Winning in the SOC Market

Agilent 93000 SOC Series
The lowest cost single scalable platform for comprehensive SOC testing

Agilent Technologies
Can you compete
in the SOC market?

The race is on...
but the rules are changing

The pace of innovation in silicon is relentless... driven by demand in the consumer market for computing, communications, as well as digital consumer products that are faster, smaller, more powerful and more mobile. System-on-a-Chip (SOC) and System-in-a-Package (SIP) technology must meet the challenge: providing more functionality and getting to market faster than ever before – at the lowest possible price. Devices and requirements are changing constantly.

How can you win when the very rules of the game are changing?
You need to be fast. You need to be first.
Time-to-Market is getting shorter. You need to respond quickly, taking the latest devices from in-depth characterization to economical volume production within the shortest possible time. You need to choose innovative solutions and tools to beat your competition.

You need to drive down your costs.
Your revenue is restricted by the time it takes to bring a product from design to high-volume manufacturing. And once in manufacturing – with continuing price erosion – your profit is limited by test costs. You only start making money on your designs when you ship more good products at the lowest cost, and that means lowering the overall Cost-of-Test.

You need to handle unpredictability – fast and effectively.
Your success depends on reacting quickly and efficiently to radical changes in the market. SOC technology is squeezing more diverse functionality into smaller areas, with unprecedented levels of integration. This means you need to be able to test SOC devices that contain all possible functional elements – to test them efficiently and with more flexibility. Your survival is based on effectively addressing the risk and uncertainty in the SOC market as it evolves.

"Our test platform of choice is the Agilent 93000 SOC Series because it reduces the manufacturing risk for our most advanced 10Gigabit Ethernet devices to an absolute minimum."

Chris Wilson, Director of Test Engineering, Worldwide Manufacturing Mindspeed Technologies.

"The Agilent 93000 provides us sophisticated functionality, including a wide variety of mixed signal capabilities that allows us to manage our fabless business model."

Joe Wu, VP of Operations Macrotech Research Inc.

To win, you must choose a test solution that will

- test all current and future technologies
- minimize your overall Cost-of-Test
- maximize your utilization of equipment and resources
- move to high-volume production, fast
The last test platform you’ll ever need to buy

Single platform, multiple solutions, and maximum value. The Agilent 93000 SOC Series gives you the freedom you need to win.

Scalability and flexibility
Today, most test systems are still dedicated solutions (memory, analog, digital, RF), which require a complex manufacturing infrastructure and dedicated test engineers trained on single systems. The solution for competitive and comprehensive SOC testing is a single scalable platform. One that scales with chip complexity and allows you to minimize your Cost-of-Test, and maximize flexibility and utilization – not only of your systems, but also of your engineers’ work time. A platform that allows you to use the same test system from characterization to high-volume manufacturing, speeding Time-to-Market. The solution is the Agilent 93000 SOC Series – the lowest cost single scalable platform.

“True scalability” gives you the freedom to configure test solutions that meet performance, and economic requirements. The Agilent 93000 SOC Series provides the necessary test performance at the lowest cost with a single scalable platform, that allows you to configure the system to match your current needs for analog, high-speed digital, RF, embedded memory and scan test capabilities while maintaining the ability to adapt to future changes and developments.

Economic Advantage
- Pay-Per-Use temporary speed upgrades
- Port Scalability mixes high-speed/low-cost channels
  - Two compatible test heads (512, 1024)
- Flexible financing
- Many price points
- Upgradable

Application Flexibility
- Gigabit serial links
- Source synchronous buses
- Complex digital logic
- DVD-video, audio, DVI
- Mobile phones, Bluetooth™, WLAN
- MPEG
- PC266
- Embedded memory
- xDSL
- Set-top box
- Plus more

Performance Scalability
- Digital Speed from 200 Mbps to 2.5 Gbps
- Digital capture up to 336M on every digital pin
- Scan Testing
- Embedded memory testing
- Vector Memory up to 112M
- Analog Memory
- Analog Frequency
- Analog Accuracy
- RF Measurement Suite

Time Effective
- One platform for characterization and manufacturing
- Upgradable anytime
- Compatibility of software, DUT boards and mechanical docking
- Breakthrough Concurrent Test method
  - SmarTest Program Generator
  - Multi-site test capability

Analog Modules
C400e
P600
P800
P1000
NP1700
NP2500
The Agilent 93000 SOC Series gives you the right models to meet the challenges of SOC testing: C-models for cost-sensitive applications and P- and NP-models where performance is paramount. The SOC Series offers you an exceptional speed/accuracy performance range starting at an extremely low entry-level price. In addition to scalable analog, digital and RF, digital speeds from 200 Mbps up to 2.5 Gbps, the ability to mix digital channels between models with Port Scalability makes the Agilent 93000 SOC Series the ultimate in meeting your SOC test needs as they change over time. From test head size, to pins, ports, and test capabilities, one scalable platform for all performance levels helps you to manage unpredictable market needs and consequently reduce risk.

**Economics – minimize your overall Cost-of-Test**

The scalability and architecture of the Agilent 9300 SOC Series is the way to achieve the lowest COT. Because you can expand and upgrade the systems as required, you can invest when you need to, minimizing up-front capital costs. Pay-Per-Use, Agilent’s patented method for temporarily upgrading speed, gives you the freedom to do this immediately, as your needs change. Analog and RF capabilities are easily upgraded, as well. But capital cost is only one aspect. Because the SOC Series can be configured to meet your needs for a wide range of devices, you reduce the overhead, which would otherwise be required to support a complex manufacturing infrastructure of multiple, incompatible testers. This means your operators, design and test engineers, as well as maintenance personnel require less training and are more flexible. To ensure you even greater flexibility, Agilent offers a variety of financing programs to best meet your specific business needs.

**Applications – maximize your utilization of equipment and resources**

No Idle Testers! The highest possible system utilization is achieved by covering a broad range of devices – from high-end to low-cost, high-volume commodity chips – on a single scalable platform. Full functionality test capabilities in RF, analog, high-speed digital, embedded memory and scan, means maximum manufacturing flexibility. This enables the system to fully meet the challenging test requirements in markets such as computation, wired and wireless communications and digital consumer. With the single platform that maximizes application coverage, you can optimize manufacturing, capacity and load-balancing – leading to higher utilization and ultimately more profits.

**Performance – test all current and future technologies**

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**Time – quickly react to changes in your markets and move to high-volume production, fast**

Be first to market. The Agilent 93000 SOC Series allows you to use the same test system from characterization to high-volume manufacturing – so there’s no need for test program conversions and lengthy correlations. Full compatibility of any of the Agilent 93000 SOC Series models of systems, software, DUT boards and mechanical docking provides rapid Time-to-Market and smooth transition to volume manufacturing. Test time itself is reduced with concurrent test, allowing all your functional elements embedded on a single SOC device to be tested simultaneously. This, together with the ability to test multiple sites, allows you to achieve truly optimal use of system resources. Also, the SmarTest Program Generator, effectively links design to test, and provides a single test development environment for all SOC technologies, enabling optimal Time-to-Market.

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“With a complete family of testers, Agilent provides one powerful platform of test systems for SOC testing. Following extensive market evaluation, we found that the Agilent P1000 offered the best hardware specifications. We are proud to be working with the most powerful tester within Philips.”

Erik Jan Marinissen, Philips Research, Eindhoven, The Netherlands
For cost-effective SOC testing you need one tester that can handle all integrated functions – a master in all disciplines.

Communication interfaces

Test the Internet and more
The combination of leading digital capabilities and a broad range of analog modules positions the Agilent 93000 SOC Series as a leader in communications test. Already established for SONET testing, the SOC Series is well positioned to address today’s silicon requirements for SerDes applications such as Gigabit Ethernet and FibreChannel by enabling a smooth transition from full parametric characterization to lowest-cost high-volume production.
Advanced analog integration

Virtually Plug and Play
Agilent’s “tester in a test head” concept drives down the cost of analog, provides flexibility and allows rapid system upgrades. It makes analog testing virtually Plug and Play. Advanced analog integration packs a complete module in the test head of the Agilent 93000 SOC Series. The analog modules have the complete Arbitrary Waveform Generator (AWG) or Waveform Digitizer located on a single board, including the converter, memory, sequencer and timing circuits.

Cool!
Combining high-speed digital, high-performance analog and RF technology in the same small area becomes a real challenge for power and heat dissipation. Water cooling in the Agilent 93000 SOC Series test head means – as a result of the constant low temperature – the analog modules feature system accuracy, reliability and stability unsurpassed in the ATE market. In addition, the system features an extremely low noise-floor as each single module is double shielded to avoid external interference.

Full range of analog applications
The Agilent 93000 SOC Series delivers what you need: low-frequency modules to test 20-bit audio resolution for consumer products such as AC-97 or audio CODECs for cellular phones, high-frequency modules with over 100 MHz of analog bandwidth for applications like set-top boxes or I/Q ADCs and DACs for cellular phones, as well as ultra high-frequency modules to address transceiver devices. The full range of analog modules will cover today’s applications – such as WAP, xDSL, Internet and enterprise networks.

...and high-speed buses

Beating the bottleneck
Increasing MPU power means that data transfer rates between chips on the motherboard become a bottleneck. High-speed buses are deployed to beat the bottleneck in the computation environment, as well as to address the bandwidth bottleneck in and between equipment in the networking infrastructure. The Agilent 93000 SOC Series not only provides solutions to test microprocessors, graphics chips and chip sets, but is also capable of testing the latest high-speed buses addressing these bottlenecks, such as HyperTransport, Rapid IO, DDR and InfiniBand.

Highest speed at lowest COT
With data rates of 2.5 Gbps at any pin location and features like differential signaling, native source-synchronous support, high-throughput jitter measurement capabilities, and high pin counts, the Agilent 93000 SOC Series provides the technical edge for testing high-speed computer buses and communications interfaces. Customers who have already adopted the Agilent 93000 SOC Series to address a wide portfolio of applications can easily upgrade their installed testers with these capabilities. Agilent not only provides high performance but also increased investment protection and lower financial risk by further extending the useful lifetime of installed capital equipment.
Agilent’s RF Measurement Suite provides the test capability to meet both current and future wireless applications – such as Bluetooth™, WLAN, and cellular – including 8 GHz modulated stimulus, 8 GHz measure, up to 12 RF ports and quad-site test. Based on Agilent’s more than 60 years of RF and microwave experience, the RF Measurement Suite provides the accuracy and repeatability required to ensure production of high quality devices. Agilent’s unique real-time RF data processing architecture allows data manipulation and comparison in the RF receiver, avoiding time consuming downloads of data into the host computer – reducing test times. In addition, all the RF components – splitters, combiners, attenuators, power amplifiers, switches – are built into the system so they are not on the DUT board, speeding up development of new DUT boards and extending DUT board lifetime.
Embedded memory

Full coverage – full speed
APG per-pin is part of the overall Test Processor-Per-Pin architecture and supports a virtually unlimited Algorithmic Pattern Generator period. This allows the widest possible range of memory organizations as well as the most complex access formats and protocols for effectively testing embedded memory. Each pin has a dedicated sequencer that can perform loops, counted loops and subroutines while other pins run a different sequencer program. Because the APG runs at full tester speed, memory test is executed at-speed to ensure full test coverage. The system will support one-shot failure analysis, regardless of how many errors occur.

The hardware and software concept supports maximum flexibility to test any type of embedded memory: SDRAM, RAM or Flash. The system also supports a high-voltage Device Power Supply (DPS) up to 22 volts, specifically for applications such as flash memory.

Two test heads in one
Configuration management is essential to maintain high levels of utility and meet volume manufacturing cost goals. The Agilent 93000 SOC Series is available with two test head sizes – 512-pin and 1024-pin – which are 100% compatible. A DUT board from the 512-pin head can be placed on the 1024-pin version. This allows you to minimize the capital cost of testers – as large and small test heads can be used on the manufacturing floor – and to maximize utilization, further reducing Cost-of-Test.

Fully scalable scan
Like the other hardware of the system, scan hardware is fully scalable. Each channel can be equipped with sufficient memory to act as a scan channel. Increasingly, devices use wide scan chains to reduce test time and Cost-of-Test. This trend is a problem for test architectures that use central resources for scan. But not for the Agilent 93000 SOC Series: the flexibility of the Test Processor-Per-Pin Architecture means that the system can easily address this trend by offering up to 1024 scan channels. Also, scan data rate can be increased up to the full sequencer speed, further reducing test time and COT.

Save with Pay-Per-Use
Data rate is recognized as a basic performance measure for ATE systems and therefore correlates to per-pin cost. Today’s devices contain more and more high-speed pins that need to be tested. Agilent’s patented Pay-Per-Use concept – which allows temporary speed upgrades means that tester costs are not dictated by a few high-speed elements on an SOC device. The true scalability of the Agilent 93000 SOC Series also provides the possibility of permanently upgrading speed and vector memory of installed systems.

Flexibility without compromise
The Agilent 93000 SOC Series features third-generation gigabit technology – and the true Test Processor-Per-Pin Architecture is a key factor for cost-effective volume testing of SOC devices. This architecture has the capacity to allow mixing channels of different speeds and segmenting of the system to address simultaneous testing of different ports at different speeds. Test Processor-Per-Pin Architecture allows data rates of up to 2.5 Gbps with vector generation on each pin – without multiplexing and without compromising system performance or accuracy.

Gigabit digital

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Gigabit digital

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The Agilent 93000 SOC Series takes you from design, to market, to volume, to profit... to Win

Agilent offers the broadest application coverage on a single scalable platform, meeting the rapidly changing needs of current and evolving markets.

Win in the Wireless Market
In today’s volatile wireless market, the only constant is change. A multitude of new standards (2.5G and 3G) for cellular phones are emerging, but their deployment plans continue to change, making it difficult to predict what the market will demand next. The evolution of Bluetooth™ and WLAN will also likely bring faster data rates and higher frequencies – driving additional changes in this market. To meet the demands of this rapidly changing market, you must be fast and flexible. You need a solution that will keep you at the leading edge of wireless SOC testing. Agilent, the number one provider of wireless test solutions, has over 10,000 employees focused on test technology for the wireless communications market. When Agilent’s wireless expertise is combined with the Agilent 93000 SOC Series platform, the result is the ultimate test solution for meeting your challenging test requirements today and in the future.

Win in the Digital Consumer Market
Digital TV, set-top boxes, DVD and personal electronic products have seen rapid growth recently. The SOC devices driving these products must be small and inexpensive, requiring test solutions that significantly lower Cost-of-Test. The Ce-models of the Agilent 93000 SOC Series have been designed with this in mind, and with breakthrough test methods like concurrent test – allowing multiple functional elements of a device to be tested simultaneously – traditional test costs can be reduced by over 80%. At the same time, MPEG services, the technology feeding this convergence of video, voice and data in the home, means having the right performance to test the large memory blocks required to decode, display and play digital content. Over 70M of vector memory is required to successfully accomplish this test. The Agilent 93000 SOC Series, with 112M of vector memory, and flexible memory architecture, allows you to allocate large memory blocks to any specific pin. The Agilent 93000 SOC Series provides both the lowest Cost-of-Test and the right performance in one single scalable platform to meet your needs in the digital consumer marketplace.

Win in the Computation and Wired Communications Markets
The heart of the Internet depends on the speed, processing power and affordability of computation and wired communications equipment. Computation and communications companies are under pressure to develop lower-cost, higher-speed devices to address the urgent need for high-speed data transfer. In the computation market, new high-speed buses like HyperTransport and Rapid IO achieve this. High-speed interfaces are also deployed in the wired communications market to increase bandwidth in the Internet infrastructure. And, due to cost pressures and demand for higher performance, multiple SerDes IP cores are embedded into a single device such as on Switch Fabrics for Gigabit Ethernet. If your components are destined for computation (MPUs, chipsets, graphics, high-speed computer buses, etc.) or for wired communications (high-speed communication links, standalone and embedded SerDes, Gigabit Ethernet, SONET/SDH, network processing, etc.), the Agilent 93000 SOC Series provides the platform that fits. With features like differential signaling, native source-synchronous support, and high-throughput jitter measurement capabilities, the Agilent 93000 SOC Series delivers the technical edge needed to overcome the test challenges associated with these high-performance devices. This platform enables extensive characterization up to 3.6 Gbps, and the lowest overall Cost-of-Test without compromising performance.
Maximize your overall equipment effectiveness

As you navigate through this relentlessly changing market, you need to look for ways to maximize your test system investments and increase productivity with the resources you have. Agilent has the services and support programs to help you meet these challenges.

Services and support must be considered as part of the “whole electronic manufacturing test solution,” providing benefits across the complete life cycle of your products.

Agilent’s services and support products add value in all phases of your product, from design through manufacturing. From evaluation, Time-to-Market, Time-to-Volume, through Time-to-Profit, you can expect comprehensive solutions from Agilent’s global team of specialists. Services and support professionals located throughout Asia, Japan, Europe, and the United States, are ready to provide solutions that enable you to increase efficiency, lower test costs, and increase profit.

- Site preparation and system installation
- User, technology and service training
- Maintenance, repair and calibration
- Utilization measurement and operations improvement services
- Test and manufacturing process consulting

"Our strategic alliance with Agilent is enabling Silicon Wave to supply high volume, top quality Bluetooth devices that exceed our customers' expectations."

Dave Lyon, CEO
Silicon Wave

Win in the SOC Market with the Agilent 93000 SOC Series

- **Performance Scalability**
  Test all current and future technologies

- **Economic Advantage**
  Minimize your overall Cost-of-Test

- **Application Flexibility**
  Maximize your utilization of equipment and resources

- **Time Efficient**
  Quickly react to changes in your markets and move to high-volume production, fast
**Intelligent Test Solutions**
Agilent Technologies provides a full spectrum of test solutions, offering revolutionary products and services that deliver the critical components you need today, while providing a roadmap that meets your future test requirements. Intelligent Test means you get the right test at the right cost, through the power of information in the following four areas:

**Semiconductor Test**
Leading solutions for memory test, parametric test, wireless RF test and SOC test applications are reducing COT and Time-to-Market in highly competitive markets.

**Board Test**
Testing hardest-to-reach components with In-Circuit test plus optical and X-ray inspection are setting the pace in manufacturing test.

**Service and Support**
Get the most out of your testers with flexible and expandable services that are tailored to your needs.

**Functional Test**
Ship with confidence – reduce warranty and repair costs by checking product specifications with fast and reliable functional test equipment.

For more information about Agilent and its products, go to [www.agilent.com](http://www.agilent.com).

For more information about Agilent Technologies semiconductor test products, applications, and services, visit our website: [www.agilent.com/go/semiconductor](http://www.agilent.com/go/semiconductor) or you can call one of the centers listed and ask to speak with a semiconductor test sales representative.

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