The IEEE Instrumentation & Measurement Magazine
August 2018 Issue

Highlighting Topics from AUTOTESTCON 2017

Presidents' Messages

Welcome to IEEE AUTOTESTCON 2018

J. Max Cortner

Welcome to the IEEE AUTOTESTCON special issue of the *I&M Magazine* and welcome to AUTOTESTCON 2018. This year, AUTOTESTCON will be held at the Gaylord National Convention Center in National Harbor, Maryland, only a few miles from Washington, DC. It's a beautiful location near the excitement of the US Capitol. As the President of the IEEE Instrumentation and Measurement Society (IMS), I can speak to over a dozen technical conferences we sponsor or co-sponsor annually, but AUTOTESTCON is unique in its ability to bring together academics, industry practitioners, and government agency representatives to exchange ideas on automated test and its contribution to system readiness, reliability, and improved performance of complex electronic systems.

Our partnership with the IEEE Aerospace and Electronic Systems Society (AESS) continues enthusiastically. AUTOTESTCON is organized by an experienced and dedicated team who represent both societies. The more than 60 exhibitors at AUTOTESTCON include electronics manufacturers, aircraft companies, instrumentation makers, and automated test system companies. There are ample opportunities to expand your network and learn the latest advances in test technology. Participating in panels will point you in the direction of demand for further research and development in this area of interest.

The IMS is proud to sponsor student best paper awards and to make available student travel grants as we seek to encourage and reward the contribution of students to new technologies. Student participation strengthens their networks and exposes industry and government institutions to their research.

This special issue of *I&M Magazine* presents selected papers from AUTOTESTCON 2017 as an illustration of the excellent work being done in the field and to show you what you can expect when attending this year's conference. Papers, panels, tutorials, exhibits, and keynotes—AUTOTESTCON 2018 has a lot to offer. I think you will enjoy this special issue of our magazine and I hope you will enjoy AUTOTESTCON 2018!

Guiseppe (Joe) Fabrizio

I am honored to welcome our distinguished attendees to the 53rd edition of IEEE AUTOTESTCON, the only conference focused entirely on automated testing and support for US military systems. AUTOTESTCON provides a unique opportunity for academics, industry practitioners, and government representatives to meet, exchange ideas, collaborate and innovate in this field. This premier conference is organized by a dedicated partnership of experienced professionals from the IEEE Aerospace and Electronic Systems Society and the IEEE Instrumentation and Measurement Society in an enduring partnership as event co-sponsors.

Military systems grow increasingly complex as technology advancements are incorporated, and an automated test environment is the only practical solution to ensure reliable and effective operational performance of complex electronic systems. The conference focuses on these types of automated test systems and now includes a new emphasis on cybersecurity, since any malicious software present in the test systems themselves has the potential to threaten prime hardware, thus compromising the integrity and security of military systems.

The committee running the conference is committed to providing a first-rate experience for all attendees, with a top quality technical program and a large number of government, military and defense system exhibitors to enhance the attendee experience. The conference venue located in National Harbor, Maryland, near to the Washington, DC area, is intended to allow for maximum participation of government and military attendees and defense personnel, providing for an outstanding networking environment.

AUTOTESTCON 2018 has much to offer participants from students to professionals. I sincerely hope you enjoy the experience and are able to fulfill your goals as an attendee.

Article Summaries

Cyber Security for Automatic Test Equipment

(Summary)

Neal Young and Ronald Drees

The research presented in this paper is a scientific extension of the work presented at *IEEE AUTOTESTCON 2017*. As the number and sophistication of cyber-attacks increases, the Automated Test Equipment (ATE) community must be aware of and be able to counter these attacks. As our adversaries' cyber capabilities increase, so must our defensive capabilities and our understanding of these attacks. Developers of ATE can employ Offensive Architecting™ to identify and mitigate present and future threats to the system and infrastructure. Offensive Architecting is the process that uses knowledge of threat profiles to make design decisions that deter anticipated threats. We must be aware not only of the security requirements imposed upon us, but also the possible attack surfaces our ATE may have. This paper discusses a few of the potential threats and some possible mitigation techniques.

This text is from introduction of the article.

A New Method to Estimate Expected Number of Failures for Allocating Spare Parts and Labor

(Summary)

Ferenc Szidarovsky, Doug Goodman and Craig Wentzel

The research presented in this paper is a scientific extension of the work presented at *IEEE AUTOTESTCON 2017*. In determining the optimal allocation of spare parts and labor in a machine shop, in addition to the planned inspections, the random failures must be considered. At present, literature on the subject mostly discusses minimal repairs and failure replacement, giving only a little attention to partial repairs. These models ignored the time period to perform repairs, when the equipment is idle. This paper includes a mathematical model in which partial repairs are considered, when at each repair the effective age decreases by a given constant multiplier. Times needed to perform repairs are also taken into account. Two integral equations are derived to find the expected number of failures in any time interval during the useful life of the machine. The first is an approximation, and the second is the exact solution. Based on this information, the allocation of spare parts and qualified labor can be appropriately planned.

This text is from the introduction of the article.

A .NET Fluent Interface for Signal-Oriented Test Programming

(Summary)

Ion Neag and Chris Gorringe

The research presented in this paper is a scientific extension of the work presented at *IEEE AUTOTESTCON 2017*. This paper describes an innovative software interface design in support of signal-oriented test programming. The design makes use of modern Domain Specific Language concepts and advanced C# language features to create an interface with excellent usability features and low implementation overhead. Due to its close syntactic compatibility with ATLAS, the proposed .NET fluent interface is an excellent solution for ATLAS translation scenarios. The C# test programs produced through translation maintain the signal-oriented nature and excellent readability of ATLAS, while improving on the legacy ATLAS implementations by relying on formal signal definitions and by making use of modern language features and developer productivity aids.

This text is from the introduction and conclusion of the article.

Automated Configuration of Modern ATE

(Summary)

William J. Headrick and Gilberto Garcia

The research presented in this paper is a scientific extension of the work presented at *IEEE AUTOTESTCON 2017*. Modern Automatic Test Equipment (ATE) must perform many tasks to support testing of devices. The devices being tested may be anything from simple circuit cards to complex multi-device systems. In addition, they may employ analog, digital and / or radio frequency testing. This, coupled with the desire to test the devices as quickly as possible, can drive ATE systems to employ multiple systems with their own associated computers in order to perform complex testing in as short a time as possible. Another requirement of modern ATE is that they are able to be quickly repaired and be able to be configured quickly to perform their intended function. Since the platforms on which the tested equipment is installed cannot be used unless they are completely operational, the ATE used to test that equipment must be available to perform the testing. Additionally, it is often intended that the testing and repair tasks be performed by non-technical or semi-technical individuals. It is this last capability that can drive the desire to support the ability to perform automated installation and configuration of the ATE systems.

This text is from the introduction of the article.

Multiple Fault Diagnosis Using Factored Evolutionary Algorithms

(Summary)

John W. Sheppard and Shane Strasser

In this paper, which is an extended version of research presented at *IEEE AUTOTESTCON 2017*, the authors combine prior work in deriving diagnostic Bayesian networks from static fault isolation manuals and fault trees with the FEA strategy to performing abductive inference. As extended work, they also perform an in-depth analysis of the effect of hidden failures in the diagnostic model as a means of explaining the rather surprising behavior from the initial experiments. They find that the presence or absence of hidden failures has a significant impact on overall multiple-fault diagnostic performance, and that their approach to deriving Bayesian networks from fault trees helps to mitigate the issues associated with hidden failures by providing clear signatures for each fault.

This summary includes text from the introduction of the article.

Digital Radio Frequency Memory Synthetic Instrument Enhancing US Navy Automated Test Equipment Mission

(Summary)

Christopher P. Heagney

This paper was presented at *IEEE AUTOTESTCON 2016*. The project developed new capabilities for US Navy Automated Test Equipment by pairing hardware and software modules to create complex waveforms. This Synthetic Instrument is a novel integration of advanced DSP hardware into existing ATE to create a new capability of measuring jamming response time from DECM avionics. The results of the direct ADC-to-DAC and ADC-to-PC-to-DAC tests show the massive performance improvement achievable with the architecture developed in this research project. Further development of this generic capability would expand the capacity of standard ATE to test advanced RF systems where current published results only focus on the needs of a peculiar test configuration. Incorporating technology like this will improve readiness and supportability of the fleet.

This summary includes text from the conclusion of the article.

Interference Measurements and Failure Analysis of Patch-Clamp Laboratory Instrumentation for Electrophysiology Tests

(Summary)

Sergio Saponara, Fabio Fusi, Simona Saponara, Massimo Macucci and Voicu Groza

This work analyzes the patch-clamp technique, which is the gold standard for ion channel measurements in electrophysiology, as well as the required instrumentation and main interferences that may affect the measurement accuracy. Different sources of degradation are evaluated, such as failure in headstage cooling and pipette/electrode impedance compensation systems, electromagnetic interference coupling from environmental wireless signals, and noise coupling from power supplies and/or the peristaltic pump motor. Robotized patch-clamp measurement systems are also considered. Experimental evaluation of the possible effects on patch-clamp metrological performance and some countermeasures to mitigate them are discussed. Daily recordings are presented to show the effects of interferences on ion channel drug analysis.

This summary includes text from the introduction of the article.

2016 Faculty Course Development Award: Measurement Architectures for Electric Systems

(Summary)

Simona Salicone

This paper describes the modifications made to develop the Measurement Architectures for Electric Systems course for master's students at the Politecnico di Milano, Italy as a result of the Faculty Course Development Award granted to the author in 2016. Since 2016, several new

course topics have been introduced, and a new laboratory was developed in the department specifically for time synchronization and synchronized measurements. According to the author, "the students have shown a great interest in the new topics which they found to be modern and near to their everyday life. They have also appreciated very much the laboratory experiences about synchronization and the seminar about the evolution of synchronization in the last decades."

This summary includes text from the article.

Columns

Future Trends in I&M

(Summary)

The Past and Future of Electronics Testing

Melanie Ooi

In this column, the author discusses how, over the past several decades, "as processors kept becoming faster with every leap in technology, the ATE test speeds kept increasing to the extent that the volume of data logged at a single second became far greater than the engineers could possibly analyze in real-time. Today, any modern ATE has additional sensors that not only report the measurements made from the device-under-test but also health indicators of the ATE itself. Such technology, while powerful, comes at the cost of security. It is now vital for companies to invest in a constantly vigilant IT team that can protect them against cyber intruders. There is a general lack of regulation and managerial understanding of the actual power of the ATE, the data that ATE collects and the scale at which ATE can communicate. In the coming decade, it is vital that the pace of engineering development be equally matched by an advancement in business management, corporate responsibility, certifications and regulations to ensure that misuse of the technology is minimized."

This text is from the body of the column.

Basic Metrology

(Summary)

The Center of a Soufflé – Metrology in the Kitchen

Richard Davis

In 1969, Professor Nicholas Kurti of Oxford University—already known to the public for building a refrigerator that cooled samples to one microkelvin above absolute zero—gave a

lecture called “The Physicist in the Kitchen.” This month’s column on Basic Metrology touches on some of Kurti’s contributions to what became known as “molecular gastronomy” and shows a connection to a famous experiment in nuclear physics.

This summary was provided by the author.

Departments

New Products

Robert Goldberg

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Device Current Waveform Analyzers
The Keysight CX3300 series enables users to characterize and validate PDN for IoT/mobile devices quicker and more accurately. With the ultra-low-noise, wide bandwidth and wide dynamic range performance of these new sensors (CX1104A and CX1105A), the CX3300 series now allows:

- Measurement of a wider range of dynamic current, from 1 μA to 100 A with more precision and speed and
- Shortened product time-to-market while increasing performance, reliability yet minimizing cost of development.

The mainframes of CX3300 series Device Current Waveform Analyzers capture measured current waveforms by current or differential sensors with up to 200 MHz bandwidth and at a sampling rate of up to 1 GSa/s. The measurement waveforms are captured with 14-bit or 16-bit resolution. To maintain the low noise sensing capabilities of the current and differential sensors, the mainframes are also designed to minimize the noise even under such wide measurement bandwidth.

The WXGA 14.1” multi touch display has enough space to simultaneously view waveforms and analyze results. The advanced Graphical User Interface (GUI) and the familiar measurement functions drastically reduce the learning curve for new users. A wide variety of built-in analysis tools improve your characterization and debug efficiency and accelerate your insights.

The CX3300 series mainframes offer 2-channel and 4-channel models to meet specific applications, budget and digital channel capability requirements. The memory depth and the mainframe's maximum bandwidth are upgradable with the purchase of required licenses. The

CX3300 mainframes are built to dimensions that fit as new and powerful benchtop measurement instruments.

The dedicated accessories for the CX3300 series are the heart of low noise current sensing. Five different types of current and differential sensors cover a wide measurement range from 100 pA to 100 A, and up to 200 MHz wide bandwidth. Sensor head products offer easy and reliable DUT connectivity for current sensors. With the low noise passive probe interface adapter, you can measure dynamic voltage with 14-bit and 16-bit resolution using a common passive probe for oscilloscopes. For more information, please visit www.keysight.com/ find/cx3300.

6½-digit Bench/System Digital Multimeter

Tektronix has introduced the Keithley DMM6500 6½-digit Bench/System Digital Multimeter. This new instrument combines the simplicity of a “pinch and zoom” touchscreen interface for easy and faster test setup and at-a-glance monitoring and display.

Today's engineers continue to need performance, accuracy and flexibility from test instrumentation. But as time-to-market windows shrink, they also need something more: simple, intuitive interfaces and fast operation. For its latest 6½-digit multimeter and data acquisition offerings, Keithley delivers improved simplicity providing a 5-in (12.7 cm) touchscreen display with graphing, pinch and zoom, cursors, and statistics for greater insight into measurement trends and waveform characteristics while saving time with setting up, monitoring, and executing measurements.

The DMM6500 6 ½-digit Bench/System Digital Multimeter supports 15 different types of measurements including capacitance, digitizing voltage or current waveforms, and temperature from thermocouples, thermistors, and resistance temperature detectors (RTDs). Waveforms and transients can be captured with the 1 Msample/s, 16-bit digitizer so that more measurements can be performed with one instrument, and engineers can study more complex load current profiles from wireless devices such as IoT devices.

The DMM6500 has high sensitivity to help design engineers make measurements on low power products. The dc current sensitivity is 10 pA and there is resistance sensitivity of 1 μΩ. It has superior accuracy, rated at 0.0025% for one year and includes two-year specifications for longer calibration cycles and lower cost of ownership.

The DMM6500's 5-in. (12.7 cm) touchscreen display simplifies instrument setup with readily accessible swipe screens and minimized menu depth for fast, in-depth data analysis with “pinch and zoom” simplicity. Touchscreen cursors make it easy for designers to characterize measurements with statistical data such as peaks, average, minimum values, and standard deviation over portions of a waveform or over the whole waveform.

If more than a single channel is needed, an optional 10-channel scan card or a 9-channel temperature card can be plugged into the rear of the instrument. The DMM6500's standard interfaces are LAN/LXI and USB-TMC.

Unique to Keithley is test script (TSP) software that allows a DMM6500 to execute a test with minimal intervention from a PC. This reduces the number of command communications between PC and instrument to save test time. This internal intelligence allows a DMM6500 to perform custom operations and customize the display for specific needs such as operator instructions.

Find more information at www.tek.com.

Entry-level Spectrum Analyzer
The R&S FPC1500 is the first spectrum analyzer to include a one-port vector network analyzer with internal VSWR bridge, an independent CW signal generator and a tracking generator.

The base model of the R&S FPC1500 has a frequency range of 5 kHz to 1 GHz. Keycode options unlock higher frequency ranges up to 3 GHz or enable other measurement application features when required. Upgrades are activated immediately when the keycodes are entered, and there is no need for upgrade calibration.

For applications requiring a high sensitivity to characterize extremely weak signals, the R&S FPC1500 offers a low noise floor level of -150 dBm (typ.), which can be further extended to -165 dBm (typ.) through an optional, keycode-activated preamplifier. Its high maximum input power allows users to measure RF signals up to +30 dBm (1 W). This combination of high sensitivity and high input power level gives the R&S FPC1500 an exceptionally wide measurement dynamic range.

Thanks to the internal VSWR bridge, the R&S FPC1500 can perform reflection measurements. This allows users to measure impedance on antennas or RF circuits with the Smith chart display or use distance-to-fault measurements to detect faulty locations on a long RF cable. There is no need to mount and dismount an external VSWR bridge when switching between the spectrum analyzer and network analyzer modes.

The tracking generator integrated into the R&S FPC1500 enables scalar transmission measurements on passive and active RF components that do not produce their own RF signal, e.g., amplifiers, filters and even RF cables.

The R&S FPC1500 can also act as an independent continuous wave (CW) signal generator. Example applications include using the CW signal source as a LO signal for mixer measurements or as an input signal for amplifier gain measurements. Further, the R&S FPC1500 offers a coupled CW mode that couples the generated CW signal to the displayed center frequency of the R&S FPC1500.

For more information, go to www.rohde-schwarz.com/ad/press/fpc.

Test System for Land Mobile Radios
Cobham has announced their newest product for the Land Mobile Radio market: the Mission Test System. The system provides end users with a very quick automated test for their radio—ensuring that in critical situations—their radio will operate as expected.

The Mission Test System combines the 8800SX Digital Radio Test set with an RF shield case to ensure radio frequency interference is not an issue during the test. The Mission Test System also comes loaded with the radio's specific Auto-Test application. The end user just needs to hook the radio up, close the case lid and push a button. Within 60 seconds or less, the 8800SX will register a “Pass” or “Fail.”

The Cobham 8800SX comes with a large touch-screen and the Auto-Test Applications for speed, accuracy and reliability. The Mission Test System allows AvComm to take their applications one step further and provide the actual end users of the radio a very quick sanity check that their radio is operational prior to their mission that day.

The Mission Test System can be ordered as an entire system, or for those customers who already own an 8800SX there is a kit available for purchase. The Mission Test Kit is a combination of hardware and software.

For more information, please visit www.cobham.com.

PXI Source Measure Unit (SMU)
Marvin Test Solutions, Inc. has announced the release of the new GX3104, 4-Channel PXI Source Measure Unit (SMU). The GX3014 is a precision 3U PXI module that forces and senses both voltage and current over a range of ±20 V and up to ± 1 A.

The module's unique flexpower architecture offers users the option to configure the SMU as a 4-channel, 250 mA/ channel SMU or as a single channel, 1A SMU—providing test engineers the flexibility to support both high current or multi-channel SMU applications with one module. The four channels are electrically isolated from the PXI power supply and share a common, isolated ground. In addition, all module power is provided by the PXI bus, eliminating the need for bulky, external DC power supplies.

The GX3104 is supplied with a full-featured API and UI as well as full documentation, online help files, and GtLinux, a software package which provides support for Linux 32/64 operating systems.

Find more information at www.MarvinTest.com/.

PXI Fault Insertion Switching
Pickering Interfaces has expanded their range of PXI Fault Insertion Switching. These new PXI Fault Insertion Switches (model 40-202), available with 22 or 11 fault insertion channels, were primarily designed to simulate fault conditions in automotive and avionics test applications involving the reliability testing of safety-critical controllers. They are specifically designed for differential signaling requirements, with capabilities to insert three different types of fault condition between the test fixture and the equipment under test; open-circuit, short-circuit between signal pairs and short-circuit to user applied fault conditions such as power or ground.

These new models complement Pickering's large range of PXI Fault Insertion Switches, which are typically used in Hardware-in-the-Loop Simulation applications for Electronic Control Unit validation.

Relays in-line with the signal paths allow open circuit conditions to be simulated on either side or both sides of a signal pair. Relays between each channel pair enable adjacent signals to be shorted, and relays between signal paths and the “Fault” connection allow the application of external fault conditions. The switching topology of the 40-202 fault insertion switches allows switching channels to be interconnected so that complex fault insertion channels can be constructed. These products are supported by Pickering's eBIRST Switching System Test Tools, which provide a quick and easy way of finding relay failures within the modules. In addition, Pickering's signal routing software, Switch Path Manager, may be used to simplify signal routing through complex switching systems.

Find more information at www.pickeringtest.com.

Module Expedites Development of IoT Devices
The OriginIoT™ LTE-M is the latest cellular IoT system by OriginGPS. Simplifying and expediting development of low power IoT products, it includes Gemalto's secure Cinterion™ module, GNSS, and all embedded software required to develop IoT devices.

OriginIoT systems are generic cellular IoT systems that simplify IoT product development and slash development resources. The systems include communication hardware, a GNSS module, embedded software, and a novel interface to OriginIoT add-ons which accommodate multiple sensors and other peripheral devices.

OriginGPS signal to noise technology is leveraged to deliver superior GNSS and cellular matching, facilitating excellent performance in noisy environments, while the OriginSmart ™ software enables cloud-based programming, relieving developers from writing embedded code. The OriginIoT LTE-M system (ordering code ORG2101) has a 15% smaller footprint than the previous 2G and 3G models and will be pre-certified with selected operators.

Find more information at www.origingps.com.

Lock-in Amplifier Based Amplitude and Frequency Modulation and Demodulation
With the new AM/FM Modulation Option, all Zurich Instruments’ lock-in amplifiers can be equipped with amplitude and frequency modulation capabilities. This option enables coherent generation and detection of signals with multiple frequency components, such as amplitude- and frequency modulated signals. Up to three frequencies can be coherently combined to generate fully configurable AM signals. The three characteristic frequency components of arbitrary AM signals can also be simultaneously demodulated, giving optimum signal recovery performance. FM signals can be generated and detected by the three demodulators, allowing the carrier frequency and sidebands to be measured simultaneously, even in the case of narrow sidebands.

In contrast to conventional methods where two cascaded lock-ins are used for tandem demodulation, all Zurich Instruments’ Lock-in amplifiers can perform single-stage demodulation

using the multiple demodulators available in each instrument. This overcomes the bandwidth limitation of cascaded demodulation filters and leads to more accurate results. The graphical LabOne user interface facilitates signal generation and acquisition, allowing simple adjustment of each component parameter. The integrated toolset reduces experiment complexity with a scope, sweeper, spectrum analyzer, signal generator, spectrogram, plotter and more.

Find more information at www.zhinst.com.

Faster General-Purpose Digitizers

Spectrum Instrumentation has announced the addition of five new models to its general purpose M2p.59xx series of PCIe 16- bit digitizer cards. The new versions extend the performance range by increasing the maximum sampling rate from 80 MS/s up to 125 MS/s. The increased sampling rate, together with higher overall bandwidth, enables the new cards to capture a wider range of electronic signals. It makes them useful in applications where signals in the dc to 50 MHz frequency range need to be acquired and analyzed with speed and accuracy.

Based on the latest 16-bit analog to digital (ADC) technology, the new M2p-596x series includes models that provide 1, 2, 4 or 8 input channels. Multi-channel models each have their own ADC and signal conditioning circuitry to allow fully synchronous acquisitions on all the inputs. Importantly, the high-resolution 16-bit ADCs deliver sixteen times more resolution than digitizers using older 12-bit technology and 256 times more resolution than what is available from digital scopes that commonly use 8-bit ADCs. The extra resolution translates directly into improved measurement capabilities and superior dynamic performance. It delivers a higher Signal-to-Noise Ratio (SNR), better Spurious Free Dynamic Range (SFDR) and less distortion than 12- or 14-bit products.

The complete product has been packed into a half-length PCIe card, yet it still offers a full set of digitizer features. Each channel has its own programmable input amplifier with ranges between ±200 mV and ±10 V, programmable input offset for unipolar measurements, programmable input termination of 50 Ohms and 1 MOhms and an integrated calibration circuit.

Incorporated into the digitizers is a PCIe x4 lane interface that enables fast, data streaming at rates of more than 600 MByte/s—or more than 80 MS/s continuous streaming for 4 channels.

For high-density, multi-channel acquisitions, up to 16 digitizer cards can be fully synchronized using Spectrum's proven Star-Hub technology. Star-Hub allows systems to be built with up to 128 channels, all sharing a common clock and trigger in one single chassis. For synchronization with other external equipment, clock and trigger inputs and outputs are also standard.

The software design of the new cards is based on Spectrum's own general driver API that was introduced in 2006. Nowadays more than 400 different products share this common driver library allowing easy switching from slow to fast products and combining PCIe, PXIe or Ethernet/LXI products with one common software interface.

For more information, visit spectrum-instrumentation.com.

Digital Barometric Pressure Sensors
Omron Electronics 2SMPB Digital Barometric Pressure Sensors are useful for battery operated mobile devices. The sensors feature a MEMS chip for sensing air pressure and an IC chip for signal processing. The absolute pressure sensors can measure barometric pressure change with ±0.6 Pa accuracy, corresponding to a height difference of ±5 cm. There are two models available, the 2SMPB-02B and 2SMPB-02E. The 2SMPB-02E has a calibration parameter for wider pressure and temperature range. 2SMPB sensor applications include smart phones, tablets, PCs, GPS, healthcare products and wearable devices.
Features:

- Measure barometric pressure and temperature with high accuracy
- Built in low noise 24-bit ADC
- Digital control and output via I2C/SPI interface
- Automatically power down non-working circuit to minimize power consumption
- Individual calibration parameters stored in OTP (One Time Programmable - ROM)

Applications Include:

- Indoor navigation (floor detection)
- Car navigation (to distinguish highway and frontage road)
- Altimeter
- Activity monitor (to detect up and down of stairs)
- Weather forecast

Find more information at www.components.omron.com/.

High Speed, High Bandwidth Optical Power Meter
The new F-712.PM1 high speed optical power meter from precision photonics alignment manufacturer Physik Instrumente (PI) converts optical signals and currents of photodiodes into a high resolution, logarithmic analog voltage signal. Its high bandwidth of 20 kHz enables faster optical alignment, when used in conjunction with PI's high speed FMPA photonics alignment systems for Silicon Photonics (SiP) applications. The extended wavelength range of 400 to 1550 nm allows working in both the visible and infrared range without switching.

The optical input is designed in a way that eliminates the influence of the optical fiber location in the connector on the optical signal. In addition to the optical input, the device also has a current input. For example, a photodiode can be connected to this input and the diode current converted into a logarithmic voltage signal. Switching between the inputs is done via a button and an LED lights up when the current input is activated. The precise, logarithmical output signal is ideal for optical alignment systems- important for fast photonics alignment.

Features:

- 20 kHz Signal Bandwidth
- 85 nW to 85 mW Dynamic Range
- 400 to 1550 nm Wavelength
- 0 to 1 mA Input Current
- Logarithmic Output

For more information, visit www.pi-usa.us/products/Photonics_Alignment_Solutions/index.php#F712PM1/

Low Noise, Low Dropout, Voltage Regulator
The Texas Instruments TPS7A92 Low Noise Low Dropout Voltage Regulator device is a low-noise (4.8 μVRMS), low-dropout (LDO) voltage regulator capable of sourcing 2 A with only 180 mV of dropout. The TPS7A92 output is adjustable with external resistors from 0.8 V to 5.2 V. The TPS7A92 wide input-voltage range supports operation as low as 1.4 V and up to 6.5 V. With 1% output voltage accuracy (over line, load, and temperature) and soft-start capabilities to reduce inrush current, the TPS7A92 is ideal for powering sensitive analog low-voltage devices.

These types of devices include voltage-controlled oscillators (VCOs), analog-to-digital converters (ADCs), digital-to-analog converters (DACs), high-end processors, and field-programmable gate arrays (FPGAs). The TPS7A92 is designed to power noise-sensitive components such as those found in high-speed communication, video, medical, or test and measurement applications.

Features:
- 1.0% Accuracy Over Line, Load, and Temperature
- Low Output Noise: 4.6μ VRMS (10 Hz–100 kHz)
- Low Dropout: 180 mV (Typical) at 2 A
- Wide Input Voltage Range: 1.4 V to 6.5 V
- Wide Output Voltage Range: 0.8 V to 5.2 V
- High Power-Supply Ripple Rejection (PSRR)
  • 60 dB at DC
  • 40 dB at 100 kHz
  • 40 dB at 1 MHz
- Fast Transient Response
- Adjustable Start-Up In-Rush Control with Selectable Soft-Start Charging Current
- Open-Drain Power-Good (PG) Output
- Stable with a 22 μF or Larger Ceramic Output Capacitor
- 2.5 mm × 2.5 mm, 10-Pin WSON Package

Applications Include:
- High-Speed Analog Circuits
- VCO, ADC, DAC, LVDS
- Imaging: CMOS Sensors, Video ASICs
- Test and Measurement
- Instrumentation, Medical, and Audio
- Digital Loads: SerDes, FPGA, DSP

Find more information at www.ti.com/power-management/overview.html.