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# Seica: Flying Probe Testers to Meet Diverse Market Needs

**By David Sigillo, Vice President, Seica, Inc.**

Seica will be exhibiting its latest flying prober, Pilot V8 Next>, in booth 1865 at SEMICON West this year. A leading provider of flying probe technology, Seica's newest line of testers brings with it key advances and features required in the semiconductor market.

The traditional Seica V8 Next> series flying prober comes packed with many features and test techniques required for the traditional original equipment manufacturer (OEM) and contract manufacturer (CM). Features that include in-circuit testing, AOI inspection, boundary scan, onboard programming (OBP), LED testing and power up functional testing are must-haves for the traditional market.

Combining these features with a true doubled-sided and vertical board testing flying probe architecture, 100 percent of the standard OEM and CM market can capitalize on the standard features. However, a semiconductor customer may be hard-pressed and challenged to fully test one of their products, such as a probe card, interface card, or substrate, without advanced features seen in one of Seica's latest innovations — the Pilot V8 HR Next> (high resolution), Pilot V8 HF Next> (high frequency), or Pilot V8 XL Next> (extra large).


***Pilot V8 HR Next> series flying probe system. High-frequency testing allows for environmental product validation.***

## Challenging Board Sizes

Starting with the basics and the mechanical designs associated with probe cards and their construction, the very first constraint a user may notice is the size of the cards themselves. Traditional flying probe test area sizes can be a limiting factor, so much so, that the probe cards do not even fit in the test area. To accommodate this market requirement, Seica developed a flying prober, the Pilot V8 XL Next>, to accommodate board sizes up to 31.5 x 25.6 in. (80 x 65 cm)

However, the board area may not be the only limiting factor, as board thickness and weight are also a concern. Board construction easily exceeds 50 layers in most cases, and the boards will not meet traditional thicknesses of 0.093 to 0.125 in. (2.4 x 3.2 mm).

The Seica "XL" structure can accommodate up to a standard of 0.276" (7 mm) with options for even larger thickness, as well as weight. One benefit of Seica's architecture is the vertical nature of mounting the unit under test (UUT). If this were a horizontal

flying probe system, as the board size/span increases, the weight increases in a corresponding fashion resulting in bow and deflection of the UUT.

The vertical architecture of the Pilot V8 Next> series of testers significantly reduces the bow and deflection, allowing for faster speed and accuracy of the probing needles on the very small test points. The vertical architecture does not require the use of bottom-side flying probe supports, or expensive jigs and shuttles that could inhibit test area for bottom-side testing. With its enhanced vertical clamping design, probe cards that exceed 15 lb (6.8 kg) have been tested in this configuration.

### CAD Data and Software

The physical size of these probe and interface cards can be quite large, and their CAD data and component counts can be extensive. With very large CAD files and component counts exceeding 10,000 parts, the flying probe provider needs to have the latest personal computers and robust, upfront, easy-to-use CAD processing software. When processing any probe card files, it is generally a necessity to have the latest computing hardware and software to even start Seica's program generation.

### High-Resolution Testing

Seica then focused its attention on the high-resolution requirements to test standard probe cards and multilayer organic (MLO) probe cards after developing the proper mechanical and software architecture.

The company introduced even more capable 10 MP cameras to be able to probe down to well under 2 mil (51 µm) pads. Specially designed probe pins leave no witness marks on the PCBs or scuff marks on the substrates. Not only are these specialized tools used to test probe cards, but also interposers and the very delicate and precise gold and precious metal regions on the most complex and expensive semiconductor boards.

The Pilot Next> series testers can be augmented with unique pin types for testing both sub-2 mil (51 µm) pads on one side of the UUT (probe card) and using alternate pin needle types on the opposite side.

### High-Frequency Testing

Next, Seica moved in the direction of "high-frequency" testing and environmental product validation. The company has developed probe pins that allow testing up to 5 GHz. Seica developed its Pilot V8 HF Next> system, with its sights set on the new market of the Internet of Things (IoT), advances in cellular devices, the expanding 5G market, and the nearly unlimited demand for more cellular bandwidth.

**Seica has integrated an environmental unit in the test area that floods it and the UUT with a temperature range from 32 to 158°F (0 to 70°C). This helps the OEM customer be assured that its product is meeting specifications.**

This allows for a single investment in a Pilot V8 Next> series machine that can be fitted with proprietary HF probes, allowing customers to test products and also validate them. Product validation is to "prove out" the capability of the OEMs end product before they initiate NPI or full scale production.

Along the same lines for product validation, Seica has integrated an environmental unit in the test area that floods it and the UUT with a temperature range from 32 to 158°F (0 to 70°C). This can be very helpful in giving OEM customers confidence that their product is meeting specifications using a quick method to test and diagnose the product in environmental conditions, without the need for ovens and other chambers.

This simultaneously allows the test engineer to probe the board under the established environment. Semiconductor probe cards and even backplane network boards may need to be tested several times during the production process. Failure analysis by customers has determined that for critical signals and certain nets, board impedances have varied, due to different customer manufacturing processes.

As a result, customers want to exercise the UUT under certain environmental constraints to see if the signal integrity has been altered. In other scenarios, the customer would like to test the UUT in its bareboard, "unloaded" component state, checking nets, as well as opens and shorts, then send the board to the assembly phase where components are installed. Then the UUT is returned to the same test system to measure the same specified and critical signal nets for comparison.

These techniques and processes are not standard, and in most case, require unique probe pins for loaded board testing, pins for substrate and wafer probing, and software algorithms that have been specifically designed for these purposes. The Pilot V8 HF Next> tester includes all these features as standard for this very specialized market segment.

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**See at SEMICON West, Booth 1865**