sovtest  
Symtx  
TEAM  
Thermal Product Solutions  
Thermotron Industries  
Unholtz-Dickie  
Vibration Research

## ESD CONTROL/PROTECTION

### Air Ionizers

DESCO  
ESD Systems  
MKS, Ion Systems  
3M Electronics  
Simco  
Terra Universal

3M Electronics  
Monroe Electronics  
Noise Laboratory  
Novx  
Prostat  
Simco  
Static Solutions  
Trek

### Bins/Boxes/Protective Bags

Conductive Containers  
ESD Systems  
3M Electronics

### Electrostatic Measuring Equipment

ACL Staticide  
AR Worldwide  
DESCO  
Electro-Tech Systems  
ESD Systems  
MKS, Ion Systems

### ESD Control/Monitoring Equipment

ACL Staticide  
DESCO  
Electro-Tech Systems  
ESD Systems  
MKS, Ion Systems  
3M Electronics  
Monroe Electronics  
Novx  
Prostat  
Simco  
Static Solutions  
Trek

*continued* >

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Did you think that getting a thermal shock chamber would be expensive, require liquid nitrogen and take up half your lab? The ESPEC TSE-11 thermal shock chamber will change your mind. Only 26 inches wide, the TSE-11 transfers product loads between cold and hot zones with a temperature range of -65°C to 200°C.

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No liquid nitrogen

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## > ESD CONTROL/PROTECTION *continued*

### Flooring/Finishes

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DESCO  
ESD Systems  
Flexco  
3M Electronics  
Static Solutions  
StaticSmart ESD  
Flooring

### Gloves and Finger Cots

DESCO  
ESD Systems  
QRP

### Protective Clothing and Wrist & Heel Straps

DESCO  
ESD Systems  
3M Electronics  
Prostat  
Static Solutions

### Work Surfaces/Workstations

ACL Staticide  
Arlink Workstation  
Systems  
Beamex  
Bevco Ergonomic  
Seating

BioFit Engineered  
Products  
DESCO  
ESD Systems

3M Electronics  
Prostat  
Terra Universal

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These temperature benchtop and floor model test chambers are well-suited for use in electronic, military, and pharmaceutical quality assurance and reliability testing, as well as research testing and production processes.

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- Pharmaceutical Equipment
- Environmental Test Products
- Heat Treat Industrial Furnaces
- Non-Ferrous Melting Equipment
- Launder Systems
- Crystal Growing
- In-line Curing Ovens

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## THIRD-PARTY SUPPLIERS

### Distributors— EMC Test Equipment

Avalon Equipment  
Clare Instruments  
Credence  
Technologies  
MetricTest  
PTL Test Equipment  
TestMart

### Distributors— Environmental Test Equipment

Carltext International  
Data Physics  
Direct Industry  
Dynamic Solutions  
Environment Associates  
m + p international  
Terra Universal  
Tucker Electronics

### Distributors— ESD Protection & Control Products

Credence  
Technologies  
Miller Industrial  
S.R.S. Market  
Solutions  
[Metersuperstore.com](http://Metersuperstore.com)  
Stanley Supply &  
Services  
Terra Universal  
TestMart

### Rental/Lease— EMC Test Equipment

A.H. Systems  
Advanced Test  
Equipment  
Atlantic Coast  
Instruments  
Bell Electronics NW  
Electro Rent  
Electro-Metrics  
Industrial Resources  
MetricTest  
Microlease  
ORIX USA  
TechRecovery

Trek Equipment  
TRS-RenTelco  
Tucker Electronics

### Rental/Lease— Environmental Test Equipment

Bruel & Kjaer, North  
America  
Burnsco Technologies  
Cincinnati Sub-Zero  
Dynamic Solutions  
Electro Rent  
Environment Associates  
EST Testing Solutions  
HALT&HASS Systems  
Industrial Resources  
LR Environmental  
Equipment  
Microlease  
Sharetree Systems  
Thermotron Industries  
TRS-RenTelco  
Tucker Electronics

### Training— EMC Test

A.T.E. Solutions  
CKC Laboratories



D.L.S. Electronic  
Systems  
Equipment Reliability  
Institute  
Garwood Laboratories  
Novx  
OptEM Engineering  
Rohde & Schwarz  
TUV America

### Training— Environmental Test

A.T.E. Solutions  
Data Physics  
Environment Associates



Equipment Reliability  
Institute  
HALT&HASS Systems  
Hobbs Engineering  
Nevada Automotive  
Test Center  
Technology Training

### Training—ESD Protection & Control

CKC Laboratories  
D.L.S. Electronic  
Systems



Electro-Tech Systems  
Equipment Reliability  
Institute  
Garwood Laboratories  
Novx  
Prostat

Stephen Halperin &  
Associates  
Trek

### Used Equipment— EMC Test

A.H. Systems  
Advanced Test  
Equipment  
AR Worldwide  
Atlantic Coast  
Instruments  
Avalon Equipment  
Bell Electronics NW  
Electro Rent  
Garwood Laboratories  
Industrial Resources  
MetricTest  
ORIX USA  
Rohde & Schwarz

TechRecovery



Test Equipment  
Connection  
TestMart  
Trek Equipment  
TRS-RenTelco  
Tucker Electronics

### Used Equipment— Environmental Test

Advanced Test  
Equipment  
Data Physics  
Dynamic Solutions  
Environment Associates  
Envirotronics

EST Testing Solutions  
Garwood Laboratories  
HALT&HASS Systems  
Industrial Resources  
K & Us Equipment  
LabX  
LR Environmental  
Equipment  
m + p international  
NEA  
ORIX USA  
Sharetree Systems  
TestEquity  
Thermal Product  
Solutions  
A unit of SPX  
Thermotron Industries  
TRS-RenTelco  
Tucker Electronics  
Vibration Research

## SERVICES/LABS/TEST HOUSES

### Compliance Testing Services

Accolade Engineering  
Solutions  
Alion Science &  
Technology  
Associated Research  
BAE Systems  
Aerospace Electronics  
CKC Laboratories  
Communication  
Certification Lab  
CSA International  
D.L.S. Electronic  
Systems



Elite Electronic  
Engineering  
*see ad, next column*



Environment Associates  
EST Testing Solutions  
ETS-Lindgren  
Garwood Laboratories  
Intertek ETL Entela  
Invisar  
JDSU  
CommTest  
MET Laboratories  
Microsys Technologies  
Motorola Product  
Testing Services  
National Technical  
Systems  
Nevada Automotive  
Test Center  
Noise Laboratory

*continued* ➤

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## ADVANCED LOGIC AND MEMORY BURN-IN.

- Memory and logic testing capability.
- 16 user-defined independent pattern zones.
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- Large system capacity of up to 32 burn-in boards.
- Programmable temperature control up to 150° C.
- Up to 128 digital I/O channels per burn-in board.
- ASIC architecture for per-pin timing, testing, and formatting of pattern data.
- 300 amps current per burn-in board.
- Scan mode vector memory up to 1G deep.



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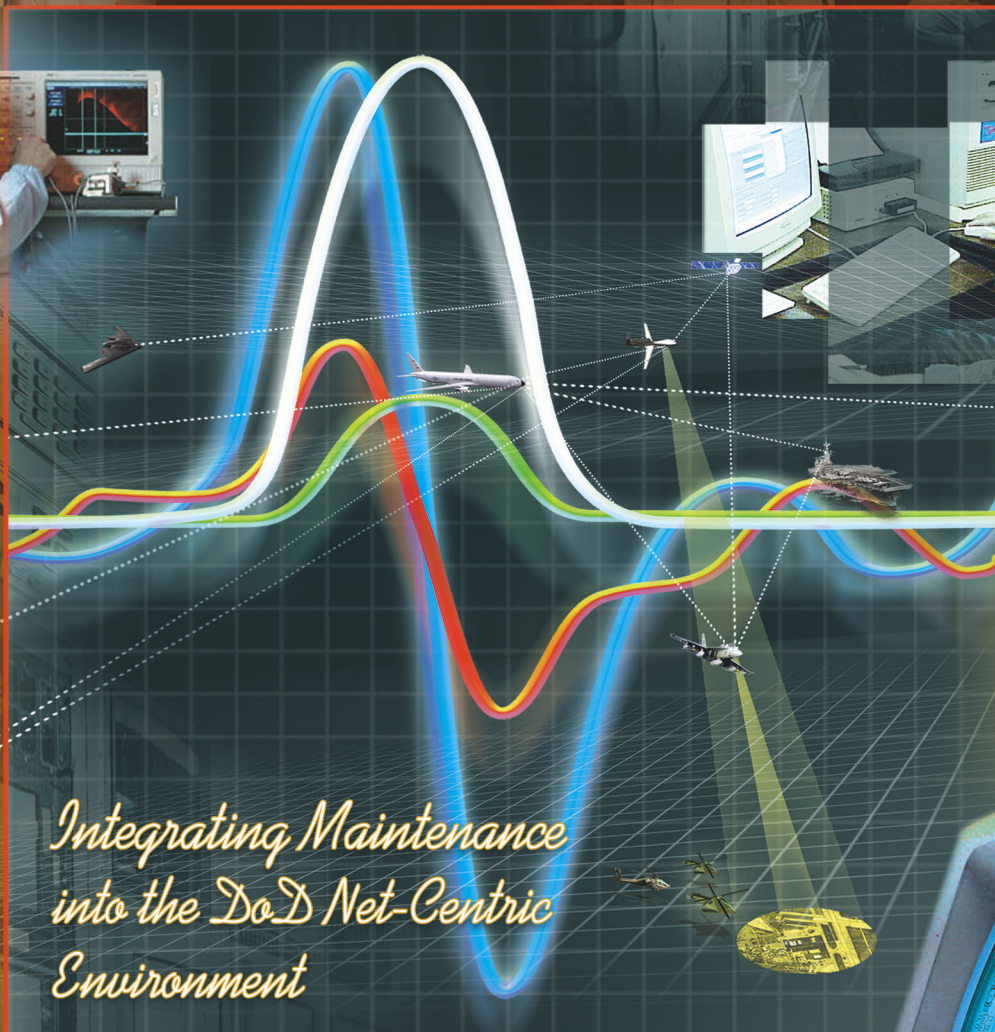




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**Dynamic Solutions**, Northridge, CA. 818-831-0832. <http://www.dynsolUSA.com>.

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# VENDOR CONTACT INFORMATION

## E

**Eagle Test Systems**, Buffalo Grove, IL. 847-367-8282. <http://www.eagletest.com>.  
**eBay**, San Jose, CA. <http://www.ebay.com>.  
**EdenTree Technologies**, Newbury Park, CA. 805-499-4555.  
<http://www.edentreetech.com>.  
**Edmund Industrial Optics**, Barrington, NJ. 800-363-1992.  
<http://www.edmundoptics.com>.  
**Elan Digital Systems**, Fareham, Hampshire, UK. +44 (0)1489-579799.  
<http://www.elandigitalsystems.com>.  
**Electro Rent**, Van Nuys, CA. 818-787-2100. <http://www.electrorent.com>.  
**Electroglas**, San Jose, CA. 408-528-3000. <http://www.electroglas.com>.  
**Electro-Metrics**, Johnstown, NY. 518-762-2600. <http://www.electro-metrics.com>.  
**Electron Tubes**, Rockaway, NJ. 973 586 9594. <http://www.electrontubes.com>.  
**Electronic Development Labs**, Danville, VA. 434-799-0807. <http://www.edl-inc.com>.  
**Electronic Systems of Wisconsin**, Racine, WI. 262-554-1211.  
<http://www.eswtesters.com>.  
**Electro-Tech Systems**, Glenside, PA. 215-887-2196.  
<http://www.electrotechsystems.com>.  
**Elgar Electronics**, San Diego, CA. 858-450-0085. <http://www.elgar.com>.  
**Elite Electronic Engineering**, Downers Grove, IL. 630-495-9770.  
<http://www.elitetest.com>.  
**ELMA Electronic**, Fremont, CA. 510-656-3400. <http://www.elma.com>.  
**Emulation Technology**, Santa Clara, CA. 408-982-0660. <http://www.emulation.com>.  
**Endevco**, San Juan Capistrano, CA. 949-493-8181. <http://www.endevco.com>.  
**Environment Associates**, Chatsworth, CA. 818-709-0568. <http://www.eatest.com>.  
**Environmental Specialties**, a Luwa Group Company, Raleigh, NC. 800-688-5859.  
<http://www.LuwaES.com>.  
**Envirotronics**, Grand Rapids, MI. 616-554-5020. <http://www.envirotronics.com>.  
**EPIX**, Buffalo Grove, IL. 847-465-1818. <http://www.epixinc.com>.  
**Equipment Reliability Institute**, Santa Barbara, CA. 805-564-1260.  
<http://www.equipment-reliability.com>.  
**ESD Systems**, Marlboro, MA. 508-485-7390. <http://www.esdsystems.com>.  
**ESPEC**, Hudsonville, MI. 616-896-6100. <http://www.espec.com>.  
**ESSC**, Cincinnati, OH. 513-793-7774. <http://www.esscinc.com>.  
**EST Testing Solutions**, Holland, MI. 800-611-7859. <http://www.est-usa.com>.  
**ETEC**, W. Peabody, MA. 978-535-7683. <http://www.etc-inc.com>.  
**ETS-Lindgren**, Cedar Park, TX. 512-531-6400. <http://www.ets-lindgren.com>.  
**Euresys**, Itasca, IL. 630-250-2300. <http://www.euresys.com>.  
**Everest Interscience**, Tucson, AZ. 520-792-4545. <http://www.everestinterscience.com>.  
**Everett Charles Technologies**, Pomona, CA. 909-625-5551. <http://www.ectinfo.com>.  
**Exacq Technologies**, Indianapolis, IN. 317-845-5710. <http://www.exacq.com>.  
**EXFO**, Vanier, QC, Canada. 418-683-0211. <http://www.exfo.com>.  
**Extech Instruments**, Waltham, MA. 781-890-7440. <http://www.extech.com>.  
**E-Z-Hook**, Arcadia, CA. 626-446-6175. <http://www.e-z-hook.com>.

## F

**Faxitron X-Ray**, Wheeling, IL. 847-465-9729. <http://www.faxitron.com>.  
**FEI**, Hillsboro, OR. 503-726-7500. <http://www.feic.com>.  
**FETtest**, Morgan Hill, CA. 408-778-0234. <http://www.fettest.com>.  
**Fiber Instrument Sales**, Oriskany, NY. 315-736-2206.  
<http://www.fiberinstrumentsales.com>.  
**Fiberbyte**, San Francisco, CA. 415-543-6859. <http://www.fiberbyte.com>.  
**Fiberoptic Systems**, Simi Valley, CA. 805-583-2088. <http://www.fiberopticsystems.com>.  
**Fieldtex Products**, Rochester, NY. 585-427-2940. <http://www.fieldtex.com>.  
**Finisar**, Eden Prairie, MN. 952-941-5905. <http://www.finisar.com>.  
**FirstSight Vision**, Tongham, Surrey, UK. +44(0)-1252-780000.  
<http://www.firstsightvision.co.uk>.  
**Flexco**, Tuscumbia, AL. 800-633-3151. <http://www.flexcofloors.com>.  
**Flex-Core**, Columbus, OH. 614-889-6152. <http://www.flex-core.com>.  
**Flextronics Test**, Oakland, NJ. 201-651-1111. <http://www.flextronics.com>.  
**FLIR Systems**, N. Billerica, MA. 800-464-6372. <http://www.flirthermography.com>.  
**Fluke**, Everett, WA. 425-347-6100. <http://www.fluke.com>.  
**Fluke Networks**, Everett, WA. 425-446-4519. <http://www.flukenetworks.com>.

**Flynn Systems**, Nashua, NH. 603-598-4444. <http://www.flynn.com>.  
**Focus Microwaves**, Dollard-des-Ormeaux, QC, Canada. 514-684-4554.  
<http://www.focus-microwaves.com>.  
**Foresight Imaging**, Lowell, MA. 978-458-4624. <http://www.fi-llc.com>.  
**FormFactor**, Livermore, CA. 925-290-4169. <http://www.formfactor.com>.  
**Frequency Devices**, Haverhill, MA. 978-374-0761. <http://www.freqdev.com>.  
**Frontline Test Equipment**, Charlottesville, VA. 800-359-8570. <http://www.fte.com>.  
**FTS Systems**, Stone Ridge, NY. 800-824-0400. <http://www.ftssystems.com>.  
**Futek Advanced Sensor Technology**, Irvine, CA. 949-465-0900.  
<http://www.futek.com>.  
**FuturePlus Systems**, Colorado Springs, CO. 719-278-3540.  
<http://www.futureplus.com>.

## G

**GAge**, Lockport, IL. 514-633-7447. <http://www.gage-applied.com>.  
**Garwood Laboratories**, Pico Rivera, CA. 562-949-2727.  
<http://www.garwoodtestlabs.com>.  
**GEI International**, E. Syracuse, NY. 315-463-9261. <http://www.geionline.com>.  
**Geller Microanalytical Lab**, Topsfield, MA. 978-887-7000.  
<http://www.gellermicro.com>.  
**Genesys IBS**, Blaenavon, UK. +44 (0)1495-793260. <http://www.genesysibs.com>.  
**Geotest - Marvin Test Systems**, Irvine, CA. 888-837-8297.  
<http://www.geotestinc.com>.  
**GHI Systems**, San Pedro, CA. 310-548-6544. <http://www.ghisys.com>.  
**Gigahertz-Optik**, Newburyport, MA. 978-462-1818. <http://www.gigahertz-optik.com>.  
**Giga-tronics**, San Ramon, CA. 925-328-4650. <http://www.gigatronics.com>.  
**Givens Control Engineering**, Burlington, ON, Canada. 905-631-8293.  
<http://www.givenscontrol.com>.  
**GL Communications**, Gaithersburg, MD. 301-670-4784. <http://www.gl.com>.  
**Glassman High Voltage**, High Bridge, NJ. 908-638-3800. <http://www.glassmanhv.com>.  
**Glenbrook Technologies**, Randolph, NJ. 973-361-8866.  
<http://www.glenbrooktech.com>.  
**Global Specialties**, Cheshire, CT. 800-572-1028. <http://www.globalspecialties.com>.  
**GMC Instruments**, Nuernberg, Bavaria, Germany. +49-0911-86020. <http://gmc-instruments.com>.  
**GMW Associates**, San Carlos, CA. 650-802-8292. <http://www.gmw.com>.  
**GOEPEL Electronics**, Austin, TX. 512-502-3010. <http://www.goepel.com>.  
**Golden Software**, Golden, CO. 303-279-1021. <http://www.goldensoftware.com>.  
**Gordon Kapes**, Skokie, IL. 847-676-1750. <http://www.gkinc.com>.  
**GraphPad Software**, San Diego, CA. 858-259-5770. <http://www.graphpad.com>.  
**Graphtec America**, Santa Ana, CA. 949-770-6010. <http://www.westerngraphtec.com>.  
**GSI Lumonics**, Wilmington, MA. 978-661-4300. <http://www.gsilumonics.com>.  
**GuideTech**, Sunnyvale, CA. 408-733-6555. <http://www.guidetech.com>.  
**Guildline Instruments**, Smiths Falls, ON, Canada. 613-283-3000.  
<http://www.Guildline.ca>.

## H

**H+W Test Products**, Seekonk, MA. 508-336-3200. <http://www.hwtestproducts.com>.  
**HALT&HASS Systems**, Westminster, CO. 303-465-5988. <http://www.haltandhass.com>.  
**Hamamatsu Photonic Systems**, Bridgewater, NJ. 908-231-1116.  
<http://hps-systems.com>.  
**Hameg Instruments**, Mainhausen, Germany. +49 (0) 6182 800 0.  
<http://www.hameg.com>.  
**Hart Scientific**, a Division of Fluke, American Fork, UT. 801-763-1600.  
<http://www.hartscientific.com>.  
**Hartman Associates**, Woodland Hills, CA. 818-887-4266. <http://hartmanassoc.com>.  
**Heim Data Systems**, Belmar, NJ. 732-556-2318. <http://www.HeimData.com>.  
**Highland Technology**, San Francisco, CA. 415-551-1700.  
<http://www.highlandtechnology.com>.  
**Hioki USA**, Cranbury, NJ. 609-409-9109. <http://www.hiokiusa.com>.  
**Hipotronics**, Brewster, NY. 845-279-8091. <http://www.hipotronics.com>.  
**Hi-Techniques**, Madison, WI. 608-221-7500. <http://www.hi-techniques.com>.  
**Hobbs Engineering**, Westminster, CO. 303-465-5988. <http://www.hobbsengr.com>.

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**Honeywell Sensotec**, Columbus, OH. 614-850-5000. <http://www.sensotec.com>.  
**HUBER+SUHNER**, Essex, VT. 630-250-0100. <http://www.hubersuhnerinc.com>.  
**Huntron**, Mill Creek, WA. 800-426-9265. <http://www.huntron.com>.  
**HV Technologies**, Manassas, VA. 703-365-2330. <http://www.hvtechnologies.com>.  
**Hypertronics**, Hudson, MA. 978-568-0451. <http://www.hypertronics.com>.

**ic automation**, Mainz, Germany. +49-(0)6131-62718-0. <http://www.ic-automation.de>.  
**ICS Electronics**, Pleasanton, CA. 925-416-1000. <http://www.icselect.com>.  
**ICS Sensor Processing**, Part of Radstone Embedded Computing, Ottawa, ON, Canada. 613-749-9241. <http://www.ics-ltd.com>.  
**IET Labs**, Westbury, NY. 516-334-5959. <http://www.ietlabs.com>.  
**Illunis**, Minnetonka, MN. 952-975-9203. <http://www.illunis.com>.  
**ILX Lightwave**, Bozeman, MT. 800-459-9459. <http://www.ilxlightwave.com>.  
**Image Labs International**, Bozeman, MT. 406-585-7225. <http://www.imagelabs.com>.  
**The Imaging Source**, Charlotte, NC. 704-370-0110. <http://www.theimaging-source.com>.  
**IMC DataWorks**, Madison, WI. 608-231-6123. <http://www.imcdataworks.com>.  
**Imperx**, Boca Raton, FL. 866-849-1662. <http://www.imperx.com>.  
**IMV**, Chiyoda-ku, Tokyo, Japan. 03-3262-6335. <http://www.imv.co.jp/>.  
**Industrial Resources**, Orange, CA. 800-654-7368. <http://www.industrialresources.com>.  
**ines**, Hannover, Bad Nenndorf, Germany. +49-5723-9162-50. <http://www.inesinc.com>.  
**Infinity Photo-Optical**, Boulder, CO. 303-440-4544. <http://www.infinity-usa.com>.  
**Infrared USA**, A Division of TTI Instruments, Williston, VT. 802-863-0085. <http://www.infrared-usa.com>.  
**Innocor**, Kanata, ON, Canada. 613-599-4069. <http://www.innocor.com>.  
**Innovative Integration**, Simi Valley, CA. 805-578-4260. <http://www.innovative-dsp.com>.  
**Innovative Technologies**, Dublin, CA. 925-803-2880. <http://www.virtualrack.com>.  
**Inovys**, Pleasanton, CA. 925-660-1700. <http://www.inovys.com>.  
**Instek America**, Chino, CA. 909-591-8358. <http://www.instek.com>.  
**Instron Structural Testing Systems**, Novi, MI. 248-553-4630. <http://www.instron.com/ist>.  
**Instrument Systems**, Ottawa, ON, Canada. 613-729-0614. <http://www.instrumentsystems.com>.  
**Instrumentation Engineering**, Oakland, NJ. 201-651-1111. <http://www.ietest.com>.  
**Instrumented Sensor Technology**, Okemos, MI. 517-349-8487. <http://www.isthq.com>.  
**Integral Vision**, Wixom, MI. 248-668-9230. <http://www.iv-usa.com>.  
**Integrated Sciences Group**, Bakersfield, CA. 661-872-1683. <http://www.isgmax.com>.  
**Integrated Technology**, Tempe, AZ. 480-968-3459. <http://www.inttechcorp.com>.  
**Intelligent Instrumentation**, Tucson, AZ. 520-573-0887. <http://www.instrument.com>.  
**Intellitech**, Durham, NH. 603-868-7116. <http://www.intellitech.com>.  
**Intercon 1**, Div. of Nortech Systems, Baxter, MN. 800-237-9576. <http://www.nortechsys.com/intercon>.  
**Interconnect Devices**, Kansas City, KS. 913-342-5544. <http://www.idinet.com>.  
**Interface Technology**, Walnut, CA. 909-595-6030. <http://www.interfacetech.com>.  
**International Data Sciences**, Warwick, RI. 401-737-9900. <http://www.idsdata.com>.  
**International Light**, Peabody, MA. 978-818-6180. <http://www.intl-light.com>.  
**Interpower**, Oskaloosa, IA. 800-662-2290. <http://www.interpower.com>.  
**Intertek ETL Entela**, Kentwood, MI. 800-888-3787. <http://www.intertek-etlentela.com>.  
**inTEST**, Cherry Hill, NJ. 856-424-6886. <http://www.intest.com>.  
**Intrinsic Quality**, Elk Grove Village, IL. 847-363-2585. <http://www.intrinsicquality.com>.  
**Intusoft**, Gardena, CA. 310-329-3295. <http://www.intusoft.com>.  
**Invisar**, Chapel Hill, NC. 919-969-9812. <http://www.invisar.com>.  
**Ion Physics**, Fremont, NH. 603-895-5100. <http://www.ionphysics.com>.  
**IOtech**, Cleveland, OH. 440-439-4091. <http://www.iotech.com>.  
**Ircon**, Niles, IL. 847-967-5151. <http://www.ircon.com>.  
**Ironwood Electronics**, Burnsville, MN. 952-229-8200. <http://www.ironwoodelectronics.com>.  
**Ixia**, Calabasas, CA. 818-871-1800. <http://www.ixiacom.com>.

## J

**JAI Pulnix**, San Jose, CA. 408-383-0300. <http://www.jaipulnix.com>.  
**JDSU**, CommTest, Milpitas, CA. 408-546-5000. <http://www.jdsu.com>.  
**JDSU**, Test & Measurement, Germantown, MD. 866-228-3762. [http://www.jdsu.com/test\\_and\\_measurement](http://www.jdsu.com/test_and_measurement).  
**JEOL USA**, Peabody, MA. 978-535-5900. <http://www.jeol.com>.  
**JFW Industries**, Indianapolis, IN. 317-887-1340. <http://www.jfwindustries.com>.  
**JMC**, Newfield, NJ. 856-697-4400. <http://www.jmc-serv.com>.  
**JMP**, Cary, NC. 877-594-6567. <http://www.jmp.com>.  
**Johnstech International**, Minneapolis, MN. 612-378-2020. <http://www.johnstech.com>.  
**JTAG Technologies**, Stevensville, MD. 877-367-5824. <http://www.jtag.com>.

## K

**K & Us Equipment**, Boulder Creek, CA. 831-338-7246. <http://www.KandUs.com>.  
**K.J. Marketing Services**, Toronto, ON, Canada. 416-252-1061. <http://www.kjmarketing.com>.  
**KAPPA opto-electronics**, Monrovia, CA. 626-256-4343. <http://www.kappa-vision.com>.  
**Keithley Instruments**, Cleveland, OH. 440-248-0400. <http://www.keithley.com>.  
**Kemo**, Jacksonville, FL. 904-223-0662. <http://www.kemo.com>.  
**Kepeco**, Flushing, NY. 718-461-7000. <http://www.kepecopower.com>.  
**Keyence**, Woodcliff Lake, NJ. 201-930-0100. <http://www.keyence.com>.  
**KineticSystems**, Lockport, IL. 815-838-0005. <http://www.kscorp.com>.  
**Kipp & Zonen**, Bohemia, NY. 631-589-2065. <http://www.kippzonen.com>.  
**Kistler Instrument**, Amherst, NY. 716-691-5100. <http://www.kistler.com>.  
**Klein Instruments**, Portland, OR. 503-245-1012. <http://www.kleininstruments.com>.  
**Krohn-Hite**, Brockton, MA. 508-580-1660. <http://www.krohn-hite.com>.  
**Kuka Real Time Products**, Tustin, CA. 714-505-1485. <http://www.kuka-controls.com>.  
**Kurz Instruments**, Monterey, CA. 831-646-5911. <http://www.kurz-instruments.com>.

## L

**L.A.B. Equipment**, Franklin Park, IL. 630-595-0144. <http://www.labequipment.com>.  
**L-3 Titan Group**, San Diego, CA. 858-527-6100. <http://www.titan.com>.  
**LabX**, Midland, ON, Canada. 888-781-0328. <http://www.labx.com>.  
**Laird Technologies**, Earth City, MO. 314-344-9300. <http://www.lairdtech.com>.  
**Lake Shore Cryotronics**, Westerville, OH. 614-891-2244. <http://www.lakeshore.com>.  
**Lambda Americas**, San Diego, CA. 619-575-4400. <http://www.lambdapower.com>.  
**Landrex Technologies**, Santa Clara, CA. 408-567-9801. <http://www.landrex-us.com>.  
**Lawson Labs**, Malvern, PA. 610-725-8800. <http://www.lawsonlabs.com>.  
**LDS Test and Measurement**, Middleton, WI. 608-821-6600. <http://www.lds-group.com>.  
**Leader Instruments**, Cypress, CA. 714-527-9300. <http://www.leaderusa.com>.  
**LeCroy**, Chestnut Ridge, NY. 800-553-2769. <http://www.lecroy.com>.  
**Lemo USA**, Rohnert Park, CA. 707-578-8811. <http://www.lemousa.com>.  
**Leutron Vision**, Burlington, MA. 781-238-0213. <http://www.leutron.com/us>.  
**Ling Electronics**, W. Haven, CT. 203-933-8000. [http://www.qualmark.com/ling\\_index.html](http://www.qualmark.com/ling_index.html).  
**LINOS Photonics**, Milford, MA. 800-334-5678. <http://www.linos.com>.  
**Linseis**, Princeton Junction, NJ. 609-799-6282. <http://www.linseis.net>.  
**LMS Instruments**, Troy, MI. 248-952-5664. <http://www.lmsintl.com>.  
**LogicVision**, San Jose, CA. 408-453-0146. <http://www.logicvision.com>.  
**LPKF Laser and Electronics**, Wilsonville, OR. 503-454-4200. <http://www.lpkfusa.com>.  
**LR Environmental Equipment**, Los Angeles, CA. 323-770-0634. <http://www.lre.com>.  
**LTX**, Westwood, MA. 781-461-1000. <http://www.ltx.com>.  
**Lumenera**, Ottawa, ON, Canada. 613-736-4077. <http://www.lumenera.com>.  
**Luna Technologies**, Blacksburg, VA. 540-961-5190. <http://www.lunatechnologies.com>.  
**Luther & Maelzer**, Pepperell, MA. 978-433-3680. <http://www.WMHague.com>.

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## M

**m + p international**, Verona, NJ. 973-239-3005. <http://www.mpihome.com>.

**M/RAD**, Woburn, MA. 781-935-5940. <http://www.mradcorp.com>.

**M3 Electronics**, Apex, NC. 919-924-3525. <http://www.m3electronics.biz>.

**MAC Panel**, High Point, NC. 336-861-3100. <http://www.macpanel.com>.

**Machine Vision Products**, Carlsbad, CA. 760-438-1138.  
<http://www.machinevisionproducts.com>.

**Macro Sensors**, Pennsauken, NJ. 856-662-8000. <http://www.macrosensors.com>.

**Macrotron Scientific Engineering**, Unterhaching / Munich, Bavaria, Germany. +49-89-45 111-0. <http://www.macrotron.org>.

**Madell Technology**, Buena Park, CA. 714-670-9023. <http://www.madelltech.com>.

**Magnetic Shield**, Bensenville, IL. 630-766-7800. <http://www.magnetic-shield.com>.

**Magtrol**, Buffalo, NY. 716-668-5555. <http://www.magtrol.com>.

**Manuals Plus**, N. Salt Lake, UT. 801-936-7000. <http://www.manualsplus.com>.

**Manufacturing Technology**, Ft. Walton Beach, FL. 850-664-6070.  
<http://www.mtifwb.com>.

**Marsh Bellofram**, ATC, Newell, WV. 800-727-5646. <http://www.automatictiming.com>.

**Materials Development**, Chatsworth, CA. 818-700-8290. <http://www.mdc4cv.com>.

**Mathsoft Engineering & Education**, Cambridge, MA. 617-444-8000.  
<http://www.mathsoft.com>.

**The MathWorks**, Natick, MA. 508-647-7000. <http://www.mathworks.com>.

**Matrix Systems**, Calabasas, CA. 818-222-2301. <http://www.matrixsystems.com>.

**Matrox Imaging**, Dorval, QC, Canada. 800-804-6243.  
<http://www.matrox.com/imaging>.

**MCC**, Hopewell, NJ. 609-466-1751. <http://www.mcc-us.com>.

**MCM, an InOne company**, Centerville, OH. 800-543-4330.  
<http://www.mcmone.com>.

**Measurement Computing**, Norton, MA. 508-946-5100. <http://www.mccdaq.com>.

**MegaPhase**, Stroudsburg, PA. 877-634-2742. <http://www.MegaPhase.com>.

**Meiji Techno America**, Santa Clara, CA. 800-832-0060. <http://www.meijitechno.com>.

**Melles Griot Optics Group**, Rochester, NY. 585-244-7220.  
<http://www.mellesgriot.com>.

**MEN Micro**, Lago Vista, TX. 512-267-8883. <http://www.menmicro.com>.

**Mentor Graphics**, Design-for-Test, Wilsonville, OR. 503-685-7000.  
<http://www.mentor.com/dft>.

**MET Laboratories**, Baltimore, MD. 410-354-3300. <http://www.metlabs.com>.

**Meterman Test Tools**, Everett, WA. 877-596-2680.  
<http://www.metermantesttools.com>.

**MetricTest**, Hayward, CA. 510-264-0887. <http://www.metrictest.com>.

**Metron Optics**, Solana Beach, CA. 858-755-4477. <http://www.metronusa.com>.

**MI Technologies**, Suwanee, GA. 678-475-8300. <http://www.mi-technologies.com>.

**Micro Component Technology**, St. Paul, MN. 651-697-4000. <http://www.mct.com>.

**Micro Control**, Minneapolis, MN. 763-786-8750. <http://www.microcontrol.com>.

**Micro Lambda Wireless**, Fremont, CA. 510-770-9221.  
<http://www.microlambdawireless.com>.

**Micro Seven**, Beaverton, OR. 503-693-6982. <http://www.microseveninc.com>.

**Micro-Coax**, Pottstown, PA. 610-495-0110. <http://www.micro-coax.com>.

**MicrolImage Video Systems**, Boyertown, PA. 610-754-6800. <http://www.mivs.com>.

**Microlease**, Cary, NC. 866-520-0200. <http://www.microlease.com>.

**Micromanipulator**, Carson City, NV. 775-882-2400. <http://www.micromanipulator.com>.

**Micro-Metric**, San Jose, CA. 408-452-8505. <http://www.micro-metric.com>.

**Micronetics**, Hudson, NH. 603-883-2900. <http://www.micronetics.com>.

**MicroOptical**, Westwood, MA. 781-326-8111. <http://www.microopticalcorp.com>.

**Microstar Laboratories**, Bellevue, WA. 425-453-2345. <http://www.mstarlabs.com>.

**Microsys Technologies**, Mississauga, ON, Canada. 905-678-3288.  
<http://www.micro-sys.com>.

**Microtronix Systems**, London, ON, Canada. 519-649-4900. <http://www.microtronix.ca>.

**Microvision**, Auburn, CA. 530-888-8344. <http://www.microvsn.com>.

**Micro-Vu**, Windsor, CA. 707-838-6272. <http://www.microvu.com>.

**Miller Industrial**, Tucker, GA. 770-270-0076.

**Mill-Max Mfg.**, Oyster Bay, NY. 516-922-6000. <http://www.mill-max.com>.

**Mindready Solutions**, St. Laurent, QC, Canada. 514-339-1394.  
<http://www.mindready.com>.

**Mini-Circuits**, Brooklyn, NY. 718-934-4500. <http://www.minicircuits.com>.

**Mitutoyo America**, Aurora, IL. 630-820-9666. <http://www.mitutoyo.com>.

**MKS, Ion Systems**, Alameda, CA. 800-367-2452. <http://www.ion.com>.

**3M Electronics**, Austin, TX. 800-328-1368. <http://www.3M.com/electronics>.

**Monarch Instrument**, Amherst, NH. 800-999-3390.  
<http://www.monarchinstrument.com>.

**Monroe Electronics**, Lyndonville, NY. 585-765-2254.  
<http://www.monroe-electronics.com>.

**Moritex**, Cambridge, UK. +44(0)-1223-301-148. <http://www.moritex.com>.

**Morrow Technologies**, St. Petersburg, FL. 727-531-4000.  
<http://www.morrowcorp.com>.

**Motorola Product Testing Services**, Lawrenceville, GA. 770-338-3795.  
<http://www.motorola.com/producttesting>.

**Moxa Technologies**, Brea, CA. 714-528-6777. <http://www.MoxaUSA.com>.

**MSI Sensors**, Hampton, VA. 757-766-1500. <http://www.msiusa.com>.

**MTI Instruments**, Albany, NY. 518-218-2550. <http://www.mtiinstruments.com>.

**Multiprobe**, Santa Barbara, CA. 805-560-0404. <http://www.multiprobe.com>.

**Multitest Elektronische Systeme**, Rosenheim, Germany. +49-(0)8031-406 0.  
<http://www.multitest.com>.

**MuShield**, Goffstown, NH. 603-666-4433. <http://www.mushield.com>.

**MVTec Software**, Munich, Bavaria, Germany. +49 89 4576950. <http://www.mvtec.com>.

## N

**NAC Image Technology**, Simi Valley, CA. 800-969-2711. <http://www.nacinc.com>.

**Naptech Test Equipment**, Lower Lake, CA. 707-995-7145. <http://www.naptech.com>.

**National Instruments**, Austin, TX. 512-683-0100. <http://www.ni.com>.

**National Quality Assurance—USA**, Acton, MA. 800-649-5289.  
<http://www.nqa-usa.com>.

**National Semiconductor**, Santa Clara, CA. 800-272-9959. <http://www.national.com>.

**National Technical Systems**, Calabasas, CA. 800-270-2516. <http://www.ntsncorp.com>.

**Navatek Engineering**, Rancho Santa Margarita, CA. 949-888-2222.  
<http://www.navatek.com>.

**Navitar**, Rochester, NY. 585-359-4000. <http://navitar.com>.

**NCI Logic Analyzers**, Huntsville, AL. 256-837-6667. <http://www.nci-usa.com>.

**NEA**, Londonderry, NH. 603-669-6080. <http://www.neainc.com>.

**Neff Instrument**, Monrovia, CA. 800-423-7151. <http://www.neff.com>.

**NET USA**, Highland, IN. 219-934-9042. <http://net-usa-inc.com>.

**Network Instruments**, Minnetonka, MN. 800-526-7919.  
<http://www.networkinstruments.com>.

**Nevada Automotive Test Center**, Carson City, NV. 775-629-2000.  
<http://www.natc-ht.com>.

**Newport**, Irvine, CA. 949-863-3144. <http://www.newport.com>.

**Newport Electronics**, Santa Ana, CA. 714-540-4914. <http://www.newportus.com>.

**Nikon Instruments**, Melville, NY. 631-547-8500. <http://www.nikonusa.com>.

**Noise Com**, Parsippany, NJ. 973-386-9696. <http://www.noisecom.com>.

**Noise Laboratory**, Sagami, Kanagawa, Japan. +81-42-712-2051.  
<http://www.noiseken.co.jp>.

**Nomadics**, Stillwater, OK. 405-372-9535. <http://www.aigproducts.com>.

**NorPix**, Montreal, QC, Canada. 514 907 1588. <http://www.norpix.com>.

**North Atlantic Industries**, Bohemia, NY. 631-567-1100. <http://www.naii.com>.

**Northwest Analytical**, Portland, OR. 503-224-7727. <http://www.nwasoft.com>.

**Northwest EMC**, Hillsboro, OR. 503-844-4066. <http://www.nwemc.com>.

**Nova Engineering**, Cincinnati, OH. 800-341-6682. <http://www.nova-eng.com>.

**Novas Software**, San Jose, CA. 408-467-7888. <http://www.novas.com>.

**Novatech Instruments**, Seattle, WA. 206-301-8986. <http://www.novatech-instr.com/>.

**Novx**, San Jose, CA. 408-998-5555. <http://www.novxcorp.com>.

**Noyes Fiber Products**, Belmont, NH. 603-528-7780. <http://www.noyes-fiber.com>.

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**ODU-USA**, Camarillo, CA. 805-484-0540. <http://www.odu-usa.com>.  
**Olympus Industrial America**, Micro-Imaging Div., Orangeburg, NY. 800-233-0697. <http://www.olympus.com>.  
**Omega Engineering**, Stamford, CT. 800-848-4286. <http://www.omega.com>.  
**Omicron Electronics**, Houston, TX. 713-830-4660. <http://www.omicron-lab.com>.  
**Omron Electronics**, Schaumburg, IL. 847-843-7900. <http://www.omron.com/oei>.  
**Oneida Research Services**, Whitesboro, NY. 315-736-5480. <http://www.ors-labs.com>.  
**Onset Computer**, Bourne, MA. 508-759-9500. <http://www.onsetcomp.com>.  
**Ophir RF**, Los Angeles, CA. 310-306-5556. <http://www.ophirrf.com>.  
**OptEM Engineering**, Calgary, AB, Canada. 403-289-0499. <http://www.optem.com>.  
**Optical Gaging Products**, Rochester, NY. 585-544-0400. <http://www.ogpnet.com>.  
**Opticom**, Erlangen, Germany. +49 9131-530 200. <http://www.opticom.de>.  
**OptoMetrix**, Renton, WA. 425-251-6363. <http://www.optomet.com>.  
**Optomistic Products**, South Freeport, ME. 207-865-9181. <http://www.optomisticproducts.com>.  
**OptoTest**, Newbury Park, CA. 805-498-2040. <http://www.optotest.com>.  
**OriginLab**, Northampton, MA. 413-586-2013. <http://www.originlab.com>.  
**ORIX USA**, Los Angeles, CA. 877-849-6749. <http://www.orixonline.com>.  
**OROS**, Noise & Vibration Solutions, Dulles, VA. 888-200-6767. <http://www.OTOS.com>.  
**Owens Design**, Fremont, CA. 510-770-8479. <http://www.owensdesign.com>.  
**Oz Optics**, Carp, ON, Canada. 613-831-0981. <http://www.ozoptics.com>.

## P

**Pace Scientific**, Mooresville, NC. 704-799-0688. <http://www.pace-sci.com>.  
**Pacific Instruments**, Concord, CA. 925-827-9010. <http://www.pacificinstruments.com>.  
**Pacific Power Source**, Irvine, CA. 949-251-1800. <http://www.pacificpower.com>.  
**Panasonic Vision Systems**, Secaucus, NJ. 888-880-8474. <http://www.panasonic.com/visionsystems>.  
**Panasonic Factory Solutions Company of America**, Buffalo Grove, IL. 847-495-6100. <http://www.panasonicfa.com>.  
**PCB Piezotronics**, Depew, NY. 716-684-0001. <http://www.pcb.com>.  
**PDF Solutions**, San Jose, CA. 408-280-7900. <http://www.pdf.com>.  
**Pearson Electronics**, Palo Alto, CA. 650-494-6444. <http://www.pearsonelectronics.com>.  
**Pendulum Instruments**, Bromma, Sweden, Sweden. +46-8-598-51000. <http://www.pendulum-instruments.com>.  
**Pentek**, Upper Saddle River, NJ. 201-818-5900. <http://www.pentek.com>.  
**PerkinElmer Optoelectronics**, Fremont, CA. 510-979-6500. <http://optoelectronics.perkinelmer.com>.  
**PFU Systems**, Plymouth, MN. 763-551-8261. <http://www.pfusystems.com>.  
**Phlox**, Aix les Milles, Cedex, France. +33-4-42-90-76-20. <http://www.phlox-gc.com>.  
**phoenix x-ray Systems + Services**, Camarillo, CA. 805-389-0911. <http://www.phoenix-xray.com>.  
**Phoseon Technology**, Hillsboro, OR. 503-439-6446. <http://www.phoseon.com>.  
**Photon**, San Jose, CA. 408-226-1000. <http://www.photon-inc.com>.  
**Photron**, San Diego, CA. 858-684-3555. <http://www.photron.com>.  
**Pickering Interfaces**, Grants Pass, OR. 541-471-0700. <http://www.pickeringtest.com>.  
**Pico Technology**, St Neots, Cambridgeshire, UK. +44 (0)1480-396395. <http://www.picotech.com>.  
**Picosecond Pulse Labs**, Boulder, CO. 303-443-1249. <http://www.picosecond.com>.  
**Piezosystem Jena**, Hopedale, MA. 508-634-6688. <http://www.piezojena.com>.  
**Pikes Peak Test Labs**, Colorado Springs, CO. 719-596-0802. <http://www.pptli.com>.  
**Pintail Technologies**, Plano, TX. 972-208-2800. <http://www.pintail.com>.  
**Plastronics**, Irving, TX. 800-582-5822. <http://www.plastronicsusa.com>.  
**PLD Applications**, Aix-en-Provence, Cedex-3, France. 866-513-0362. <http://www.plda.com>.  
**Pleora Technologies**, Kanata, ON, Canada. 613-270-0625. <http://www.pleora.com>.  
**PMG Technologies**, Blainville, QC, Canada. 888-764-8378. <http://www.pmgtest.com>.  
**Point Grey Research**, Vancouver, BC, Canada. 604-730-9937. <http://www.ptgrey.com>.  
**Polytec**, Tustin, CA. 714-850-1835. <http://www.polytec.com>.  
**Pomona Electronics**, Everett, WA. 800-490-2361. <http://www.pomonaelectronics.com>.  
**PPT Vision**, Minneapolis, MN. 952-996-9500. <http://www.pptvision.com>.

**Praxsymb**, Fisher, IL. 217-897-1744. <http://www.praxsym.com>.  
**Precision Contacts**, El Dorado Hills, CA. 916-939-4147. <http://www.precisioncontacts.com>.  
**Precision Filters**, Ithaca, NY. 607-277-3550. <http://pfinc.com>.  
**Precision Test Systems**, South Woodham Ferrers, Essex, UK. +44-845-052-0920. <http://www.ptsyst.com>.  
**Premier Semiconductor Services**, Austin, TX. 512-912-3500. <http://www.premiertest.com>.  
**Pressure Systems**, Hampton, VA. 800-678-7226. <http://www.pressuresystems.com>.  
**Princeton**, Lawrenceville, NJ. 609-895-9890. <http://www.princeton.com>.  
**Prior Scientific**, Rockland, MA. 781-878-8442. <http://www.prior.com>.  
**Prism Sound**, Rockaway, NJ. 973-983-9577. <http://www.prismsound.com>.  
**Probe Master**, El Cajon, CA. 800-772-1519. <http://www.probemaster.com/>.  
**ProbeStar**, Milpitas, CA. 408-942-4896. <http://www.probestar-usa.com>.  
**Product Safety Consulting**, Bensenville, IL. 630-238-0188. <http://www.productsafetyinc.com>.  
**Professional Testing**, Round Rock, TX. 512-244-3371. <http://www.ptitest.com>.  
**Prostat**, Bensenville, IL. 630-238-8883. <http://www.prostatcorp.com>.  
**Protek Test and Measurement**, Englewood, NJ. 201-818-7711. <http://www.protektest.com>.  
**PTL Test Equipment**, Jupiter, FL. 561-747-3647. <http://www.ptltest.com>.  
**Pulizzi Engineering**, Santa Ana, CA. 800-870-2248. <http://www.pulizzi.com>.  
**PXIT**, Lexington, MA. 781 674 2400. <http://www.pxit.com>.  
**Pyrometer Instrument**, Windsor, NJ. 609-443-5522. <http://www.pyrometer.com>.

## Q

**QA Technology**, Hampton, NH. 603-926-1193. <http://www.qatech.com>.  
**QIOPTIQ Imaging Solutions**, A Member of the QIOPTIQ Group, Rochester, NY. 800-430-3041. <http://www.qioptiqimaging.com>.  
**Q-Panel Lab Products**, Cleveland, OH. 440-835-8700. <http://www.q-lab.com>.  
**QRP**, Tucson, AZ. 520-790-3533. <http://www.qrpgloves.com>.  
**QuadTech**, Maynard, MA. 800-253-1230. <http://www.quadtech.com>.  
**QualiTau**, Santa Clara, CA. 408-522-9200. <http://www.qualitau.com>.  
**Quality Standards & Marketing**, Oxnard, CA. 800-500-7190. <http://www.qualitystandards.com>.  
**QualityLogic**, Moorpark, CA. 805-531-9030. <http://www.qualitylogic.com>.  
**Qualtest**, Orlando, FL. 407-293-5844. <http://www.qualtest.com>.  
**Quantum Change**, Huffman, TX. 281-359-5540. <http://www.quantumchange.com>.  
**Quantum Data**, Elgin, IL. 847-888-0450. <http://www.quantumdata.com>.

## R

**R.C. Electronics**, Santa Barbara, CA. 805-685-7770. <http://www.rcelectronics.com>.  
**Racal Instruments**, Irvine, CA. 949-859-8999. <http://www.eads-nadefense.com>.  
**RADCOM**, Paramus, NJ. 201-518-0033. <http://www.radcom.com>.  
**Radiant Imaging**, Duvall, WA. 425-844-0152. <http://www.radiantimaging.com>.  
**Rad-Icon Imaging**, Santa Clara, CA. 408-486-0886. <http://www.rad-icon.com>.  
**RAM Optical Instrumentation**, Rochester, NY. 585-758-1300. <http://www.ramoptical.com>.  
**Ramsey Electronics**, Victor, NY. 800-446-2295. <http://www.ramseytest.com>.  
**Real Controls**, Salix, PA. 814-487-5195. <http://www.realcontrols.com>.  
**Red Rock Software**, Salt Lake City, UT. 801-322-4322. <http://www.redrocksw.com>.  
**Redlake**, Tucson, AZ. 520-547-2772. <http://www.redlake.com>.  
**Reinhardt System und Messelectronic**, Diessen, Bavaria, Germany. +49-8196-934100. <http://www.reinhardt-testsystem.de>.  
**Reliability Analysis Laboratory**, Raytheon, Tewksbury, MA. 800-725-4787. <http://www.reliabilityanalysislab.com>.  
**ReMaTek**, St. Laurent, QC, Canada. 514-333-0101. <http://www.rematek.com>.  
**Ricreations**, Universal Scan, Gainesville, GA. 678-455-7255. <http://www.universalscan.com>.  
**Rika Denshi America**, Attleboro, MA. 508-226-2080. <http://www.testprobe.com>.  
**Robert A. Denton**, Rochester Hills, MI. 248-852-5100. <http://www.dentoninc.com>.  
**Robson Technologies**, Morgan Hill, CA. 408-779-8008. <http://www.testfixtures.com>.

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# VENDOR CONTACT INFORMATION

**Rockwell Scientific**, Thousand Oaks, CA. 805-373-4545.  
<http://www.rockwellscientific.com>.

**Rocky Mountain Test Equipment**, Centennial, CO. 303-693-3322.  
<http://www.rmte.net>.

**Rohde & Schwarz**, Columbia, Maryland. 410-910-7800.  
<http://www.rohde-schwarz.com/USA>.

**Rolyn Optics**, Covina, CA. 626-915-5707. <http://www.rolyn.com>.

**Ross Engineering**, Campbell, CA. 408-377-4621.  
<http://www.rossengineeringcorp.com>.

**Rotek Instrument**, Waltham, MA. 781-899-4611. <http://www.rotek.com>.

**Rotronic Instrument**, Huntington, NY. 631-427-3898. <http://www.rotronic-usa.com>.

**Router Solutions**, Newport Beach, CA. 949-737-4567. <http://www.rsi-inc.com>.

**Rudolph Technologies**, Flanders, NJ. 973-691-1300. <http://www.rudolphtech.com>.

**RVSI Acuity CiMatrix**, Nashua, NH. 800-468-9503. <http://www.acuitycimatrix.com>.

**RVSI Inspection**, Hauppauge, NY. 631-273-9700. <http://www.rvsi.com>.

## S

**S.R.S. Market Solutions**, Metersuperstore.com, Eagleville, PA.  
<http://www.metersuperstore.com>.

**Saelig**, Pittsford, NY. 585-385-1750. <http://www.saelig.com>.

**ScanCAD International**, Morrison, CO. 303-697-8888. <http://www.scanCAD.com>.

**Schaffner EMC**, Edison, NJ. 732-225-9533. <http://www.schaffner.com>.

**Schomandl**, Yucaipa, CA. 909-797-0484. <http://www.schomandl.com>.

**Schott North America**, Auburn, NY. 315-255-2791.  
<http://www.us.schott.com/fiberoptics>.

**Schroff**, Warwick, RI. 888-550-9543. <http://www.schroff.us>.

**Sciometric Instruments**, Ottawa, ON, Canada. 613-596-3995.  
<http://www.sciometric.com>.

**Sciencescope International**, Chino, CA. 909-590-7273. <http://www.sciencescope.com>.

**Scientific Solutions**, Mentor, OH. 440-357-1400. <http://www.scientific-solutions.com>.

**Scientific Test**, Richardson, TX. 972-479-1300. <http://www.scitest.com>.

**Sealevel Systems**, Liberty, SC. 864-843-4343. <http://www.sealevel.com>.

**Sefelec**, Yucaipa, CA. 909-797-0484. <http://www.sefelec.com>.

**Seica**, Strambino, Italy. +39-0125-636811. <http://www.seica.com>.

**Semitek**, Richardson, TX. 972-783-8100. <http://www.semitek.com>.

**Sencore**, Sioux Falls, SD. 605-339-0100. <http://www.sencore.com>.

**SensArray**, Fremont, CA. 510-360-5600. <http://www.sensarray.com>.

**Sensor Products**, Madison, NJ. 973-884-1755. <http://www.sensorprod.com>.

**Sensortronics**, Walpole, MA. 508-660-8823. <http://www.sensortronics.com>.

**Sentech America**, Carrollton, TX. 972-481-9223. <http://www.sentechamerica.com>.

**Sharetree Systems**, Gloucestershire, Stroud, UK. +44(0)-145-382-8642.  
<http://www.sharetree.com>.

**Sigma Systems**, El Cajon, CA. 619-258-3700. <http://www.sigmasystems.com>.

**SigmaQuest**, Santa Clara, CA. 408-654-9401. <http://www.sigmaquest.com>.

**Signal Recovery**, Oak Ridge, TN. 865-482-4411. <http://www.signalrecovery.com>.

**Signalysis**, Cincinnati, OH. 513-528-6164. <http://www.signalysis.com>.

**Signametrics**, Seattle, WA. 206-524-4074. <http://www.signametrics.com>.

**Silicon Imaging**, Troy, NY. 518-279-9098. <http://www.siliconimaging.com>.

**Simco**, Hatfield, PA. 215-997-0590. <http://www.simcolON.biz>.

**Slaughter**, Lake Forest, IL. 847-932-3662. <http://www.hipot.com>.

**Smart Sonic**, Canoga Park, CA. 818-610-7900. <http://www.smartsonic.com>.

**Solaris Development**, Sunnyvale, CA. 408-541-0151. <http://www.solaris-inc.com>.

**SOLTEC**, San Fernando, CA. 800-423-2344. <http://www.solteccorp.com>.

**Sony Electronics**, Park Ridge, NJ. 201-930-7000. <http://www.sony.com/videocameras>.

**Sony Precision Technology America**, Lake Forest, CA. 949-770-8400.  
<http://www.sonypt.com>.

**Southwest Research Institute**, San Antonio, TX. 210-684-5111. <http://www.swri.org>.

**Sovtest**, Kursk, Russia. <http://www.sovtest.ru>.

**SPEA**, Volpiano, Italy. +39-0119825400. <http://www.spea.com>.

**Spectracom**, Rochester, NY. 585-321-5800. <http://www.spectracomcorp.com>.

**Spectraste**, Mt. View, CA. 800-716-2421. <http://www.spectraste.com>.

**Spectrum Control**, Fairview, PA. 814-474-0333. <http://www.spectrumcontrol.com>.

**Spirent Communications**, Performance Analysis Broadband, Calabasas Hills, CA. 800-927-2660. <http://www.spirentcom.com>.

**Stag Programming Solutions**, Yucaipa, CA. 909-797-0484. <http://www.stag.co.uk>.

**Stanford Research Systems**, Sunnyvale, CA. 408-744-9040. <http://www.thinksrs.com>.

**Stanley Supply & Services**, N. Andover, MA. 800-225-5370.  
<http://www.stanleyworks.com>.

**StataCorp.**, College Station, TX. 800-782-8272. <http://www.stata.com>.

**Static Solutions**, Marlboro, MA. 508-480-0700. <http://www.staticsolutions.com>.

**StaticSmart ESD Flooring**, Julie Industries, Wilmington, MA. 978-988-8802.  
<http://www.staticsmart.com>.

**Statit Software**, Corvallis, OR. 800-478-2892. <http://www.statit.com>.

**StatSoft**, Tulsa, OK. 918-749-1119. <http://www.statsoft.com>.

**Stephen Halperin & Associates**, Bensenville, IL. 630-238-8883.  
<http://www.halperinassoc.com>.

**StockerYale**, Montreal, QC, Canada. 800-814-9552. <http://www.stockeryale.com>.

**Storm Products—Microwave**, Woodridge, IL. 630-754-3300.  
<http://www.stormproducts.com>.

**Strategic Test**, Woburn, MA. 617-621-0080. <http://www.strategic-test.com>.

**Summit Instruments**, Akron, OH. 330-659-3312. <http://www.summitinstruments.com>.

**Sun Electronic Systems**, Titusville, FL. 321-383-9400. <http://www.sunelectronics.com>.

**Sunnex**, Natick, MA. 800-445-7869. <http://www.sunnexonline.com>.

**Sunstone Circuits**, Mulino, OR. 503-829-9108. <http://www.sunstone.com>.

**Superior Electric**, Bristol, CT. 860-585-4500. <http://www.superiorelectric.com>.

**SurplusEq.com**, Phoenix, AZ. 602-867-1904. <http://www.surplusseq.com>.

**Suss MicroTec**, Sacka bei Dresden, Saxony, Germany. +49-35240-73-0.  
<http://www.suss.com>.

**SV Probe**, Santa Clara, CA. 408-727-6341. <http://www.svprobe.com>.

**Swift Textile Metalizing**, Bloomfield, CT. 860-243-1122. <http://www.swift-textile.com>.

**Symmetricom**, Timing, Test & Measurement Division, San Jose, CA. 978-232-1422.  
<http://www.symmetricom.com>.

**Symtx**, Austin, TX. 512-328-7799. <http://www.symtx.com>.

**Synergetix**, Kansas City, KS. 913-342-0404. <http://www.synergetix.com>.

**Synergy Software**, Reading, PA. 610-779-0522. <http://www.synergy.com>.

**Synopsis**, Mt. View, CA. 650-584-5000. <http://www.synopsys.com>.

**SynTest Technologies**, Sunnyvale, CA. 408-720-9956. <http://www.syntest.com>.

**SyntheSys Research**, Menlo Park, CA. 650-364-1853. <http://www.bertscope.com>.

**Sypris Test & Measurement**, Orlando, FL. 407-678-6900. <http://www.sypris.com>.

## T

**Tabor Electronics**, Yucaipa, CA. 909 797 0484. <http://www.taborelec.com>.

**TAL Technologies**, Philadelphia, PA. 215 496 0222. <http://www.TALtech.com>.

**Tamar Technology**, Newbury Park, CA. 805-480-3358.  
<http://www.tamartechnology.com>.

**Tamron USA**, Commack, NY. 631-858-8400. <http://www.tamron.com>.

**Tamara Corp. of America**, Temecula, CA. 800-472-6654. <http://www.tamuracorp.com>.

**Tanisys Technology**, Austin, TX. 512-335-4440. <http://www.tanisys.com>.

**TDI-Dynaload**, Hackettstown, NJ. 908-979-0599. <http://www.tdi-power.com/dynaload/>.

**TDK RF Solutions**, Cedar Park, TX. 512-258-9478. <http://www.tdkrfsolutions.com>.

**TEAC America**, Montebello, CA. 323-726-0303. <http://www.teac.com>.

**TEAM A.T.E.**, Denver, CO. 303-628-7722. <http://www.team-ate.com>.

**TEAM**, Burlington, WA. 360-757-8601. <http://www.teamcorporation.com>.

**Technology Training**, Santa Barbara, CA. 866-884-4338. <http://www.TTiedu.com>.

**TechRecovery**, Mendon, MA. 877-837-8872. <http://www.techrecovery.com>.

**Tecpel**, Sin Yi District, Taipei, Taiwan. +886-2-2737-5866. <http://www.tecpel.com>.

**Tegam**, Geneva, OH. 440-466-6100. <http://www.tegam.com>.

**Tekscan**, South Boston, MA. 617-464-4500. <http://www.tekscan.com>.

**Tektronix**, Portland, OR. 800-426-2200. <http://www.tektronix.com>.

**Telatemp**, Fullerton, CA. 714-879-2901. <http://www.telatemp.com>.

**Telco Testing Solutions**, Tempe, AZ. 480-603-1828. <http://www.telcotesting.com>.

**Telinc**, Mount Laurel, NJ. 800-257-5110. <http://www.telinc.com>.

**Teltone**, Bothell, WA. 800-426-3926. <http://www.teltone.com>.

**Temptronic**, an inTest company, Sharon, MA. 781-688-2300.  
<http://www.temptronic.com>.

**Teradyne**, Assembly Test Div., North Reading, MA. 800-837-2396.  
<http://www.teradyne.com/atd>.

**Teradyne**, Semiconductor Test Division, Boston, MA. 617-482-2700.  
<http://www.teradyne.com>.

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**Terahertz Technologies**, Oriskany, NY. 315-736-3642.  
<http://www.terahertztechnologies.com>.

**Terra Universal**, Fullerton, CA. 714-578-6000. <http://www.terrauniversal.com>.

**Test & Measurement Global Exchange (Tamge)**, Lexington, MA. 617-820-8630.  
<http://www.tamge.com>.

**Test Advantage**, Tempe, AZ. 480-337-3377. <http://www.testadvantage.com>.

**Test Coach**, Hoffman Estates, IL. 847-885-4880. <http://www.testcoachcorp.com>.

**The Test Connection**, Reistertown, MD. 410-526-2800. <http://www.ttc.com>.

**Test Equipment Connection**, Lake Mary, FL. 800-615-8378.  
<http://www.testequipmentconnection.com>.

**Test Equipment Solutions Today**, Foster City, CA. 888-889-8378.  
<http://www.testsolu.com>.

**Test Research**, Taipei, Taiwan. +886-2-28328918. <http://www.tri.com.tw>.

**Test Site Services**, Milford, MA. 508-634-3444. <http://www.testsiteservices.com>.

**TestEdge**, San Diego, CA. 858-451-1012. <http://www.testedgeinc.com>.

**TestEquity**, Thousand Oaks, CA. 800-950-3457. <http://www.testequity.com>.

**TestMart**, San Bruno, CA. 650-624-0525. <http://www.testmart.com>.

**Testo**, Flanders, NJ. 973-252-1720. <http://www.testo.com>.

**Testronics**, McKinney, TX. 972-542-3111. <http://www.testronics.com>.

**Texas Instruments**, Dallas, TX. 800-336-5236. <http://www.ti.com>.

**ThermaCal**, Solon, OH. 440-498-1005. <http://www.thermacal.com>.

**Thermal Product Solutions**, A unit of SPX, Williamsport, PA. 570-326-1770.  
<http://www.thermalproductsolutions.com>.

**Thermo Electric**, Saddle Brook, NJ. 201-843-5800.  
<http://www.thermo-electric-direct.com>.

**Thermo Electron**, Thermo KeyTek, Lowell, MA. 978-275-0800.  
<http://www.thermo.com/esd>.

**Thermonics**, Santa Clara, CA. 408-496-6838. <http://www.thermonics.com>.

**Thermotron Industries**, Holland, MI. 616-393-4580. <http://www.thermotron.com>.

**Thunder Scientific**, Albuquerque, NM. 505-265-8701.  
<http://www.ThunderScientific.com>.

**Thurlby-Thandar Instruments (TTi)**, Huntingdon, Cambs, UK. +44-1480-412451.  
<http://www.tti-test.com>.

**TiePie engineering**, Sneek, Friesland, Netherlands. +31 515 415 416.  
<http://www.tiepie.nl>.

**Total Temperature Instrumentation**, Williston, VT. 802-863-0085.  
<http://www.ttiglobal.com>.

**Tracespan Communications**, Ann Arbor, MI. 734-846-0549. <http://www.tracespan.com>.

**Tracewell Systems**, Westerville, OH. 800-848-4524. <http://www.tracewellsystems.com>.

**Transcat**, Rochester, NY. 800-828-1470. <http://www.transcat.com>.

**TransEra**, Orem, UT. 800-666-3216. <http://www.HTBasic.com>.

**Trek**, Medina, NY. 585-798-3140. <http://www.trekinc.com>.

**Trek Equipment**, Sausalito, CA. 415-332-1555. <http://www.trekequip.com>.

**Trio-Tech International**, Van Nuys, CA. 818-787-7000. <http://www.triotech.com>.

**TRS-RenTelco**, DFW Airport, TX. 800-874-7123. <http://www.trs-rentelco.com>.

**Tucker Electronics**, Garland, TX. 800-527-4642. <http://www.tucker.com>.

**TUV America**, Danvers, MA. 800-888-0123. <http://www.TUVamerica.com>.

**TUV Rheinland of North America**, Newtown, CT. 888-975-3943. <http://www.tuv.com>.

**Tyrosys**, Plano, TX. 877-897-6797. <http://www.tyrosys.com>.

**TYX**, Reston, VA. 703-264-1080. <http://www.tyx.com>.

## U

**UGS**, Plano, TX. 800-498-5351. <http://www.ugs.com>.

**Ultrafast Sensors**, Thousand Oaks, CA. 866-205-0592.  
<http://www.ultrafastsensors.com>.

**UltraTest International**, San Jose, CA. 408-433-2244. <http://www.ultratest.com>.

**UMD Advanced Test Technologies**, Vancouver, WA. 360-433-6230.  
<http://www.umdtech.com>.

**Underwriters Laboratories**, Northbrook, IL. 847-272-8800. <http://www.ul.com>.

**Unholtz-Dickie**, Wallingford, CT. 203-265-3929. <http://www.udco.com>.

**Unisoft**, Milford, CT. 888-486-4246. <http://www.unisoft-cim.com>.

**United Electronic Industries**, Canton, MA. 781-821-2890. <http://www.ueidaq.com>.

**Unitron**, Bohemia, NY. 631-589-6666. <http://www.unitronusa.com>.

**Universal Switching**, Van Nuys, CA. 818-785-0200. <http://www.uswi.com>.

## V

**V.J. Electronix**, Bohemia, NY. 800-858-9729. <http://www.vjelectronix.com>.

**Vektrex Electronic Systems**, San Diego, CA. 858-558-8282. <http://www.vektrex.com>.

**Verigy**, Santa Clara, CA. 800-283-8378. <http://www.verigy.com>.

**VI Technology**, Austin, TX. 512-327-3348. <http://www.vi-tech.com>.

**Vibration Research**, Jenison, MI. 616-669-3028. <http://www.vibrationresearch.com>.

**Vicor**, Andover, MA. 978-470-2900. <http://www.vicorpower.com>.

**Videology Imaging Solutions**, Greenville, RI. 401-949-5332.  
<http://www.videologyinc.com>.

**View Engineering**, Simi Valley, CA. 805-578-5000. <http://www.vieweng.com>.

**Viewpoint Systems**, Rochester, NY. 585-475-9555. <http://www.viewpointusa.com>.

**Virginia Panel**, Waynesboro, VA. 540-932-3300. <http://www.vpc.com>.

**Viscom**, Norcross, GA. 678-966-9835. <http://www.viscomusa.com>.

**Vision Components**, Hudson, NH. 603-598-2588. <http://www.vision-components.com>.

**Vision Engineering**, New Milford, CT. 860-355-3776. <http://www.visioneng.com>.

**Vision Systems International**, Yardley, PA. 215-736-0994. <http://www.vision1.com/vsi>.

**VLSI Standards**, San Jose, CA. 408-428-1800. <http://www.vlsistandards.com>.

**VMETRO**, Houston, TX. 281-584-0728. <http://www.vmetro.com>.

**Volpi USA**, Auburn, NY. 315-255-1737. <http://www.volpiusa.com>.

**VXI Technology**, Irvine, CA. 949-955-1894. <http://www.vxitech.com>.

## W

**W.J. Ford Surplus Enterprises**, Smith's Falls, ON, Canada. 613-283-5195.  
<http://www.testequipmentcanada.com>.

**W.L. Gore & Associates**, Elkton, MD. 800-311-3060. <http://www.gore.com>.

**W.M. Hague**, Pepperell, MA. 978-433-3777. <http://www.WMHague.com>.

**Warwick Control Technologies**, Fen End, Warwickshire, UK. +44(0)1676 536010.  
<http://www.warwickcontrol.com>.

**Wavecrest**, Eden Prairie, MN. 952-831-0030. <http://www.wavecrest.com>.

**Wentworth Laboratories**, Brookfield, CT. 203-775-0449.  
<http://www.wentworthlabs.com>.

**WESCO**, Western Scientific, San Francisco, CA. 415-826-5732.  
<http://www.wescomicroscopes.com>.

**Willtek Communications**, Indianapolis, IN. 317-595-2021. <http://www.willtek.com>.

**Wintriss Engineering**, San Diego, CA. 800-550-7300. <http://www.weco.com>.

**WiTec Instruments**, Savoy, IL. 217 351 9705. <http://www.witec-instruments.com>.

## X

**Xantrex Technology**, Burnaby, BC, Canada. 604-422-8595. <http://www.xantrex.com>.

**Xitron Technologies**, San Diego, CA. 858-530-8099. <http://www.xitrontech.com>.

**X-TEK Group**, Tyngsboro, MA. 978-649-6333. <http://www.xtekxray.com>.

## Y

**Yamaichi Electronics USA**, San Jose, CA. 408-456-0797. <http://www.yamaichi.us>.

**YesTech**, San Clemente, CA. 949-361-2714. <http://www.yestechinc.com>.

**Yokogawa Corp. of America**, Newnan, GA. 770-254-0400. <http://www.yokogawa.com/us>.

**Y-tek**, Raleigh, NC. 919-676-4741. <http://www.Y-tek.com>.

## Z

**Zmation**, Portland, OR. 503-253-8871. <http://www.zmation.com>.

**Ztec**, Albuquerque, NM. 505-342-0132. <http://www.ztec-inc.com>.

**Zygo**, Middlefield, CT. 860-347-8506. <http://www.zygo.com>.

T&MW

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# PROFESSIONAL SOCIETIES & TRADE ASSOCIATIONS

**Accellera**, [www.accellera.org](http://www.accellera.org). Formed by the merger of VHDL International and Open Verilog International, Accellera drives the development of standards that enhance a language-based design automation process.

**AeA**, [www.aeanet.org](http://www.aeanet.org). Formerly the American Electronics Association, AeA is a trade association representing all segments of the technology industry.

**American Association for Laboratory Accreditation (A2LA)**, [www.a2la.org](http://www.a2la.org). The A2LA is dedicated to accreditation of competent testing and calibration laboratories, proficiency testing providers, and reference materials producers.

**American Council of Independent Laboratories (ACIL)**, [www.acil.org](http://www.acil.org). ACIL is a trade association representing independent, commercial scientific, and engineering firms.

**American National Standards Institute (ANSI)**, [www.ansi.org](http://www.ansi.org). ANSI is a private, nonprofit administrator and coordinator of the US voluntary standardization system.

**American Society for Nondestructive Testing (ASNT)**, [www.asnt.org](http://www.asnt.org). ASNT promotes the discipline of nondestructive testing (NDT) as a profession and facilitates NDT research.

**American Society for Quality (ASQ)**, [www.asq.org](http://www.asq.org). The American Society for Quality advances learning, quality improvement, and knowledge exchange to improve business results.

**American Society of Test Engineers (ASTE)**, [www.astetest.org](http://www.astetest.org). The ASTE, a nonprofit corporation, is dedicated to promoting test engineering as a profession.

**ASTM International**, [www.astm.org](http://www.astm.org). ASTM develops and distributes voluntary technical standards and related information.

**Audio Engineering Society (AES)**, [www.aes.org](http://www.aes.org). The AES is a professional society devoted exclusively to audio technology.

**Automated Imaging Association (AIA)**, [www.machinevisiononline.org](http://www.machinevisiononline.org). The AIA is a trade association for machine-vision imaging suppliers and users. AIA also maintains the Camera Link and GigE Vision standards.

**British Standards Institution (BSI)**, [www.bsi-global.com](http://www.bsi-global.com). British Standards is the National Standards Body of the UK, responsible for facilitating, drafting, publishing, and marketing British Standards and other guidelines.

**Canadian Standards Association (CSA)**, [www.csa.ca](http://www.csa.ca). CSA is a not-for-profit membership-based association serving business, industry, government and consumers in Canada and the global marketplace.

**DSL Forum**, [www.dslforum.org](http://www.dslforum.org). DSL Forum is a consortium of telecommunications, equipment, computing, networking, and service-provider companies that promotes the use of DSL technology.

**Electronic Industries Alliance (EIA)**, [www.eia.org](http://www.eia.org). EIA represents companies involved in the manufacture of electronic components, parts, systems, and equipment.

**ESD Association**, [www.esda.org](http://www.esda.org). ESD Association is dedicated to advancing the theory and practice of electrostatic discharge avoidance.

**European Committee for Electrotechnical Standardization (CENELEC)**, [www.cenelec.org](http://www.cenelec.org). CENELEC creates electrotechnical standards, many of them following the mandates of the European Commission.

**European Committee for Standardization (CEN)**, [www.cenorm.be](http://www.cenorm.be). CEN works to implement voluntary technical harmonization in Europe in conjunction with worldwide bodies and European partners.

**European Telecommunications Standards Institute (ETSI)**, [www.etsi.org](http://www.etsi.org). ETSI's mission is to produce the telecom standards that will be used throughout Europe.

**Federal Communications Commission (FCC)**, [www.fcc.gov](http://www.fcc.gov). The FCC is charged with regulating interstate and international communications by radio, television, wire, satellite, and cable.

**Fibre Channel Industry Association (FCIA)**, [www.fibrechannel.org](http://www.fibrechannel.org). The FCIA aims to develop the market for Fibre Channel products.

**IEEE**, [www.ieee.org](http://www.ieee.org). The IEEE is a technical professional society that advances the theory and practice of electrical, electronics, and computer engineering as well as computer science.

**Institute for National Measurement Standards (INMS)**, [inms-ienm.nrc-cnrc.gc.ca/](http://inms-ienm.nrc-cnrc.gc.ca/). The INMS, Canada's national metrology institute (NMI), carries out a range of research and service activities.

**Institute of Environmental Sciences and Technology (IEST)**, [www.iest.org](http://www.iest.org). The IEST is concerned with the effects on equipment and machinery of natural, indoor, and extreme environments, which may occur under aerospace, naval, and climatic conditions.

**Institution of Engineering and Technology (IET)**, [www.theiet.org/](http://www.theiet.org/). The IET, a UK-based organization, was formed by the merger of the Institution of Electrical Engineers (IEE) and the Institution of Incorporated Engineers (IIE). It aims to advance engineering and technology by facilitating the exchange of knowledge and ideas.

**InterNational Committee for Information Technology Standards (INCITS)**, [www.incits.org](http://www.incits.org). The INCITS works to produce voluntary consensus standards for storage media, databases, programming languages, multimedia, and communication among computing devices and information systems.

**International Electrotechnical Commission (IEC)**, [www.iec.ch](http://www.iec.ch). The IEC creates international consensus standards and conformity assessment schemes in the fields of electricity, electronics, and associated technologies.

**International Microelectronics & Packaging Society (IMAPS)**, [www.imaps.org](http://www.imaps.org). IMAPS is a professional society dedicated to educating engineers in all phases of electronics packaging.

**International Organization for Standardization (ISO)**, [www.iso.org](http://www.iso.org). ISO promotes the development of international standards.

**International Society for Optical Engineering (SPIE)**, [www.spie.org](http://www.spie.org). The SPIE is a technical society dedicated to advancing engineering, scientific, and commercial applications of optical, photonic, imaging, electronic, and optoelectronic technologies.

**International Telecommunication Union (ITU)**, [www.itu.int](http://www.itu.int). Through the ITU, governments and industries establish and coordinate policies, standards, regulations, and treaties covering global telecommunication networks.

**IPC-Association Connecting Electronics Industries**, [www.ipc.org](http://www.ipc.org). IPC is a global trade association that represents all facets of the electronic interconnection industry, including design, printed wiring board manufacturing, and electronics assembly.

**ISA, The Instrumentation, Systems, and Automation Society**, [www.isa.org](http://www.isa.org). ISA is a society of more than 39,000 professionals involved in instrumentation, measurement, and control.

**Japan Electric Measuring Instruments Manufacturer's Association (JEMIMA)**, [www.jemima.or.jp/english/index.htm](http://www.jemima.or.jp/english/index.htm). JEMIMA promotes research and standards to help develop Japan's electric measuring instrument industry.

**LXI Consortium**, [www.lxistandard.org](http://www.lxistandard.org). The LXI Consortium is working to develop the LAN eXtensions for Instrumentation (LXI) standard.

**MFA Forum**, [www.mfaforum.org](http://www.mfaforum.org). The MFA Forum is an association of telecom, networking, and other companies focused on advancing the deployment of multi-vendor, multi-service packet-based networks.

**Microelectronics Packaging and Test Engineering Council (MEPTEC)**, [www.meptec.org](http://www.meptec.org). MEPTEC is a trade association committed to enhancing the competitiveness of the assembly and testing of semiconductor devices.

**National Cooperation for Laboratory Accreditation (NACLA)**, [www.nacla.net](http://www.nacla.net). NACLA's primary mission is to evaluate US laboratory accreditation bodies (ABs).

**National Institute of Standards and Technology (NIST)**, [www.nist.gov](http://www.nist.gov). NIST promotes US economic growth by working with industry to develop and apply technology, measurements, and standards.

**National Society of Professional Engineers (NSPE)**, [www.nspe.org](http://www.nspe.org). The NSPE is an interdisciplinary professional engineering society.

**National Voluntary Laboratory Accreditation Program (NVLAP)**, [www.nist.gov/nvlap](http://www.nist.gov/nvlap). Administered by NIST, NVLAP provides third-party laboratory accreditation services.

**NCSL International**, [www.ncsl.org](http://www.ncsl.org). The National Conference of Standards Laboratories, NCSL International, is an association of metrology organizations with a focus on education.

**Optical Society of America (OSA)**, [www.osa.org](http://www.osa.org). The OSA is a nonprofit professional society of engineers and scientists in the optics and photonics community.

**PC/104 Consortium**, [www.pc104.org](http://www.pc104.org). The PC/104 Consortium disseminates information about PC/104 and serves as a liaison between the PC/104 community and standards organizations.

**PCI Special Interest Group (PCI-SIG)**, [www.pcisig.com](http://www.pcisig.com). The PCI SIG is committed to the development and enhancement of the PCI standard.

**PCMCIA**, [www.pcmcia.org](http://www.pcmcia.org). PCMCIA is a standards body and trade association that promotes the interoperability of PC Cards in a variety of products.

**PXI Systems Alliance**, [www.pxisa.org](http://www.pxisa.org). The PXI Systems Alliance maintains the PXI specification, promotes PXI technology, and ensures multivendor interoperability.

**SAE International**, [www.sae.org](http://www.sae.org). SAE International works to advance the engineering of mobility systems, whether for use on land or sea or in air or space.

**Semiconductor Equipment and Materials International (SEMI)**, [www.semi.org](http://www.semi.org). SEMI is a trade association for equipment and materials suppliers to the semiconductor, MEMS, and flat-panel display industries.

**Semiconductor Industry Association (SIA)**, [www.sia-online.org](http://www.sia-online.org). The SIA is a trade organization that represents US-based semiconductor manufacturers.

**Semiconductor Test Consortium (STC)**, [www.semitest.org](http://www.semitest.org). The STC oversees the OPENSTAR (Open Semiconductor Test Architecture) platform.

**Society for Information Display (SID)**, [www.sid.org](http://www.sid.org). The SID is devoted to the advancement of electronic display technology, manufacturing, and applications.

**Standards Council of Canada**, [www.scc.ca](http://www.scc.ca). The Standards Council of Canada oversees Canada's National Standards System.

**Surface Mount Technology Association (SMTA)**, [www.smta.org](http://www.smta.org). The SMTA seeks to advance the industry through education, training, and networking in regards to electronics assembly technologies and related business operations.

**Telecommunications Industry Association (TIA)**, [www.tiaonline.org](http://www.tiaonline.org). The TIA is a trade association serving the communications and information technology industries. TIA represents the communications sector of the Electronic Industries Alliance (EIA).

**Test and Diagnostics Consortium (TDC)**, [www.test-diagnostics.org](http://www.test-diagnostics.org). The TDC brings together users and suppliers from industries such as medical, automotive, satellite, railroad, trucking, and defense to optimize the test and diagnostic environment.

**Underwriters Laboratories (UL)**, [www.ul.com](http://www.ul.com). The UL is an independent, nonprofit certification organization that evaluates products in the interest of public safety.

**VMEbus International Trade Association (VITA)**, [www.vita.com](http://www.vita.com). VITA is a nonprofit trade association that promotes the use of open system architectures.

**VXibus Consortium**, [www.vxibus.org](http://www.vxibus.org). The VXibus Consortium develops and promotes the VXibus instrumentation standard.

**ZigBee Alliance**, [www.zigbee.org](http://www.zigbee.org). The ZigBee Alliance works to enable low-power, wirelessly networked, monitoring and control products based on a global standard.



## PRODUCT FOCUS

The following write-ups were supplied by advertisers in this issue.

### USB-based thermo-couple module

The USB-4718 is Advantech's first dedicated USB-based thermocouple module. The USB-4718 supports seven different types of thermocouples (J, K, T, E, R, S, B), six voltage input ranges, 0–20-mA or 4–20-mA current input (to support a variety of sensors), and 16 isolated digital I/O channels. The USB-4718 supports either USB 2.0 or USB 1.1 buses.

Advantech, Cincinnati, OH.  
800-205-7940;  
[www.eautomationpro.com](http://www.eautomationpro.com).



### Breakthrough in automated programming

The new FLX500 from Data I/O is a self-contained, automated device programmer that fits on a desktop. Eliminating the



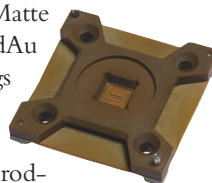
need for special facility requirements, the FLX500 offers plug-and-program capability. Supporting virtually all devices, the system is modular, expandable, offers extremely low changeover times, and requires virtually no operator training.

Data I/O, Redmond, WA. 425-881-6444; [www.dataio.com](http://www.dataio.com).

### Test sockets for lead-free test

The Pad ROL200 Series test socket is designed for testing QFN, DFN, and other pad-style applications in lead-free production test. The Pad ROL200 Series can test Matte Tin and NiPdAu device platings while preserving load boards. This product maintains the excellent mechanical and electrical performance Johnstech has come to be known for.

Johnstech International, Minneapolis, MN. 612-378-2020;  
[www.johnstech.com](http://www.johnstech.com).



### Pulsed laser diode drivers

The Avtech AVO-9 Series offers a range of easy-to-use, ultra-high-speed pulsed laser diode drivers. Each AVO-9 output module has a specially designed

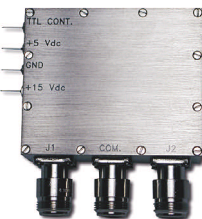


high-speed socket for the user's laser diode. This arrangement provides a user-friendly plug-and-play setup without degrading performance.

Avtech Electrosystems, Ogdensburg, NY. 888-670-8729;  
[www.avtechpulse.com](http://www.avtechpulse.com).

### 100-W hot switch

JFW's latest solid-state switch allows you to hot switch up to 100 W. The 50S-1268, a 1P2T RF switch, has a frequency range



of 100–500 MHz and a maximum insertion loss of 0.5 dB. Isolation is 55 dB minimum, and the switch is available with a choice of SMA, N, BNC, or TNC connectors.

JFW Industries, Indianapolis, IN. 317-887-1340;  
[www.jfwindustries.com](http://www.jfwindustries.com).

### Microwave connectors

GORE 100 Series connectors are a super high-density blind-mate, high-performance mi-



crowave interconnect system offering performance through 100 GHz. GORE 100 connectors were developed as a response to the industry's demand for increased packaging density, low mass, and increased performance. The blindmate interfaces are robust, durable, and lightweight.

W. L. Gore & Associates, Newark, DE. 410-506 7787;  
[www.gore.com](http://www.gore.com).

## PRODUCT FOCUS

The following write-ups were supplied by advertisers in this issue.

### EMI test receiver

The R&S ESU from Rohde & Schwarz is a new family of CISPR16-1-1-compliant EMI test receivers that meet civil and



military standards for electromagnetic interference measurements. The instrument features a complete set of parallel detectors and is available in three models with the frequency ranges 20 Hz to 8 GHz, 26.5 GHz, and 40 GHz.

Rhode & Schwarz, Munich, Germany. +49 89 4129-0; [www.rohde-schwarz.com](http://www.rohde-schwarz.com).

### Probe increases first-pass yields

You can increase first-pass yields with IDI's ICT. This revolutionary probe design features bifur-



cated beams at the top of the barrel. The result is lower and more consistent resistance and near-perfect pointing accuracy. The compliant fit between the plunger and barrel virtually seals the internal portion of the probe from contaminants.

Interconnect Devices, Kansas City, KS. 913-342-5544; [www.idinet.com](http://www.idinet.com).

### Optical manufacturing test platform

Designed to house a scalable amount of test modules, the IQS-500 Intelligent Test System offers multi-mode and single-mode functionalities.

This powerful platform tests active/passive CWDM, DWDM, and FTTH components and systems—at both the R&D and manufacturing levels. The IQS-500 also provides a flexible solution for performing transmission equipment qualification.

EXFO, Vanier, QC, Canada. 800-663-3936; [www.exfo.com](http://www.exfo.com).



### High-performance smart camera

The VC4466 with 1-GHz DSP power is one of the world's fastest smart cameras with com-



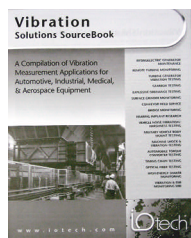
putational power of 8000 MIPS rivaling a 7.2-GHz Pentium. It has 64

Mbytes of DRAM and 4 Mbytes of Flash EPROM for program and data storage (expanded by the 512-Mbyte SD card inside). It can acquire full frames (1024x768 pixels) at 30 frames/s.

Vision Components, Hudson, NH. 603-598-2588; [www.vision-components.com](http://www.vision-components.com).

### Vibration solutions sourcebook

IOtech offers a compilation of vibration-measurement applications for automotive, industrial,



medical, and aerospace equipment. The Wave-Book and ZonicBook series of measurement

products are featured in these applications. For a free copy of the sourcebook, contact the company at 888-890-1322 or [sales@iotech.com](mailto:sales@iotech.com), or visit [www.iotech.com/literature](http://www.iotech.com/literature).

IOtech, Cleveland, OH. 888-714-3272; [www.iotech.com](http://www.iotech.com).

### 3.0-GHz spectrum analyzer

Instek's new GSP-830 3.0-GHz spectrum analyzer offers many features like autoset, a USB interface, and a brilliant TFT color



display in one package at an affordable price. The battery-pack option and low noise floor make this unit ideal for the lab or the field.

Instek America, Chino, CA. 909-591-8358; [www.instek.com](http://www.instek.com).



## Development environment & test executive

Combining a test-development environment and test executive into one integrated, complete

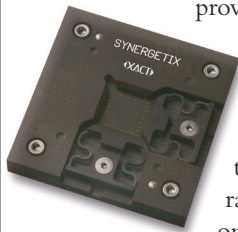


package, ATEasy's open architecture offers all the tools necessary to develop and maintain software components—from instrument drivers to complex test programs. Offering value and versatility, ATEasy contains all the tools you need in one integrated package.

*Geotest—Marvin Test Systems, Irvine, CA. 888-837-8297; [www.geotestinc.com](http://www.geotestinc.com).*

## Test socket solves device variance

Synergetix introduces the first self-adjusting test socket with compliant walls to increase first-pass yields. Named XACT, it



provides an exact fit for each device, no matter how wide the tolerance ranges found on your device

prints. A patent is pending. To see how these compliant walls work, visit the company's Web site.

*Synergetix, Kansas City, KS. 913-342-0404; [www.synergetix.com/XACT](http://www.synergetix.com/XACT).*

## Antenna kit for high frequencies

A.H. Systems' Model AK-571-4 antenna kit provides a convenient solution for increased frequency requirements from 700 MHz

to 40 GHz. Specifications that require higher test frequencies

also require an accurate antenna solution. This kit includes one SAS-571 horn antenna, one SAS-574 horn antenna, low-loss cables, and adapters in an antenna storage case with several extra cutouts for optional pre-amplifiers.



*A.H. Systems, Chatsworth, CA. 818-998-0223; [www.ahsystems.com](http://www.ahsystems.com).*

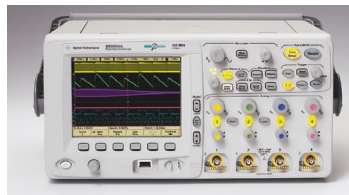
## GigE Vision and MIL

Matrox Imaging supports GigE Vision with a driver for use with the Matrox Imaging Library (MIL) development kit. The driver requires very little host CPU intervention for processing incoming GigE Vision traffic, and it is compatible with any network interface card (NIC). The MIL GigE Vision driver is available as a driver update to MIL/MIL-Lite 8.0.

*Matrox Imaging, Dorval, QC, Canada. 514-822-6000; [www.matrox.com](http://www.matrox.com).*

## Capture analog, digital, and serial signals

Now it's possible—with a single acquisition—to capture analog, digital, and serial signals in real



time. Agilent 6000 Series scopes let you view time-aligned analog waveforms, logic patterns, and serial data streams on a single display. You can correlate their interplay. And with MegaZoom memory, you won't miss a detail in your design.

*Agilent Technologies, Palo Alto, CA. 800-829-4444; [www.agilent.com/find/scope](http://www.agilent.com/find/scope).*

## Optical positioning for test handlers

The Multitest vision alignment, supporting the full tri-temp range ( $-55^{\circ}\text{C}$  to  $155^{\circ}\text{C}$ ), is available as an add-on



for all MT9510 and MT9510XP systems. The testing company may switch between regular and vision-alignment according to its needs. Each device is scanned and positioned individually without substantial influence on throughput, and all devices being contacted simultaneously (up to four devices) are aligned individually.

*Multitest, Rosenheim, Germany. +49-8031-60-60; [www.multitest.com/eng](http://www.multitest.com/eng).*

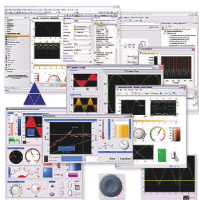
## PRODUCT FOCUS

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### Measurement and automation software

It's about time—engineers and scientists can finally use the time-saving power and convenience of Measurement Studio's integrated suite of measurement and automation controls, tools, and class libraries with Measurement Computing's cost-saving hardware. Spend less time writing code and more time advancing technology. Time—as they say—is money!

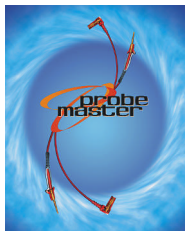
*Measurement Computing,  
Norton, MA. 508-946-5100;  
www.measurementcomputing.com.*



### Probe & test leads catalog

Probe Master's new 2006 catalog features new products and a full line of test and measurement accessories. Included are oscilloscope probes, differential probes, DMM test leads, BNC cables, terminations, probe test clips, adapters, SMD probes, and grippers. Secure online ordering is also available with no minimum order requirements.

*Probe Master, El Cajon, CA.  
800-772-1519;  
www.probemaster.com.*



### Better pulses in a heartbeat

The Series 3400 pulse/pattern generators offer control over pulse amplitude, rise time, fall time, width, and duty cycle. Their flexibility and 165-MHz frequency output make these instruments smart choices for nanotechnology researchers and semiconductor and RF device design and development departments. Built-in pattern-generation simplifies simulating serial data patterns for characterizing device performance.

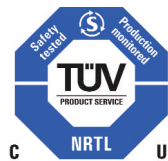


*Keithley Instruments, Cleveland, OH. 800-552-1115;  
www.keithley.com/at/371.*

### NRTL services

TÜV America is a Nationally Recognized Testing Laboratory (NRTL). Its blue NRTL mark proves that your product meets necessary US workplace requirements—just as well as other marks. The company provides electrical safety-certification services for IT equipment, laboratory test and measurement equipment, medical devices, machinery, electrical consumer products, and more.

*TÜV America, Danvers, MA.  
800-888-0123;  
www.tuvamerica.com.*



### Failure-analysis systems

Hamamatsu provides emission, laser stimulation, and substrate-thickness monitoring systems for failure analysis. The company focuses on manufacturing emission and laser systems with the highest transmission and sensitivity in the market to give failure analysts the tools they need to localize difficult-to-find device defects at the package or wafer level. Hamamatsu Phemos and  $\mu$ Amos tools are renowned for their reliability and sensitivity.

*Hamamatsu, Bridgewater, NJ.  
908-231-0960;  
www.hps-systems.com.*



### Large-format lenses

Edmund Optics' large-format lenses are specifically designed for line-scan and area-scan cameras. These high-performance imaging lenses are compatible with leading-edge cameras and provide twice the amount of light throughput of comparable lenses. Typical applications include web inspection, flat panel (LCD, plasma) inspection, factory automation, and food-and-beverage inspection.

*Edmund Optics, Barrington, NJ.  
800-363-1992;  
www.edmundoptics.com/US.*





## Semiconductor test company

Verigy's advanced test solutions provide optimal combinations of flexibility, cost, and performance



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V93000 Series and V5000 Series are built on a scalable system architecture for best-in-class test of SOC, SIP, high-speed memory, and memory devices including multichip packages.

Verigy US, Santa Clara, CA.  
408-553-2424; [www.verigy.com](http://www.verigy.com).

## Machine-vision software toolkit

Sapera Essential is a machine-vision software-imaging toolkit that provides developers with the



critical functionality they need to design, develop, and deploy high-performance machine-vision applications. Sapera Essential offers quick and easy access to software functions to control image acquisition, manage image memory, and facilitate image-processing and analysis tasks.

Dalsa Coreco, St. Laurent, QC, Canada. 514-333-1301;  
[www.imaging.com](http://www.imaging.com).

## AC power distribution and control

Pulizzi offers AC power-distribution and control systems in domestic and international configurations. Systems are rack- or strip-mounted with circuit-breaker protection, EMI and RFI filtering, spike/surge protection, remote power on/off, emergency shut-down, redundant power, sequential power up/down, power regulation, and connection to systems down-line. The company offers UL, cUL, CSA, CE, and TUV approved systems.



Pulizzi Engineering, Santa Ana, CA. 714-540-4229;  
[www.pulizzi.com](http://www.pulizzi.com).

## Programmable DC power supply

The 9122 is a single-output programmable power supply with RS-232 and SCPI language



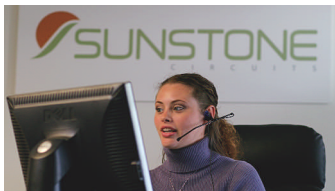
compatibility. It meets the needs of R&D design verification,

university labs, production testing, and other applications that require clean and reliable power and excellent performance. With meter resolution of 10 mV and 1 mA, the 9122 is ideal for low-power surface-mount circuits that require very precise voltage and current settings.

B&K Precision, Yorba Linda, CA. 714-921-9095;  
[www.bkprecision.com](http://www.bkprecision.com).

## PCB customer service

From quote to delivery, Sunstone Circuits offers the best customer experience in online PCB ordering. Great quick-turn pricing for



two-to-six layer proto boards and production volumes to eight layers. With 30+ years experience in PCB manufacturing, Sunstone offers free circuit-board design software downloads and expert design checks on demand.

Sunstone Circuits, Mulino, OR.  
503-829-9108; [www.sunstone.com](http://www.sunstone.com).

## Rugged temperature datalogger

Omega Engineering's OM-CP-TEMP1000FP is a waterproof, portable, battery-powered, stand-alone high-temperature recorder.



This all-in-one compact device records up to 32,767 measurements at a  $-40^{\circ}$  to  $150^{\circ}\text{C}$  ( $-40^{\circ}$  to  $302^{\circ}\text{F}$ ) temperature range. The datalogger is ideal for use in harsh environments. Its real-time clock ensures that all data is date and time stamped. Price: \$649.

Omega Engineering, Stamford, CT. 800-848-4286;  
[www.omega.com](http://www.omega.com).

### 600-W programmable DC power supply

Compliant to LXI Class C specification, the DLM 600-W programmable DC power supply is a 1U half-rack unit with high



power density. The Ethernet connection lets a single master control up to 31 DCS slave units. The DLM offers near linear ripple (rms) and noise (p-p) as well as fast transient response and built-in down programming.

*Elgar Electronics, San Diego, CA. 858-458-0281; [www.elgar.com](http://www.elgar.com).*

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**Test & MEASUREMENT WORLD.**

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### Boundary-scan tools

Corelis offers a complete line of JTAG (boundary-scan) tools called ScanPlus and ScanExpress for interconnect testing and JTAG in-system programming of flash memories and CPLDs. *Corelis, Cerritos, CA. 562-926-6727; [www.corelis.com](http://www.corelis.com).*

### Antennas and accessories

A.H. Systems provides EMC antennas, accessories, and calibration services for your global testing. The company's new catalog includes new broadband antennas from 25 MHz to 40 GHz. *A.H. Systems, Chatsworth, CA. 818-998-0223; [www.ahsystems.com](http://www.ahsystems.com).*



### Environmental testing services

TÜV America has announced a new environmental testing laboratory offering climatics (wind, temperature/altitude, humidity, etc.), dynamics (shock, vibration, etc.), package testing (compression, drop, etc.), HALT testing, HASS services, and more. *TÜV America, Danvers, MA. 800-888-0123; [www.tuvamerica.com](http://www.tuvamerica.com).*

### 11-Mpixel GigE camera

The IPX-11M5 offers 4000x2672 at 5 frames/s. It features built-in LUT, defective pixel correction, and flat-field correction, and it is fully programmable, field upgradeable, and RoHS compliant. The IPX-11M5 works with all image-processing packages. *Imperx, Boca Raton, FL. 866-849-1662; [www.imperx.com](http://www.imperx.com).*

### Test-development environment

Combining a test-development environment and test executive into one integrated package, ATEasy's open architecture offers all the tools necessary to develop and maintain software components—from instrument drivers to complex test pro-

grams. Offering value and versatility, ATEasy contains all the tools you need in one package. *Geotest—Marvin Test Systems, Irvine, CA. 949-263-2222; [www.geotestinc.com](http://www.geotestinc.com).*

### USB test and measurement

Data Translation's 2006 USB product guide offers details on the company's broad range of USB data-acquisition products. You can choose from low-cost, simultaneous, high-performance, and DSP products. For a free copy, call the company or visit its Web site. *Data Translation, Marlboro, MA. 800-525-8528; [www.datatranslation.com/productguide](http://www.datatranslation.com/productguide).*

### PC-based oscilloscope

The PicoScope 3000 range of high-performance PC-based oscilloscopes are lightweight and portable and feature high bandwidths and sampling rates previously not available in PC-based units. *Pico Technology, Cambridgeshire, UK. +44(0)1480-396395; [www.picotech.com/scopetm](http://www.picotech.com/scopetm).*

### Socket brochure

Synergetix changed the shape of test socket probe technology with the three-piece probe design. This brochure features the newest socket design breakthroughs, including the XACT compliant wall design. *Synergetix, Kansas City, KS. 913-342-0404; [www.synergetix.com](http://www.synergetix.com).*



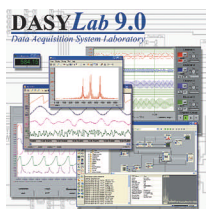
### Test and measurement products

Instek's new test and measurement catalog is a valuable source of technical information and displays the company's entire line card. Users can compare instruments and determine the right spec for their application. *Instek America, Chino, CA. 909-591-8358; [www.instek.com](http://www.instek.com).*



## Programming for data acquisition

Powerful graphical programming for data acquisition, DASyLab 9.0



is an icon driven software package for users who need custom programs but don't have the time, training,

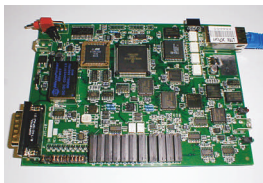
or inclination to write code. *Capital Equipment, Norton, MA. 508-946-8900; www.cec488.com.*

## Audio analyzer

The dScope series III is a comprehensive and powerful audio-measurement system for analog and digital audio analysis, including digital audio carrier parameters. The dScope is ideal for use in R&D, verification, and production test. *Prism Sound, Rockaway, NJ. 973-983-9577; www.prismsound.com.*

## Vehicle network interface

The AVT-418 vehicle network interface connects a host computer to a module or vehicle. It supports all the current popular auto-



motive protocols and uses an Ethernet connection to the host computer. *Advanced Vehicle Technologies, Davidsonville, MD. 410-798-4038; www.avt-hq.com.*

## AC power distribution

Pulizzi's AC power-distribution and control systems are rack- or strip-mounted with circuit breaker protection, EMI/RFI filtering, spike/surge protection, system-remote power on/off, remote reboot, emergency shutdown, redundant (dual) power, sequential power up/down, and power regulation. The ISO 9001:2000 certified company offers agency-approved systems. *Pulizzi Engineering, Sioux Falls, SD. 800-870-2248; www.pulizzi.com.*

## Power analyzer

Xitron Technologies has unveiled the 2801 advanced single-channel power analyzer, designed for use on engineering and R&D benches as well as in critical manufacturing and production testing environments. *Xitron Technologies, San Diego, CA. 858-530-8099; www.xitrontech.com.*

## GPIO interface card

The PCI-1671UP from Advantech is a cost-effective, universal PCI, GPIO controller in MD1 low-profile form factor, which allows for data transfer rates of up to 1.5 Mbytes/s. Its comprehensive driver and utility software allows users to control instruments from a variety of command line and programmatic interfaces. *Advantech, Cincinnati, OH. 800-800-6889; www.eautomationpro.com/us.*

## Data-acquisition resource

*Bluecat New Horizons in Data Acquisition Systems* features 120 Dilbert cartoons. The catalog contains more than 130 pages of information about USB data-acquisition products, Ethernet data-acquisition products, signal conditioners, portable dataloggers, wireless devices, and plug-in boards. *Omega Engineering, Stamford, CT. 800-848-4286; www.omega.com.*

## Ultra LED testing

Ultra FINN, the latest innovation in LED color and intensity verification from Test Coach, features improved accuracy, increased speed, and even greater reliability, all in a miniaturized package. *Test Coach, Hoffman Estates, IL. 847-885-4880; www.testcoachcorp.com.*

## RF glossary

The pace of innovation in the semiconductor and wireless communication industries means the vocabulary of these industries is growing rapidly. Keithley Instruments' glossary, *Speaking RF: Wireless Communication Terminology*, can help you stay up to date.

It includes conversion tables, selector guides, and RF switching applications. You can request a free copy at the company's Web site. *Keithley Instruments, Cleveland, OH. 440-248-0400; www.keithley.com/at/263.*

## High-speed imaging

Dalsa's 4M60 SA delivers 4-Mpixel resolution at 62 frames/s with per-pixel flat-field correction. The ad-



vanced CMOS imager provides windowing, anti-blooming and a global shut-

ter for imaging fast moving objects. *Dalsa, Waterloo, ON, Canada. 519-886-6000; www.dalsa.com/4M60.*

## Spectroradiometer

Edmund Optics' new compact spectroradiometers, for VIS or VIS-NIR applications, feature a USB 2.0 interface with excellent sensitivity and resolution. They have a quartz cosine receptor and are calibrated to measure absolute spectral irradiance of light sources. *Edmund Optics, Barrington, NJ. 800-363-1992; www.edmundoptics.com.*

## Probe catalog and sourcebook

IDI's new *Eighth Edition Catalog & Sourcebook* introduces the test engineer to the widest probe lineup available, unsurpassed product performance, and a wealth of probe knowledge. *Interconnect Devices, Kansas City, KS. 913-342-5544; www.idinet.com.*

## Failure-analysis systems

Hamamatsu provides emission, laser stimulation, and substrate thickness monitoring systems for the failure-analysis field. Hamamatsu Phemos and  $\mu$ Amos tools are renowned for their reliability and sensitivity. *Hamamatsu, Bridgewater, NJ. 908-231-0960; www.hps-systems.com. (continued)*

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The following write-ups were supplied by advertisers in this issue.

### Clamp-on current monitor

A clamp-on current monitor features a hinged opening for easy use on a fixed conductor. Apertures of 0.5 and 1.0 in. are available and typical 3-dB bandwidth is 15 Hz to 20 MHz. *Pearson Electronics, Palo Alto, CA. 650-494-6444; www.pearsonelectronics.com.*



### GigE vision cameras

The Genie-M640 takes full advantage of Gigabit Ethernet technology. Like all Genie cameras, the M640 is based on the AIA GigE Vision standard to directly link the camera to a PC. *Dalsa Coreco, St. Laurent, QC, Canada. 514-333-1301; www.imaging.com.*

### Refurbished test equipment

Test Equipment Solutions Today offers certificates of calibration, 12-month warranties, and 10-day acceptance periods. Contact the company's lab services department for your calibration and repair needs. *Test Equipment Solutions Today, Foster City, CA; 888-889-8378; www.testsolu.com.*

### Switching systems

Cytec offers programmable switching systems for ATE data acquisition, communications LAN, telephony, and microwave and RF systems. Products include matrices, multiplexers, and discrete relays. DC to 18-GHz systems are available. *Cytec, Penfield, NY. 800-346-3117; www.cytec-ate.com.*

### Programmable power

Get the latest on Sorensen, Elgar and PowerTen brand programmable DC & AC supplies and electronic loads. The manufacturer has hundreds of programmable, precision products available. *Elgar Electronics, San Diego, CA. 877-648-3839; www.elgar.com.*

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### VOL. 26, NO. 6

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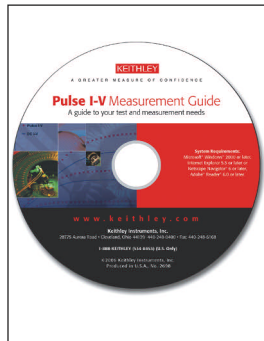


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## TestLit Review®

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Website: <http://www.pulizzi.com>

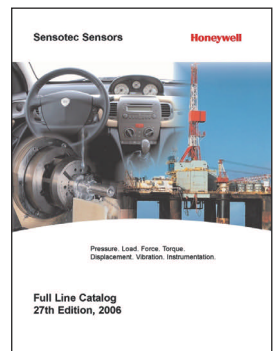
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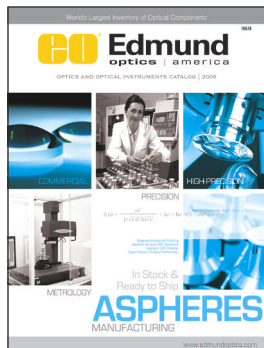
The 27th edition of the Honeywell Sensotec full line catalog is double in size to the 26th (2005) edition. It features pressure transducers, load cells, Wireless rotary and reaction torque cells, piezoelectric and piezoresistive accelerometers, LVDT's, amplifiers, digital read outs and instrumentation. Call to get your complete Test and Measurement catalog today.

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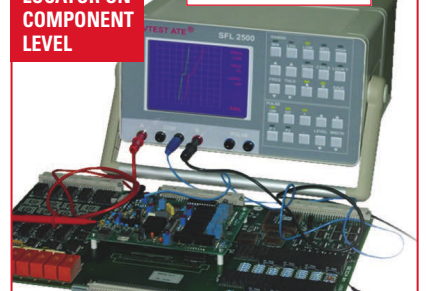
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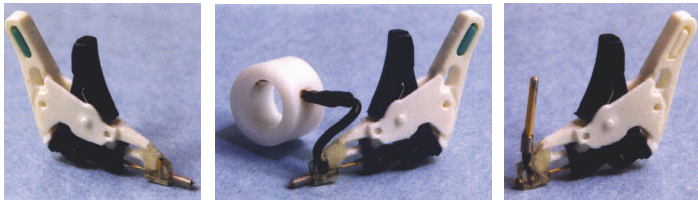
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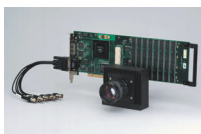
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**CORENTIN THIERCELIN**

Founder & CEO  
DirectIndustry.com  
Marseille, France

In 2001, Corentin Thiercelin founded DirectIndustry.com, a “virtual exhibition” Web site that helps engineers find information on industrial equipment and components. Previously, Thiercelin founded AllAccess and Access Technology—a free quarterly journal distributed to the automation sector. He served as the head of research and development for quality-control machines in commercial agriculture for MAF, and he has also worked at ELM Leblanc in France on the development of industrial gas heaters. Thiercelin earned a degree in design and engineering at the National School of Advanced Design and Engineering (ENSAM) in Paris.

Chief editor Rick Nelson recently exchanged e-mails with Thiercelin about the role of the Web in purchasing decisions.

## Connecting engineers and manufacturers

**Q: Could you briefly describe the history of your company?**

**A:** I was a research and development engineer in California from 1995 to 1997. My fellow engineers and I spent a lot of time chasing information from one source to another. I realized that there was a real need to centralize and rationalize it all. Burgeoning globalization meant this need would only get more urgent. The Internet seemed the perfect tool. I returned to France and teamed up with two other engineers to put my ideas into practice.

**Q: How many exhibitors are represented on your site?**

**A:** There are currently 5600 exhibitors online showing over 40,000 individual products—26% from American companies.

**Q: Out of the 24 industrial sectors represented on the site, how important is test and measurement?**

**A:** Very important, representing over 15% of all exhibitors. Four months ago, we had to split the category “Sensing and Measurement,” which had been the first category on our home page in 2001, into “Sensors” and “Measuring Instruments,” because it was getting too big. We knew that the basic idea of DirectIndustry would live or die with test and measurement, because it’s a sector with constant innovation and thus a greater need to organize information.

**Q: How many people visit your site, and how many are focused on test and measurement?**

**A:** We’ve just passed 2.1 million unique visitors per month—16% from test and measurement. 30% of all visitors return at least once a month.

**Q: Why do engineers need specialized industrial search engines—why not use search engines such as Google?**

**A:** Google is an amazing tool, and anyone who says otherwise can’t be taken seriously. But the Internet isn’t standing still. Like all media before, it’s evolving from general

usage to usage that is more specialized. Google is so exhaustive that it can sometimes lack the order and logic necessary for professionals to compare products and brands effectively. As a search engine specialized for industry, DirectIndustry returns this order to the search, saving professionals time and headaches. The fact that 700,000 visitors access us directly at least once a month is ample proof of this need.

**Q: Do you have any immediate plans for introducing new features?**

**A:** Soon we will launch a virtual technical library containing 3000-plus PDF catalogs from manufacturers across the world.

**Q: What makes your PDF feature different from such services on other sites?**

**A:** It’s true that lots of sites include PDF catalogs—nothing ground-breaking here. However, this is a good example of how we do things differently. Engineers aren’t really looking for a whole catalog, or even a section of a catalog, but for a kernel of information buried somewhere within. On DirectIndustry you won’t have to download anything. You can search a 400-page catalog by key word and find the right page in seconds. A tool bar allows you to print out the page, browse the surrounding pages, or send an e-mail request to the manufacturer. This demonstrates our principle of organizing information intuitively to engineers, for fast and effective research.

**Q: Why do think your site is more helpful for engineers than other specialized search engines?**

**A:** It’s made by engineers for engineers. This means we never stray from certain guiding principles—keep it fast, keep it intuitive, and above all, keep it focused on the products. T&MW



Corentin Thiercelin comments on long-term plans for DirectIndustry.com in the online continuation of this interview: [www.tmworld.com/2006\\_07](http://www.tmworld.com/2006_07).



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