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Handheld Spectrum and Vector Network Analyzer

SIGLENT TECHNOLOGIES has introduced the SHA850A series, its first handheld spectrum and vector network analyzer. The SHA850A series is highly integrated and is specifically designed for field operation. It is lightweight and portable with accurate measurements and flexible analysis capabilities. This handheld spectrum and vector network analyzer can easily handle advanced characterization or signal capture applications in harsh working environments.

SIGLENT'S SHA850A series provides professional accuracy with flexible analysis capabilities. In spectrum analyzer mode, it can measure up to 7.5 GHz. The DANL is as low as -165 dBm, which can effectively identify small signal levels. The single sideband phase noise is < -104 dBc/Hz @ 1 GHz with a 10 kHz offset. An independent full frequency source and a 25 dB preamplifier is standard, providing fast scanning speed and high sensitivity for a variety of applications.

The SHA850A series' measurable frequency range in vector network analyzer mode and cable and antenna measurement mode is from 100 kHz to 7.5 GHz with a dynamic range as high as 114 dB. This critical range makes the SHA850A series suitable for applications such as measuring the pass-band and out-of-band rejection performance of filters at the same time as well as measuring narrow-band devices with high rejection.

To learn more, visit: <http://www.siglentna.com/spectrum-analyzers/sha850a-series-handheld-spectrum-vector-network-analyzer>.



Midrange Network Analyzer Delivers Fast, Accurate Error Vector Magnitude Measurements

Keysight Technologies, Inc. has introduced the Keysight E5081A ENA-X, the first mid-range vector network analyzer (VNA) that produces fast, accurate error vector magnitude (EVM) measurements and accelerates the characterization of 5G component designs by up to 50%.



Demand for ever-increasing data speeds with ultra-low latency is pushing the next generation of wireless communications systems to operate at higher radio frequencies (RF). To ensure 5G New Radio (NR) transmitters meet these operational demands, RF engineers must fully test the design and performance of components such as power amplifiers (PAs). Obtaining measurements for PAs under realistic conditions can be time consuming, requiring multiple instruments and test setups. In addition, acquiring the precise EVM measurements needed to certify PA conformance to 5G standards requires using a high-performance VNA.

The new Keysight ENA-X addresses this need by giving RF engineers a midrange network analyzer platform with integrated modulation distortion analysis offering full vector correction at the device under test (DUT) plane in a single test setup. With a unique architecture, the ENA-X can perform multiple measurements with a single connection, which simplifies test setup, drives repeatability, and speeds testing.

The Keysight ENA-X provides the following benefits:

- ▀ Integrated solution – Provides an integrated upconverter, direct receiver access, and modulated distortion analysis software enabling characterization of RF amplifier performance under complex modulation schemes in high-power systems operating at up to 44 GHz.
- ▀ Simplified setup – Offers a single test setup run with one connection and requiring only a single calibration that accelerates the characterization of PAs for 5G transmitters in the 5G NR FR1 and FR2 frequency bands by up to 50%
- ▀ Accurate, repeatable results – Builds on Keysight's metrology expertise with patented, custom monolithic microwave integrated circuits (MMIC) to provide the highest measurement accuracy, easily repeatable results, and the lowest residual EVM on the market.

Learn more at <http://www.keysight.com>.

Enterprise Level PCI Express 5.0 Based Solid State Drive Validation Test Solutions

Teledyne LeCroy has announced availability of the OakGate PCI Express (PCIe) 5.0 based solid-state drive (SSD)



R300-G5 PRO Test Appliance, the DE200-G5 PRO Test Appliance, and the E-Series 16-Bay Expansion Enclosures. These robust SSD test solutions allow customers to ensure their data center storage is operating at the expected level of performance.

Among other things, Enterprise grade SSDs are expected to operate at higher data transfer speeds (IOPS) when compared with Consumer grade SSD's. They consume more power, need to interoperate seamlessly in high-capacity systems with many other devices and need to be able to operate 24 hours per day for longer lifetimes. Enterprise system and storage engineers need to validate SSD product performance, compliance, and functionality to ensure overall data center performance will meet expectations. To do so, having a comprehensive test system is critical.

The OakGate R300-G5 PRO and DE200-G5 PRO Appliances and 16-Bay Expansion Enclosures are ideal for medium to large test teams who need maximum test performance and scalability.

- ▶ The R300-G5-PRO and DE200-G5-PRO appliances can be integrated with optional OakGate 8-bay plug-in modules.
- ▶ These PRO appliances can be scaled up even more with optional 16-Bay expansion enclosures.
- ▶ The modules and enclosures support the U.2, M.2, U.3, EDSFF E1.S/L or EDSFF E3.S/L form-factors.

These systems are powered by the OakGate SVF/Enduro validation test software, which has been purposefully built from decades of storage industry experience, making these solutions into the industry's most sophisticated, high-performance, and feature-rich test systems. The current, fifth generation of SVF/Enduro has been hardened for over a decade in intense test environments at major disk drive and SSD development sites worldwide.

For additional information, visit Teledyne LeCroy's web site at <https://teledynelecroy.com/ssdtesting/oakgate-ssd-test-solutions.aspx>.

Next Generation Oscilloscope Software for Enhanced Performance and User Experience

Pico Technology announces the launch of its next-generation software: PicoScope 7. Building on the success of PicoScope 6 software, PicoScope 7 has been rewritten to take advantage of



the latest PC and display technologies. PicoScope 7 boasts a range of enhanced features and functionality making it the ideal choice for engineers and technicians looking for precise, reliable, and easy-to-use tools for their test and measurement needs.

PicoScope 7 is available for Windows, Linux, and Mac operating systems. All current PicoScope models, from the entry-level 2000 Series through to the high-performance 6000E Series are supported, as are legacy PicoScope models dating back a decade or more. The software is free of charge for all PicoScope users.

PicoScope 7 features a range of intuitive tools that streamline workflows and boost productivity, including:

- ▶ Comprehensive views to visualize deep memory captures in both time and frequency domains.
- ▶ Touchscreen support for a more interactive and immersive experience.
- ▶ Advanced triggers to capture anomalies and glitches with ease.
- ▶ Automated measurements for common waveform parameters.
- ▶ Over 30 serial protocol decoders (free of charge) including the latest I3C and CAN XL standards.
- ▶ Event-driven actions for mask fails, triggers, and more.
- ▶ The ground-breaking DeepMeasure™ function for analysis of waveform parameters on up to a million cycles with each triggered acquisition.
- ▶ Advanced math channels, including filters, trigonometry, exponentials, logarithms, statistics, integrals, and derivatives.
- ▶ Waveform math for real-time comparisons with historical peak, averaged, or filtered waveforms.

Download the T&M Windows, Linux, or Mac version of PicoScope7 at <https://www.picotech.com/PS7.1>.

Low-Cost ICP® Accelerometers with Resistance Temperature Detectors

IMI Sensors has released two new low-cost ICP® accelerometers with dual vibration and temperature outputs.



Like others in IMI's 602 series, models RTD602D91 and RTD602D11 are 100 mV/g ICP® accelerometers with measurement ranges of ± 50 g and frequency ranges (± 3 dB) of 0.5 to 8,000 Hz. The RTD sensor utilizes a commercially available "PT100" type of temperature sensing element. The models' platinum resistance temperature detection and vibration sensing elements are housed in a hermetic 316L stainless steel casing for accurate performance in temperatures from -65 to $+250^\circ\text{F}$.

Model RTD602D91 is designed with a side exit, M12 connector, while model RTD602D11 contains a side exit, integral

polyurethane cable of configurable lengths. Both designs are ideal for machine health monitoring in wind turbines, hydroelectric power plants, and other applications where the detection of temperature and vibration irregularities is critical.

Learn more about IMI Sensors at <http://www.pcb.com>.

Safe Compact Encoders for Autonomous Vehicles

Safe angle and speed measurement is a key requirement in vehicles, including autonomous industrial trucks. This is possible with functionally safe and certified encoders with a suitable safety interface on rotary axes or drive motors. Autonomous vehicles can quickly approach their target positions with safe position and speed data. Monitoring by compact safety encoders helps to protect the environment, people, and machines.

Particularly in the field of autonomous vehicles there is a need for certified safety sensors in small form factors, especially for Automated Guided Vehicles (AGVs) and Autonomous Mobile Robots (AMRs). In comparison, AMRs are more adaptable to the current work situation. This is due to their more independent navigation without the need for lanes, route specifications or other infrastructure. They can adapt their routes to the situation and often realize more efficient logistics. In those circumstances high-performance sensor technology is key to achieve safe operation. Steering angle, wheel speed and the position of any vehicle must always be reliably available.

TWK offers a portfolio of certified sensors in compact design with different safety interfaces: For example, single-turn encoders with a housing diameter and length of only 38 mm and a Fail-Safe-over-EtherCAT (FSOE) interface (TRK38), or devices with a housing depth of only 30 mm and a CANopen safety interface with a diameter of 55 mm (TBN55). Various housing designs are available for these and other safety interfaces such as PROFIsafe via PROFINET. Sensors with our reliable multiturn gearbox are available starting at 42 mm diameter.

TWK's miniature encoders can be mounted directly at the wheels of an automated guided vehicle to detect the vehicle's speed. Alternatively, they can be mounted on the drive motor of the vehicle. The devices are also available with magnetically shielded stainless steel housings. They can handle speeds up to 15,000 rpm and have a typical position resolution of 16 bits/360°.

Another application for the compact encoders is the detection of the steering angle of the vehicle. Here measurements can also be taken at the wheels or, after an intermediate transmission stage, at the servo motor. In the latter case, TWK offers devices with SIL2-certified software—the so-called slew-ring functionality—which reliably converts the position of the motor/sensor shaft into the position of the wheels (steering

angle). This works for arbitrary rotations over the complete measurement range and for at least 1024 revolutions even when the encoder is not powered. The wheel position is reliably and correctly output when switched on again. During commissioning, the user transfers the gear ratio and the required resolution as parameters via the encoder's interface and the encoder is ready to use.

Further information can be found at: <http://www.twk.de/en>.

Material Level Sensors benefit from 80 GHz Radar Technology

Endress+Hauser has launched its new generation of Micropilot 80 GHz radar sensors: FMR60B, FMR62B, FMR63B, FMR66B and FMR67B. The new generation provides solutions across all industries and applications. The sensors are suited for challenges when measuring points are not easily accessible, located in dusty areas and harsh environments with extreme process temperatures and process conditions.

The new generation of sensors come equipped with wizards which operate via multiple HMI formats, including the SmartBlue app, and make the sensors easier to use. Besides tried-and-tested digital communication protocols like HART, other digital protocols such as Profibus and Ethernet/APL will be included in the near future. The exceptional measurement performance of the new radar chip combined with the smart Heartbeat Technology monitoring function helps to increase productivity. The new Micropilot generation offers solutions that make individual customer processes simpler, safer, and more productive.

Commissioning and operation of the radar devices are straightforward and intuitive. Users are guided through the process by integrated assistants (wizards), thus preventing errors and enabling the devices to be successfully commissioned with limited experience or training. Thanks to a Bluetooth interface, the devices can be conveniently controlled remotely via the SmartBlue app from Endress+Hauser. In conjunction with Heartbeat Technology, processes can thus be monitored continuously, and verifications performed in less than three minutes while the process is running.

Device verifications can be performed in less than three minutes without removing the device or interrupting the process. The patented radar accuracy index (RAI) combined with Heartbeat Verification now enables traceable verification



according to DIN ISO 9001 for the first time, resulting in a considerable reduction in the effort and costs associated with calibration and documentation and significantly extending calibration cycles.

For further information, please visit www.endress.com.

Using the Cloud for O-RAN Testing

Viavi Solutions Inc. has launched the TM500 Cloud, developed for testing cloud-deployed O-RAN (Open Radio Access Network) components. As operators increasingly deploy core network services in the cloud through hyperscalers and other cloud providers, the TM500 Cloud is designed to measure and mitigate any risks associated with the Quality of Service (QoS) for end users.

The solution is applicable to typical O-RAN cloud deployment models, where the O-DU, O-CU, and core are all deployed in the cloud. The TM500 Cloud allows Network Equipment Manufacturers (NEMs) and operators to overcome risks associated with this new deployment model and ensures that they can deliver the same Key Performance Indicators (KPIs) and QoS for end users as they would see with traditional gNB (Next Generation Node B) and core network architectures.

The TM500 Cloud can be used in alternative deployment scenarios: for example, private or public cloud. Also, in architectures where the 5G User Plane Function (UPF) is deployed close to the edge of the "Cloud RAN" to meet strict latency requirements, the TM500 Cloud could likewise be deployed to measure performance in those architectures.

The solution evaluates critical KPIs such as throughput, latency, and round-trip time, ensuring no compromise in performance per user as more users are added. It also guarantees that quality measures for applications, such as voice, remain uncompromised.

For more information, visit <https://www.viavisolutions.com/en-us.com>.

New Miniature ICP® Triaxial Accelerometer with TEDS

PCB Piezotronics (PCB®) is introducing their new TLD356A01 and TLD356A03 Miniature ICP® Triaxial Accelerometer with TEDS. These new models are upgrades to their current 356A01 and 356A03 models with the addition of TEDS functionality.

Models TLD356A01 & TLD356A03 feature:

- ▶ The addition of TEDS to minimize errors from manual sensitivity entries, reducing setup time
- ▶ Miniature, lightweight, durable ICP® triaxial accelerometer



- ▶ Wide frequency range: 2 to 8,000 Hz (x axis), 2 to 5,000 Hz (y & z axis)

- ▶ High resonant frequency: ≥ 50,000 Hz

The TLD356A01 and TLD356A03 are primarily used to measure vibration inside devices, where space is restricted.

For more information, please see <https://www.pcb.com/products?m=tld356a01> and <https://www.pcb.com/products?m=tld356a03>.

High-Force Piezo Linear Motor with Nanometer Precision

Physik Instrumente (PI) introduces a new high force piezo linear motor actuator for ultra-high vacuum environments and applications in strong magnetic fields. The



new N-331.24U PICMAWalk precision linear actuator is based on patented piezo actuator technology and a patented piezo stepping motion principle. Designed specifically for semiconductor and physics applications, this high-vacuum compatible piezo linear motor stands out as the fastest and most powerful in its class, boasting exceptional push/pull and holding forces.

Features of the PICMAWalk V8 Piezo Linear Motors:

- ▶ Suitable for vacuum up to 10⁻⁹ hPa
- ▶ 55 mm travel
- ▶ 4 nm sensor resolution
- ▶ Sub-nm actuator resolution
- ▶ 50 N drive force
- ▶ 60 N power-off holding force
- ▶ 10 mm/sec max velocity
- ▶ Robust piezo V8 linear motor with PICMA® piezo stack elements for extreme durability
- ▶ Fastest and strongest piezo linear drive of its size class
- ▶ Precise, nanometer precision positioning of loads up to 5 Kg
- ▶ Plug-and-play, thanks to PI proprietary controller

Applications of the N-331 High Force UVH Piezo Linear Motor

- ▶ Precision motion drive in strong magnetic fields and in high vacuum
- ▶ Semiconductor test and manufacturing technology
- ▶ Wafer inspection
- ▶ Lithography
- ▶ Nanoimprinting
- ▶ Nanometrology
- ▶ Physics-related R&D

PI's PICMAWalk piezo linear motor utilizes a unique V-shaped arrangement of eight PICMA® piezo actuators, resembling a classical V8 engine, to deliver exceptional push/pull and holding forces, combined with nanometer

precision. These space-tested PICMA® actuators are known for their outstanding reliability, offering a push/pull force of 50 N (11 lbs) and power-off holding force of 60 N (13 lbs). The UHV-compatible linear motor can achieve a maximum velocity of 10 mm/sec (0.4 inch/sec), and it can accurately position loads weighing up to 5 kg (11 lbs) with nanometer-level precision.

In contrast to classical electromagnetic actuators, piezo motor actuators offer the advantage of not creating magnetic fields as well as being unaffected by magnetic or electric fields. This characteristic makes them well-suited for a wide range of applications, from e-beam lithography to MRI technology.

Visit <http://www.pI-USA.us> for more information.

Flow Detection Uses Microwave Technology

The Flow Detect 2000 from BinMaster emits a low power microwave signal toward the material being monitored. Part of this signal is reflected off the material back to the antenna. This reflected signal combines with the emitted signal to produce a beat frequency, which is the difference in frequency between the two signals.

If the material being monitored is not moving, the reflected signal will be the same frequency as the emitted signal and there will be no beat frequency produced. However, if the material is moving, the reflected signal will be shifted in frequency and a difference or beat frequency will be produced. This shift in frequency is called the Doppler effect. The presence or absence of this beat frequency is sensed by the FD 2000 to detect a flow or no flow condition.

By ensuring flow has stopped before a new material is introduced into the flow stream you can prevent cross contamination and avoid product waste and improper batching.

The sensor uses low power microwave Doppler technology and makes no contact with the material flow stream. It installs quickly & easily in a 1-1/4" NPT fitting. It can be used in hazardous locations where there is the threat of combustible dust.

Find more information at <http://www.binmaster.com>.



Expanded Line of IP68, ODVA-Compatible, MPO Fiber Optic, Outdoor Cable Assemblies

L-com, has announced the expansion of its line of IP68, ODVA-compatible, MPO fiber optic, outdoor cable assemblies. The new fiber optic cables are water-proof and dustproof for a wide range of outdoor uses, including broadcast, military ground communications, oil and gas, transportation, and renewable energy.

These new ODVA-compatible, fiber optic cable assemblies offer major benefits. They feature a simple bayonet-locking system and are compatible and interchangeable with new or existing ODVA cable deployments.

The MPO fiber optic cable assemblies exceed the requirements for ODVA. They are outdoor rated with an IP68 designation for reliability in harsh environments. This includes water immersion and an operational temperature range of -40 degrees Celsius (-40°F) to +70 degrees Celsius (+158°F). The cable jackets are chemical-resistant and have a low-smoke, zero-halogen (LSZH) burn rating.

These fiber optic cable assemblies offer low insertion loss and come in 12-strand fiber or 24-strand fiber and lengths up to 30 meters (98 feet). Also included in the product line are ODVA-compatible, IP68-rated fan-out assemblies with lengths up to 5 meters (16 feet) and IP68 LC connectors with chemical resistance and a superior pull force of 100 pounds.

Find more information at <http://www.lcom.com>.



Robert Goldberg (r.goldberg@ieee.org) has over 35 years' experience with over 25 years in management of the design and development of hardware and software for a broad range of military electronic products involving digital, RF/Microwave, electro-optical and electromechanical systems. He is retired from ITT Aerospace Communications Division in Clifton, NJ, where he was responsible for Sensor Communication programs utilizing the application of sensor radios developed by ITT as a result of work with DARPA on the Small Unit Operations Situation Awareness System (SUOSAS). Prior to joining ITT, he held positions in systems test and systems engineering with Northrop Grumman in programs related to RF and IR electronic warfare systems. He is a Fellow of the IEEE and is currently chairman of the Fellows Evaluation Committee of the IEEE Instrumentation and Measurement Society.