



# Leading the **World** in **Testing** Innovations



## WHO IS **AEM**

For more than 25 years, AEM has been innovating advanced test capability across a broad set of technologies that span the silicon wafer, integrated circuit (i.e., microchip), complete computer boards and networking systems. This paper summarizes the unique breadth of our test design expertise, corporate values, and focus on customer care, for the purpose of helping you get to know us better.

As technology progresses and integrates with every aspect of how the world works, testing becomes crucial to eliminating any exponential risks and to fully realize and promote technological advancement. The breadth of our products and engineering expertise combined with our total manufacturing capability, allows AEM to deliver unparalleled test solutions across a broad set of test technologies.



AEM International, Ltd. Chandler, Arizona Office

# Creating a **Zero Failure** World

AEM's mission is to provide the most comprehensive semiconductor, electronics and network infrastructure test solutions for best-in-class and emerging technologies, processes and customer support. Our ultimate goal is to assure that all products perform at 100% proficiency creating a zero-failure world.

The two drivers that dominate testing excellence are fault coverage and overall cost of test. AEM is constantly challenging testing measures to set industry standards and push the limits of innovation. Challenges spark innovative thinking that result in optimizing the test processes and provide complex test solutions contributing to a zero-failure world for all industries.

AEM is recognized as providing the most cost-effective test systems due to our own expansive worldwide manufacturing capabilities, R&D and field service teams. From the design conception in our innovation lab that bring all engineering teams together for brainstorming to final production in our manufacturing plants, AEM has the capability to control costs because we are our own OEM and not just an assembly plant. AEM reduces cost because we can control raw materials allowing us to avoid any shortages that may affect other test equipment companies, such as electronic chips.



## Priority #1: **Global Customer Commitment**

AEM's stable and smart reputation is based on our keenly focused global customer satisfaction across all vertical markets. As a result, we leverage critical, real-time data to manufacture and provide optimized test solutions.

When faced with unforeseen challenges, all AEM engineering and manufacturing teams work together to solve problems by looking all perspectives. In the most recent pandemic, we established supply chain resilience and mitigation plans through sites' self-sufficiency, securing essential materials through global sourcing, and increased safety stocks.

Field Service Engineers (FSEs) across all manufacturing sites were quick to learn and support each other's expertise to ensure seamless production. Much of this was accomplished using Virtual-Reality (VR) technologies for remote teaching and training due to global travel restrictions. This proved the entire team's agility, resilience, and collaborative efforts. Not only were all shipment schedules, equipment installations and development milestones met, but we were recognized and awarded a "Supplier Continuous Quality Improvement (SCQI) Award" by a leading chip manufacturer for their extraordinary performance, innovation, and resolve demonstrated in the face of pandemic-related supply-chain challenges.





# Application **Specific Solutions**

A pioneer in testing innovation, AEM was the first to introduce wafer probe stations in 1998. Silicon wafers are the very foundation of all electronics as layers of dopant are deposited on these wafers to create integrated circuits (ICs), also called “chips.” These chips are the basis for all electronic equipment such as computers, mobile devices and even cars and home appliances. AEM manufactures equipment test components to final system testing. Taking these core testing concepts and engineering expertise from testing semiconductors, AEM expanded into providing comprehensive test solutions for end-to-end networking channels.

Understanding customer needs and keeping ahead of evolving technologies, AEM creates seamless and reliable solutions for complex challenges. AEM’s two divisions are Test Cell Solutions and Instrumentation. Test Cell Solutions includes both the wafer level and system level test (SLT) solutions for semiconductors. Instrumentation includes automated test solutions (ATE) and test and measurement solutions for inline and networking applications, including purpose-built field testing solutions for Smart Building applications, and Automotive wire harness testing.



## Test Cell Solutions: **From Lab to Fab**

Small mechanical devices driven by electricity are integrated onto individual microscopic chips on silicon wafers through a technology known as micro-electromechanical systems (MEMS). Today these devices are used in computers and electronic apparatuses in every industry, varying from very small wearable devices to large AI machinery deployments such as automotive manufacturing.

AEM’s wafer and wafer-frame probe stations are optimized for test and calibration of a variety of MEMS and other semiconductor devices. The main features and benefits of these application specific test solutions for wafer probing include: early device characterization which results in faster time to market; good die and quality binning, resulting in maximum cost savings, and final test of wafer level packaged devices for improved yield.

As technology nodes continue to evolve and with a more aggressive time to market to bring devices to end applications, full test coverage of such chips requires System Level Testing (SLT). Devices are becoming more complex, heterogeneous and applications more demanding, such as a monolithic chip, which contains a variety of different processing electronics on one small IC. SLT expands beyond chip manufacturers but also tests complete modules and panels in the electronics industry.

AEM address the test gaps with unique asynchronous massively parallel system (AMPS) which expands test capabilities to include test environmental and motion sensors in wafer level and other advanced packages. AEM has deployed over 35,000 system level test sites and 5,000 final test sites.

# Purpose-Built Test and Measurement Solutions

With many years of developing unmatched testing concepts and engineering expertise from wafer probing, circuitry testing and system level testing, AEM expanded into providing comprehensive test solutions for complex in-line semiconductor systems as well as end-to-end networking channels. AEM's Instrumentation Division is comprised of Automated Test Equipment (ATE) and Test and Measurement systems.

AEM acquired Mu-TEST, a leading global semiconductor test solution provider in the ATE industry. In doing so AEM offers test systems including electro-mechanical tester and instrumentation hardware and software that covers test program development, advanced debug functionalities, test operation, and a complete set of supporting services for arrays and matrix's such as image sensors. Mu-TEST brings to the AEM suite proprietary technology based on field programmable gate arrays (FPGA) rather than application specific integrated circuits (ASIC).

AEM's Field Test and Measurement solutions are designed and developed by a team with more than four decades of experience designing solutions for customers in enterprise and automotive. Our solutions are designed for users across the life-cycle stages of the wiring and connectors be it the manufacturing and laboratory environment or in use during installation and ongoing management and troubleshooting. The result is solutions with a highly accurate RF measurement system, and feature sets purpose built for modern networking requirements, which have giving rise to disruptive innovations, including several industry firsts.

AEM's award winning test solutions include the TestPro CV100 - Multifunction Cable Certifier, Network Service Assistant - Multifunction Connectivity Tester, Mixed Mode Multi-Port Vector Network Analyzer, and the WideOptix-SR4.



# TestPro CV100 Multifunction Cable Certifier

AEM took an innovative approach to traditional cable certification, recognizing that the modern smart building has expanded testing requirements that go beyond the network environments of old. For cable contractors and system integrators, the only way to assure system reliability and scalability is to test, characterize and monitor complete end-to-end validation of the infrastructure's bandwidth, latency and network-based power to assure infrastructure readiness across smart building technologies. The TestPro CV100 - Multifunction Cable Certifier offers the most expansive feature set of any other test equipment available to provide customers across a broad network topology with cabling performance assurance and system warranty approved by cable manufacturers.

Some of the biggest benefits of the TestPro CV100 is its low cost, fastest test speed, and expansive functionality all in one field tool versus competitors' offerings of multiple testers to perform comparable functions. Installers are amazed at the six-second autotest which includes all TIA certification parameters plus the optional test parameters recommended for smart building deployments that include DC Resistance Unbalance, TCL, and ELTCTL, in addition to TDR locator for Return Loss, NEXT and Shield.

The TestPro Smart Building Test Kits include two test platforms to support dual-ended cable certification. However, depending on the use case, the two test platforms can be independently deployed, giving users double the available test equipment for some test scenarios. TestPro supports four-pair and single-pair Ethernet in addition to Singlemode and Multimode fiber optic cabling. TestPro supports testing of network-based power, that includes hybrid powered fiber and Power over Ethernet, including RealPower load testing. Additionally, SNR based multi-gigabit link speed testing up to 10GigE while under both traffic and PoE load provide a real-world scenario for link speed assurance testing. And finally, TestPro even allows you to perform both wired and wireless network connectivity testing and troubleshooting. TestPro will provide switch detail include slot/port/VLAN, as well as handy troubleshooting tools such as discovery of connected devices, ping and traceroute. On the wireless side, see all SSIDs and their associated channel and signal strength, including roaming signal strength, handy for locating those dreaded dead zones.



When I first saw the AEM tester and saw the easy-to-use interface and heard about the speed of this machine, as well as the price, it was an easy purchasing decision. The TestPro is simpler and faster than its competitor, which saves us time, labor and cost,”

Sean Ricketts, Vice President of Trinity Cabling Company





## The Network Service Assistant

In continuing with our focus to find innovative ways of solving the challenges in infrastructure test faced by our users, AEM's Network Service Assistant (NSA) is a hybrid test solution, that bridges the gap between qualification and certification categories, with Qualification+ testing capability.

Due to an increased reliance on network-connected technologies in the enterprise, especially for smart buildings, IT departments require a cable test tool that fills the gap between network qualification and certification categories.

The NSA is the first Qualification+ test tool on the market that provides those responsible for general wired and wireless network troubleshooting, as well as assurance that the cabling infrastructure meets industry test standards. NSA's Certi-Lite technology provides an ANSI/TIA 1152-A standards based single ended cable testing for CAT5e-CAT6A.

The NSA also offers Advanced Link Identification (ALI) capabilities with smart numbered terminators that not only provide an indication of link continuity through numbered plugs, but also support Certi-Lite testing, allowing users to quickly obtain in-depth assurance as to link quality and all network speeds it can support.

The NSA Smart Building Test Kits include a single test platform and smart passive terminator with Certi-Lite for single-ended cable testing. NSA supports four-pair Ethernet in addition to Singlemode and Multimode fiber optic cabling. NSA supports testing of network-based power, that includes hybrid powered fiber and Power over Ethernet, including RealPower load testing. Additionally, SNR based multi-gigabit link speed testing up to 10GigE while under both traffic and PoE load provide a real-world scenario for link speed assurance testing.

And finally, NSA also supports the same wired and wireless network connectivity testing and troubleshooting as noted above for TestPro.



# MMVNA – Mixed Mode Multi-port Vector Network Analyzer

The Multi-port Vector Network Analyzer was designed to simultaneously measuring all ports and their interdependency. The small, portable 8-port form-factor makes MMVNA-200 easy to integrate in the manufacturing environment. Measuring all possible combinations of RF S-parameters on all ports within a sweep, lasting less than 10 seconds, MMVNA-200 greatly reduces test time over other RF test systems with no external switch matrix required. This greatly simplifies the test setup. Additionally, multiple test ports eliminate the need of connecting and disconnecting different test fixtures repeatedly.

The MMVNA-200 is uniquely capable of performing dual-ended testing using two independent MMVNA-200 instruments synchronized over the communications channel under test. This feature makes it ideal for laboratory and manufacturing testing for both network infrastructure cabling, as well as automotive wiring harness test.

The MMVNA-200 is one of the most versatile RF analyzers for the engineers interested in deep-dive, and at the same time fast and easy for the operators. A large number of test applications can be supported by user configurable parameters and test limits. These are several built-in configurations for widely used test applications, such as a wiring harness as well as single-pair Ethernet (SPE) used in automotive manufacturing.



## WideOptix-SR4

The WideOptix-SR4 measurement system is a sophisticated and purpose-built combination of a signal generator and oscilloscope for extremely high-speed signals ranging in 25GHz frequencies. It's transmission performance test platform provides more than certification testing. It is designed to detect bandwidth limitations on multimode fiber optic cables and components before deploying data services. This is increasingly important for companies that want to confirm that their fiber plant will support higher bandwidth applications.

The WideOptix-SR4 measurement system offers an eye-diagram based bandwidth verification system. This characterization is done by observing the change in waveform shape after the signal propagates through the device-under-test (fiber). A quantitative measure of the change of waveform shape is derived by analyzing an eye-diagram, a term to describe distorted square wave while traversing through the DUT and attaining a shape resembling an eye. Its fast testing and detailed and clear reporting with pass/fail indication make WideOptix an easy-to-operate test system, and commonly used for those that are pre-qualifying patch cables used in 5G infrastructure deployments.





## Local Customer Support through **Global Reach**

AEM partners closely with customers across the globe to ensure their success. With a vast global network combined with focused localized support and full-stack test capabilities, AEM constantly relies on customers' input to develop integrated testing that accelerates delivery cycles and enables better product quality.

