go/semiconductor

Ideas and Information for Test Engineers and Managers

HEWLETT® PACKARD

Speed, Technology, Experience, Price/Performance

keeping you one S.T.E.P. ahead



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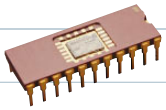
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It never was easy, but now, more than ever, semiconductor manufacturing is an extremely demanding environment. Manufacturers are in a double bind, for they are under constant pressure to bring new products to market, and yet, at the same time, they know that they must continually improve quality. This now makes testing an even more critical element in the production process.

As a semiconductor manufacturer and user of test systems, Hewlett-Packard understands that four important elements are absolutely critical for success in today's dynamic marketplace: Speed, Technology, Experience and Price/Performance (S.T.E.P.). [continued on page 4]



forward

From the editor, Rick Gaan



"We selected the name *'go/semiconductor'* because we wanted a title that is forward-looking, something that immediately identifies the focus as semiconductors..."

Welcome to our inaugural issue of *go/semiconductor*, a publication for test engineers, test engineering managers, R&D, semiconductor executives and the general semiconductor test population.

Why another newsletter? Because we hope that you will find within these pages as much up-to-date information as we can garner not only about HP's semiconductor testing solutions, but also ideas, applications and tips to help you come up with solutions to your testing problems.

We selected the name *"go/semiconductor"* because we wanted a title that is forward-looking; something that immediately identifies the focus as semiconductors, and, perhaps not so coincidentally, is also the name of our Web address.

We plan on producing quarterly publications (July, October, January and April) with a circulation of about 20,000. To get on our mailing list, simply send me an e-mail message (rick_gaan@hp.com) or drop me a note.

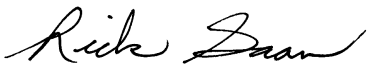
Each issue will have a specific theme. For this inaugural issue (Summer, Volume 1), we are highlighting SEMICON West 97, not only because it is a major trade show that brings us all together, but also because it represents an exhibition of the most up-to-date information and products available, including a series of HP products that will "Keep you one STEP ahead." Our own IC manufacturing divisions rely on STEP — Speed, Technology, Experience and Price/Performance — for test system solutions.

The newsletter is organized into specific departments in order to provide you with a consistent format. Our departments include:

- *Executive Perspective:* In each publication, one of HP's top executives will be interviewed in-depth on important issues within the semiconductor industry, as well as sharing of best-business practices within the HP organization.
- *Customer Partnership:* Success stories of how customers were able to achieve and exceed their goals by partnering with HP.
- *Product Review:* A profile of our newest products, applications and tips.
- *Did You Know:* Briefs on interesting aspects of the semiconductor industry.
- *Global Calendar:* A calendar of HP semiconductor activities worldwide.

We want the newsletter to be as lively and interesting as possible. We also want this to be an interactive publication, one that enables you to respond to us, either through our web site or by e-mail. Tell us your reactions, what you like and don't like, what you want to see more (or less) of, what you would find interesting to read about. Your input into what we are trying to provide would be most helpful.

Happy reading!



Rick Gaan
Marketing Project Manager
rick_gaan@hp.com

DID YOU KNOW

Meeting the next generation

The HP 33000 F1300 meets the needs of the next-generation Rambus devices up to 1.3 Gbps.



executive perspective

'Going beyond what's needed today…'

— A talk with John Scruggs, vice president & general manager of HP's Automated Test Group



Q: How is Hewlett-Packard helping its customers stay one step ahead?

A: HP recognizes that the semiconductor industry is a very rapidly changing environment in which customers can't always predict their test needs in advance. As a result, we create products with superior performance reach, which I would define as the ability to go beyond what's needed today and anticipate what's needed in the future. HP does this by creating product families that offer flexibility now and the ability to easily upgrade as the need arises.

Q: Can you give an example of what you mean by performance reach?

A: The HP 83000 family of high-speed digital testers has, for quite some time, been able to test at speeds of up to 660 MHz, which is well above mainstream needs. In fact, HP is currently the only vendor able to test Rambus DRAMs. Recently, Intel endorsed Rambus as its architecture of the future, so the main memory for PCs is soon likely to have a Rambus interface. Because HP built performance reach into its HP 83000 Series testers, HP and its customers already have a wealth of experience testing devices at very high speeds—including Rambus devices. This is just one example of how building performance reach into our products helps our customers stay one step ahead of what's coming.

Q: Where is HP investing its resources in order to meet future customer needs?

A: We're focusing on several key areas, including developing higher speed digital test capabilities and improving tester accuracy. We're also driving cost out of our test systems to keep customers' costs low.

But in a broader sense, HP has a huge advantage. As a company, we can leverage the rich technical resources of the remainder of HP's world-leading test and measurement business and supplement our own investments. For example, RFICs are becoming more popular due to the rise in mobile communications. HP has been testing cellular phones for many years. We've been able to take the RF technologies used in other applications and leverage them in creating our RFIC and mixed-signal semiconductor test systems. The depth and breadth of HP's test and measurement experience also helps our customers stay a step ahead.

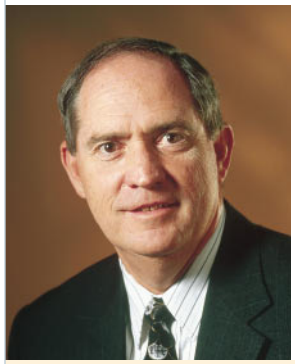
Q: What does the future hold for HP's semiconductor test customers, not only in terms of products, but also in terms of the way HP supports and serves them?

A: Some of the biggest changes you'll see in the near future have to do with customer support. We're looking for ways to work more closely with customers to ensure that their operational performance is optimized. We're increasing our support staff worldwide, and actively building expertise in a number of key application areas.

We're also excited about the potential of using the Internet to help us get closer to our customers and to deliver superior support on a "pull" basis. In the very near future, HP customers will have Web access to all kinds of critical support information—perhaps even be able to chat on-line with HP application engineers.

Q: Any final word for those semiconductor manufacturers out there?

A: Semiconductor companies that are pushing the envelope (which is necessary to be a leader in this dynamic industry) should partner with a company with the breadth and depth of resources needed to cope with the inevitable unknowns. What I'd say to leading-edge semiconductor manufacturers is this: If you've got tough, emerging problems, let's talk.



"Some of the biggest changes you'll see in the near future have to do with customer support. We're looking for ways to work more closely with customers to ensure that their operational performance is optimized."

featured story



keeping you one S.T.E.P. ahead!

Hewlett-Packard's focus on price, speed and efficiency



New HP products showcased at

SEMICON West 97, Booth #10516

For more information on Hewlett-Packard Test and Measurement products, applications or services, please call

1-800-452-4844



[continued from page 1]

And these four elements are the theme of HP's presentation at SEMICON West 97, where you will see how HP's semiconductor test products and services can help you get your products to market faster, and, at the same time, enable you to achieve the highest quality product. HP is recognized as being the number one worldwide supplier of test and measurement equipment, based on its years of experience in digital design & testing, RF & Microwave technology and manufacturing technology, to name just a few.

Speed, speed, speed

In semiconductor manufacturing, speed counts. It is important on many fronts:

- *High throughput* — Manufacturers strive to maximize the number of devices correctly tested in their production processes. HP helps its customers improve throughput. For example, soon after adopting HP Versatest systems as a common front-end test platform at all four wafer fabrication facilities, Cypress Semiconductor Corporation, based in San Jose, California, improved throughput 200 percent and, as a result, significantly reduced test costs.

- *At-speed testing* — Today's high-performance digital and multimedia devices need to be tested at the speed at which they will eventually operate in their end product, in order to guarantee functionality. At-speed testing is absolutely essential for some high-speed parts with extremely tight timing tolerances. HP offers the industry's fastest testers, with clock rates of 500 MH/z and above.

- *Time* — Time is an essential factor of the fast-paced semiconductor industry. Manufacturers must constantly seek ways to improve *time-to-market*, but they also need to be concerned with the *time-to-volume* and *time-to-money* phases of semiconductor production in order to remain competitive. HP makes a solid contribution in reducing time factors. For example, when Nintendo Corporation approached Silicon Graphics, Inc., and NEC Corporation to manufacture the millions of parts needed for their new game machine, Nintendo 64, the two companies faced a critical time-to-volume challenge. These were no ordinary parts, but Reality Co-Processors, and ultra-high-performance multimedia chips. Using the HP 83000 and working together with HP, NEC and Silicon Graphics met their four-month time-to-volume goal.

But speed isn't everything. There are other elements to consider in order to succeed at semiconductor testing.

Technology

In keeping with its legacy of invention, HP leverages the depth and breadth of its expertise across the company to help customers stay a step ahead. Some examples of HP's technology:

- HP invests approximately 10 percent of its revenues into one of the world's largest fundamental industrial research organizations. HP Labs, located adjacent to Stanford University in Palo Alto, California, provides a source of fundamental measurement, computation, communication and software technology — the seeds for innovative new products.

- Military RF test technology from HP's Santa Rosa Systems Division is used in the HP 84000, HP 94000, and RF 9490 Series test systems. In addition, the Multi-Chip Module (MCM) technology currently found in the HP 83000 Digital IC test systems was first used in HP's high-performance computers.

- HP has a patented membrane probing technology which allows high-speed, low-leakage wafer probing. This technology has been licensed to an industry-leading probe card manufacturer, enabling high-speed measurements that would otherwise be impossible.

- HP Labs' work in computer architectures gives the HP semiconductor test business insight into the silicon devices of the next century. As HP moves to new concepts such as very long instruction word and other 64-bit-plus computer structures, the requirements of semiconductor devices will change to higher speed, more parallelism, and lower voltage margins and tighter timing tolerance. HP's semiconductor test systems will be prepared for these challenges as the newer devices reach commercial viability.

By the way, HP's full line of testers have one of the smallest footprints in the industry, saving on precious floor space, and overhead costs — thus more efficient, cost-effective use.





Experience

HP has more than 50 years of experience in test and measurements, which has contributed to its long-standing reputation for reliability and in-depth knowledge of the semiconductor industry. According to VLSI Research, and based on surveys of the semiconductor industry, HP has been ranked number one in process diagnostics equipment and among the top five suppliers for test and material handling equipment.

HP has more than 2,800 semiconductor test systems installed worldwide, of which more than 1,500 systems are relied on in back-end production tests.

And with more than 250 multimedia-ready systems installed worldwide, HP 83000 customers include Motorola, IBM, Hitachi, AT&T and Rambus.

Price/Performance

HP has come up with innovative *just-enough-test* solutions to address price/performance issues in testing. And many of HP's test systems allow for testing multiple devices or die in parallel, thereby maximizing test throughput. For example:

- *Tester-per-site:* HP has test system architectures that provide independent resources for multi-site testing, thus allowing for more efficient production test techniques. The results can produce a 50 percent increase in throughput over alternative shared-resources architectures.
- *Scalable architectures:* Scalable systems allow you to meet your individual needs as well as test problems in parallel. The advantage here is that you can pay for just what you need, and do not need to make a large investment of dollars, particularly if you are in the early stages of testing or do not need the extremely sophisticated, high-power testing units that HP provides.
- *Pay-per-use:* Under this innovative program, customers can acquire the basic machines at very reasonable prices, and then "rent" the additional capability. This concept allows a manufacturer to purchase a highly configured system for the price of a base system, then use the high-end capability such as higher digital test speed or more test nodes, only as needed. A special benefit of this program is that pay-per-use charges can be applied to the cost of owning the machine.
- *Self multisite testing:* Test systems are expensive, and HP understands that customers would like to test an array of smaller chips at those times when they are not involved with the testing of complex chips. HP provides a high-performance platform by which a variety of testing options for a variety of chip sizes can occur.

Thus, under the price/performance element, HP enables customers to come up with solutions that will be cheaper, more effective and produce higher quality output.

HP impacts the 'test cell'

Hewlett-Packard's strategy is to provide customers with a total working solution. Focusing on testing as a critical element of a manufacturer's competitive strategy, HP sees its larger role as having a positive impact on its customers' business.

HP has the resources to provide integration services, test program development and data management worldwide. ●



New HP products showcased at SEMICON West 97, Booth #10516

Hottest in Multimedia, Mixed-Signal, RF Test, Memory and more! Hewlett-Packard will have a major display at SEMICON West 97, July 16 to 18, and among the products that will be displayed are:

HP 83000 MMP Multimedia System — The Ultimate for Multimedia Device Test
The ideal "workhorse" for production test of today's most advanced multimedia devices. Perfect for testing devices that feature embedded memory, analog, PLL and fast digital logic with only a single insertion, in a single pass.

HP 83000 Series F1300c — Perfect for Production
Introduced at SEMICON West 97, this compact test system performs at-speed tests for ultra-high-performance devices such as RAMBUS DRAM (RDRAM) and telecommunications devices. The HP 83000 Series F1300C offers fast throughput and flexibility in a production test environment. See it at the show testing a Rambus RDRAM device "at speed."

HP 94000 Model 266 — The Fastest for Mixed-Signal
The HP 94000 Model 266 is the fastest per-pin mixed-signal tester on the market today. To showcase its speed and superior fidelity, the HP 94000 Model 266 will test a RAMDAC at the show. Offers complete program, DUT board and software compatibility with HP 9490 series.

HP9494 with RF9490 — Unparalleled for Cellular and Wireless
The HP9494 with RF 9490 is ideal for complex RF testing combined with high quality mixed-signal test. Customers no longer have to do two-pass testing, or decide between quality mixed-signal testing or RF testing. This combination excels at both.

HP 84000 RFIC — The Best for RF
The HP 84000 RFIC test system offers fast measurement speed, RF measurement integrity, high uptime and software that is optimized for production test. HP will highlight the newest features of the HP 84000's system software including a simplified operation interface, multiple test plan calibration and improved test plan generation reports. See it perform production testing of an RFIC.

HP V3300 — The Latest for Logic, Flash, Non-Volatile Memory
The new HP V3300 adds higher speed production test capability for enhanced throughput with its unique "tester-per-site" architecture for testing up to eight sites per system. Capability includes 20/40MHz operation, timing-on-the-fly and format-on-the-fly.

HP 4071A and HP 4155B/4156B — Peerless for Parametric
The HP4071A semiconductor parametric test system is the first in a series of new products designed to test and analyze the most advanced semiconductor processes at low cost and risk. To improve test throughput, HP has minimized system parasitics, improved SMU performance and optimized control and communications.

HP 4155B and 4156B Precision Semiconductor Parametric Analyzers — Throughput Leader
Introduced at SEMICON West 97, these analyzers provide higher throughput, LAN capability, a powerful new user command language, and other convenient features. The HP 4155B and HP 4156B are ideal for electronics and semiconductor manufacturers for process development, incoming inspection, device characterization, process monitoring, failure analysis and more.

Schedule Demos in Advance

Tester demonstrations run every 20 to 30 minutes and are limited to small, company-specific groups. To ensure availability, please schedule a demo early — in advance of the SEMICON West 97 show. Contact the following individuals for demos of specific test platforms:

HP 83000 MMP and HP 83000 F1300C:
contact Sandy Riddell at (408) 553-3307

HP 94000; HP9494 with RF9490:
contact Karen Santos at (408) 553-3310

HP 84000: contact Lisa Hebert at (707) 577-4346

HP V3300: contact Maria Vasta at (408) 553-6705

HP 4071A; HP 4155B and HP 4156B:
contact Jeannette Meline at (408) 553-2870

customer partnership

The need for speed: How Rambus, Inc., wins the race



"The HP 83000 F660i is the only system that can characterize Rambus technology…"

says Jim Gasbarro, senior designer for Rambus

In the era of multimedia and 3D graphics, speed is king. Just ask anyone at Rambus, Inc., inventors of the world's fastest DRAM interface technology, the Rambus DRAM (RDRAM®). They'll tell you speed is one reason why on May 21, 1997, this 135-person company enjoyed the second-best opening day for an initial public offering in Silicon Valley in three years. All told, Rambus raised $33 million and its share price jumped 152 percent. Only Yahoo! Inc. had a steeper climb on the first day.

But being speedy isn't always easy. When you've got some of the world's fastest parts — with 600 MHz vector rates and higher — you've also got to find the world's fastest test systems. That's why Rambus uses HP 83000 F660i digital IC test systems.

The HP 83000 F660i systems are the only test systems available today that can attain the high data rates necessary to do functional test of Rambus parts. They're also the only ones that can provide the timing accuracy necessary to fully characterize RDRAMs. "The HP 83000 F660i is the only system that can characterize the sophisticated high-speed timing circuitry and closed-loop performance used in the Rambus technology with the necessary accuracy (less than 50 ps). And, with the F660i's dual transmission-line support, we can evaluate circuitry of 600 MHz and up," says Jim Gasbarro, senior designer for Rambus.

Rambus, Inc.'s, semiconductor manufacturing partners also use HP 83000 F660i systems for final production test of well over a million parts per month. Says Gasbarro, "500 MHz was our starting point, but we are now moving to parts that operate at 600 MHz and beyond. The HP 83000 systems will continue to provide a low-cost solution for us and our manufacturing partners well into the future." ●

Nintendo 64: How NEC Corporation wins in the multimedia mass-market



No doubt about it. Nintendo Corporation's Nintendo 64 home video game player is hot. Since its introduction, it's been a mass-market, multimedia hit. To date, worldwide shipments of Nintendo 64 exceed 10 million units.

Part of the secret to its popularity? At the heart of every Nintendo 64 home video game player is one of the world's fastest 64-bit multimedia processors. This ultra-high-performance device, called the MIPS™ Reality Co-Processor, or RCP, is key to Nintendo 64's advanced 3-D graphics and video. It consists of a very complex co-processor with an RDRAM interface macro (called Rambus™ ASIC Cell [RAC]). Developed by Silicon Graphics, Inc., and manufactured by NEC Corporation, the RCP is no ordinary device.

And because the RCP is so advanced, "next generation" test platforms had to be considered. So, when Nintendo Corporation approached Silicon Graphics and NEC to manufacture the millions of parts needed for its new mass-market multimedia game machine, testing the RCP became a critical factor. Time was another issue. Nintendo 64 was slated to ship only eight months later in Japan; Nintendo needed parts in four months to meet its goal.

NEC Corporation uses the HP 83000 F330t for testing the RCP in production. This high-performance tester can drive the RCP's 250 MHz clock directly, eliminating the problems associated with testing a device with a very high clock rate using a test system with a lower clock rate. It also tests the RCP's fast data bus at up to 500 Megabits per second. "The performance of the HP 83000 was a big factor in our ability to supply the parts to Nintendo on schedule," says Shigetatsu Katori, engineering manager for NEC Corporation.

But that's only half the story. Ramping up to volume production required more than just a test system. HP provided a complete solution including device fixturing, handler interfacing, training for line operators and test software development. "HP's support enabled us to successfully store 10s of thousands of parts to our warehouse in less than four months, allowing us to ship them to our awaiting customer. It was truly a miracle to complete all preparations for chip sorting in such a short lead time," says Katori. Because NEC Corporation delivered the parts in volume on schedule to Nintendo, Nintendo met its time-to-market goal for the Nintendo 64 home video game player. ●

DID YOU KNOW

A Roadmap prediction

The SEMATECH/Semiconductor Industry Association's National Technology Roadmap for Semiconductors predicts 0.18 micron processes in production by the year 2001 and 0.13 by the year 2004. The Roadmap is a description of the semiconductor technology requirements for ensuring advancements in the performance of integrated circuits.



Multimedia chip makers celebrate an HP delivery

It was labeled a "multimedia chip evening of celebration," for more than 100 representatives from Silicon Valley's top multimedia chip companies gathered in late February at Digital Testing Services (DTS) in Santa Clara, California, a subsidiary of Alphatec, to cheer an HP product delivery.

The reason for the festivities? DTS, one of the world's premier test houses, took delivery of Silicon Valley's first 1024-pin ready, 330 MHz clock rate, multimedia-capable HP 83000 test system — the 250th HP 83000 test system sold in the world.

The delivery itself was a significant cause for celebration, because it represents a solution to a problem that has, until recently, plagued multimedia chip makers.

Going beyond the traditional method

One of the biggest roadblocks to successfully bringing multimedia devices to market is the ability to cost-effectively test them in a single pass. To do this, the test platform must be able to validate the performance of video, audio, memory and the high-speed processing core, all on a single platform. With traditional test solutions, each data type has to be tested on a separate machine, generating extra test steps and increasing costs significantly.

Dell Gilliam, vice president of marketing and sales at DTS, said HP has helped to solve this market challenge by providing the HP 83000 Multimedia Series. These are the only testers in the world capable of fully testing all of the multimedia functionality of a multimedia processor, along with the ability to test today's ultra-high-speed interfaces, and all on a single machine.

In order to satisfy its customer's needs, DTS has eight HP 83000 testers running production test and characterization around the clock. "Once you begin testing devices with data rates above 100 MHz, there's not much choice but to go with HP," Gilliam said.

Trend toward outsourcing testing

Until the last several years, the larger semiconductor companies owned the most advanced design technologies. However, a new breed of company — the fabless semiconductor design house — has emerged, and it includes some of Silicon Valley's top chip companies. Because it is fabless, for the most part, these firms choose not to own test equipment, but instead depend on the test house to provide the state-of-the-art characterization, validation and test that their devices require.

Because of its combination of test engineering expertise and the latest state-of-the-art equipment, DTS has become the vendor of choice for all the tests for complex multimedia chips.

"HP is playing a leading role in supporting the trend toward outsourcing test, and in helping us to meet our customer's requirements," said Gilliam. "Our customers are demanding test time on the HP 83000 platform — it's that simple." ●



The delivery (at the first 1024-pin ready HP 83000 test system) itself was a significant cause for celebration, because it represents a solution to a problem that has, until recently, plagued multimedia chip makers.



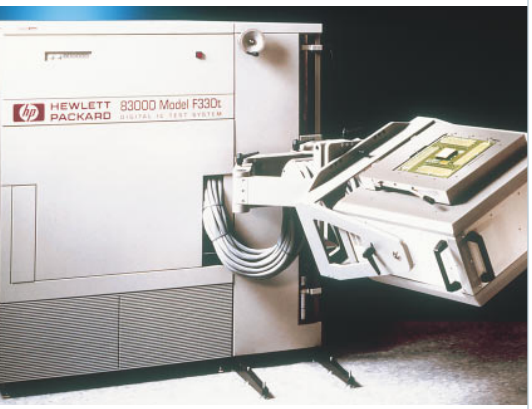
For more information, please contact your HP sales engineer. Or visit our Website at:

http://www.hp.com/go/semiconductor



products

Digital IC Test



The HP 83000 Models P and C testers are fully configured with embedded-memory test, analog test, high-speed bus test and digital test.

Test solutions for multimedia chip manufacturers

The HP 83000 series multimedia testers readily handle complex ICs, so testing doesn't hinder a short time-to-market

Faced with cost pressures and the need to fit more functionality into less space, multimedia chip manufacturers are now integrating multiple functions onto one chip, including sound, graphics, memory and video. This integration drives costs down, but also increases a chip's complexity, which can make testing a potential bottleneck to bringing consumer electronics to market.

The solution: the HP 83000 multimedia series IC test systems. This member of the HP test system adds to the capability of the HP 83000 family and is recognized throughout the semiconductor test industry for excellent uptime and reliability.

The multimedia models are "all-in-one," cost-effective solutions for testing the digital, analog, memory, and high-speed interface components of multimedia chips. HP prepackages and preinstalls the capabilities needed to test all functions of such chips.

Meeting analog test needs

To meet analog test needs, including static and dynamic test and measurements like distortion and signal-to-noise ratio, the HP SmartDSP Smart Waveform Instrument is a fully integrated component of the HP 83000 multimedia series test systems. Optional add-on analog test capabilities include audio sampler, waveform generator and analog clock. Test times are reduced by a special processor-per-analog-channel architecture that fully supports multisite testing of high-pin-count multimedia devices.

Templates help digital-test engineers write analog tests in less time. These templates are ready-to-run, digital-style, analog test functions with graphical setup and result screens. They permit the direct execution of mixed-signal tests without compilation.

Accurately simulate 'real-world' use

Both HP 83000 multimedia series testers allow instantaneous switching among testing of memory, logic or scan. This capability improves the overall quality of the test because it more accurately simulates "real-world" use.

For testing embedded-memory portions of a multimedia chip, the HP 83000 multimedia series test systems have a hardware-per-pin algorithmic pattern generator (APG). The APG can be programmed to generate address/data and control signals to as many pins as needed, without limitation.

Each test processor-per-pin in the HP 83000 multimedia series is controlled by a high-level algorithmic pattern description (ALPAD), which is translated into a per-pin executable code. Test setup and programming are simplified because the ALPAD is independent from the underlying hardware, eliminating the hardware restrictions common to alternative solutions.

Two models for a range of applications

The two models in the HP 83000 multimedia series are optimized to test integrated multimedia chips, such as graphics accelerators and multimedia processors, including those with embedded audio CODECs.

- The HP 83000 Model P tester is ideal for manufacturers who need a higher-performance, yet cost-effective, solution for production testing of multimedia processors.
- The HP 83000 Model C tester, HP's lowest-cost multimedia test option, is designed for the high-volume production test of low-cost ICs, where lowest-cost manufacturing test is required. It operates at lower frequencies than the HP 83000 Model P. The model C also is capable of production analog testing.

The HP 83000 Model P and Model C can test multimedia chips with even the highest-speed interfaces. They have a high edge-placement accuracy that allows tests of I/O data rates up to 250 Mbps. ●

DID YOU KNOW

The 'Information Age' is 50!

1997 is the 50th anniversary of the transistor, the Bell Labs invention that marked the dawn of the Information Age.



For more information, please contact your HP sales engineer. Or visit our Website at:

http://www.hp.com/go/semiconductor



Data rate isn't everything; throughput is. With their tester-per-site architecture, the HP Versatest V1200 and V3300 mixed memory/logic testers excel at high-throughput, low-cost tests of devices such as flash memories.

Memory Test

HP's unique architecture reduces test time for memory/logic devices

The HP Versatest V1200 and V3300 allow high-throughput, asynchronous testing of up to 64 devices.

HP's tester-per-site architecture — the HP development exclusive to the HP Versatest V1200 and V3300 mixed memory/logic test systems — applies the benefits of parallel processing technology to test problems that traditionally have been handled by test architectures that use shared resources. To allow devices to be tested asynchronously in parallel, each site (die on a wafer, or DUT) is served by its own independent test resources.

With the tester-per-site approach, the slowest memory cell or logic circuit doesn't impede, or impact in any way, the test time of the up to 63 other devices that the test system can process simultaneously.

Shorter test times, lower costs

Tests of Flash memory chips illustrate the shorter test times and lower costs enabled by the HP V1200 and HP V3300. A typical test schedule for a flash chip would consist of parametric tests, memory array read, program entire memory array, erase entire memory array, program memory array diagonal pattern, and program memory array checkerboard pattern. With a shared resource tester, the tested chips that perform the slowest in each step hold up the shift to subsequent test steps for all other chips, unless they are determined to have failed.

This situation is analogous to the situation on a two-lane road that allows no passing. Fast traffic is held up just by one slow moving vehicle. The parallel processing enabled by the tester-per-site architecture, in effect, widens that "road" to include many lanes so passing can occur.

The independent operations allowed by HP's tester-per-site architecture maximize test efficiency. Typical throughput can be 50 percent higher.

Mixed Signal IC Test

Mixed-signal tester family gives you 533 Mbps digital performance

The HP 94000 series' high-speed digital and advanced analog capabilities readily handle the most demanding digital and mixed-signal chips

The HP 94000 series solves many of the challenges of testing leading-edge, mixed-signal semiconductors that require high-speed digital performance. While maintaining full compatibility with the existing HP 9490 series of mixed-signal test systems, the HP 94000 series offers faster digital performance, a low noise floor, and new analog instrumentation, including a 40-MHz, 12-bit digitizer with 80-MHz bandwidth and a 1-GHz, 8-bit arbitrary waveform generator (AWG).

The HP 94000 series can test high volumes of the high-performance semiconductor devices that are key enabling components in new generations of electronic products. The test systems are ideal for production tests of complex parts such as graphics controllers, high-speed partial response maximum likelihood (PRML) disk drive read-channel ICs, digital subscriber-line (xDSL) chips, and asynchronous transfer mode (ATM) devices.

A lower-cost solution

Despite its high levels of performance, which includes a faster edge slew rate than the HP 9490, the highly configurable HP 94000 series is a generally lower-cost test solution. Customers save considerable time and expense with the HP 94000 series because it is completely compatible with the current HP 9490 series of mixed-signal test systems. No extensive recorrelation is needed to run existing HP 9490 test programs. Existing Load Boards and DUT boards are completely compatible. This compatibility protects test system investments, allows maximum flexibility on the production floor, and facilitates the highest levels of capital utilization.

True mixed-signal architecture

The HP 94000 series test systems provide high-quality synchronization between analog and digital signals, as well as HP's historically low noise floor. For maximum timing flexibility and ease of programming, the HP 94000 digital subsystem features 16 formats on the fly and 16 timing sets on the fly on a per-pin basis. For accurate characterizations of analog circuit performance, the HP 94000 series includes the same radio frequency subsystem (RF) capability as the RF 9490, including eight RF ports capable of sourcing up to 3 GHz and measurement up to 6 GHz. Specialized RF hardware allows spectral, vector, modulation/demodulation (PCS, NADC, and GSM), and noise-figure measurements.



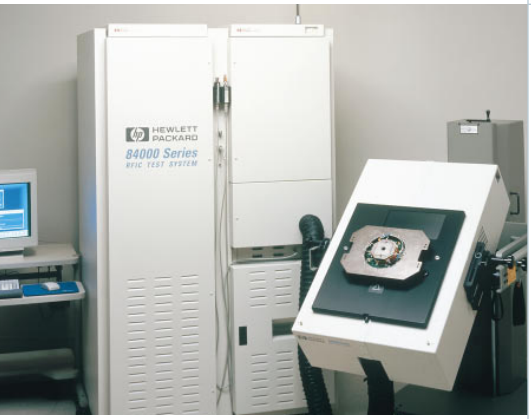
The HP 94000 series enables the cost-effective, efficient testing of emerging mixed-signal devices, while providing compatibility with the HP 9490 series.

To allow an optimum fit with a multitude of testing requirements, the HP 94000 series offers a wide range of capabilities that includes a choice of 80/160- or 133/266-MHz I/O rates, 320- or 533-Mbps data rates, and 128 or 256 pins. To help customers improve time to market, the tester series provides an easy-to-use graphical user interface for program generation, HP's exclusive visual pin monitor, CAE/CAD links to simulation tools, and a special graphical vector editor/logic analyzer. These tools have the potential to provide 30- to 50-percent improvement over traditional program generation.



products

RFIC Test



Get better test results at higher frequencies with less downtime with the innovative HP YieldPro contactor.

APPLICATION NOTE

Enhanced software for HP 84000 series helps boost productivity

Improvements make RFIC testers easier to set up and use

A new software release (Rev. A.01.00) makes the HP 84000 RFIC test system easier to set up and run, and also cuts calibration time in many applications.

Operator improvements:

- The HP 84000 now can illuminate LEDs on calibration and verification ring boards, and can also read the position, model number, and serial number of the ring board. This information helps guide the operator through calibration, catching incorrect connections and validating the per-standard data to be used. The calibration LEDs show the location to which manual standards should be connected, as well as the required position of the rotational calibration boards. If the wrong board has been connected, the position light blinks to alert the operator about the problem.
- The test window is now larger and contains tabbed folders for the plots, lot summary and data table. Controls that used to be on the Test window are now located to the left of the folders, and many controls that used to be on the Test window's menu can be found on the first folder. This improved user interface gives the operator constant access to START, STOP, PAUSE commands; allows customization of the real time data display window; and greatly reduces the complexity of the display.

One-time calibration of multiple test plans:

- Customers often implement more than just one test plan when using the HP 84000 to test a volume of any one type of part. Typically, a production test plan is used for testing the bulk of the parts, but a validation plan characterizes the first few parts in the lot more rigorously. Special cases may also necessitate sample and debug test plans. As a convenience to such users, and to save them time and expense, HP increased the functionality of the test system's software to allow all such related test plans to be calibrated at one time, eliminating redundant calibration procedures.

All current customers with HP 84000 series RFIC testers will receive the Rev. A.01.00 software upgrade at no charge.

Innovative low-parasitic contactor for more accurate, reliable high-volume RFIC test

HP YieldPro contactor provides device-to-system interface up to 18 GHz for HP 84000 RFIC test systems.

The low-parasitic HP YieldPro is a technical breakthrough companion product for HP 84000 series RFIC test systems. It forms the key interface between the device under test and the test system, and enables accurate, high-volume testing of high-frequency devices at up to 18 GHz. The contactor gives users of the HP 84000 a competitive advantage by helping to ensure quality while also increasing test throughput, and by minimizing downtime with a lifetime estimated to be in the millions of actuations, or insertions.

In use at Raytheon

Raytheon Company (Andover, Massachusetts) is one of the first companies to use the new HP contactor as part of a high-volume manufacturing fixturing solution on the HP 84000 test system. According to Bill Vaillancourt of Raytheon's manufacturing operations engineering staff, "HP's new contactor is an enabling technology which allows Raytheon to perform accurate RF measurements at frequencies up to 12 GHz in production volumes exceeding 350,000 parts per month. Prior to these contactors being available, we could only sample test products at much lower volumes and with degraded accuracy and repeatability." Raytheon currently uses two HP 84000 series test systems, along with the low parasitic contactor, in production testing of its direct broadcast satellite (DBS) downconverter parts at 12 GHz.

Ensuring high-quality test

The contactor's small physical size and short electrical length minimize unwanted parasitics. With the HP YieldPro, test engineers can place matching circuitry very close to the integrated circuit (IC) being tested, thereby creating a test environment that closely resembles the IC's end-use environment. In turn, this significantly boosts the quality and reliability of the test.

Each contact in the long-life HP contactor is also individually compliant to overcome lack of planarity in the IC's leads, making it ideal for automated production test. A wiping action during insertion ensures that oxides on the device do not degrade electrical connections. Because the HP YieldPro is made from precious metal alloys, it eliminates the connection integrity problems that arise when the metal plating used in plated contactors wear out.

If you're not yet using the HP YieldPro contactor to increase the versatility and productivity of your HP 84000 series RFIC test systems, contact your HP representative to obtain a specification sheet or to request a quotation for a configuration built to your requirements. HP also offers this contactor for use with HP 9490 and HP 94000 series test system. ●



For more information, please contact your HP sales engineer. Or visit our Website at:

http://www.hp.com/go/semiconductor

DC Power/Parametric Test

Semiconductor parameter analyzers combine high throughput and convenience

Use the LAN capability of the HP 4155B/4156B to create setup libraries and data files that the networked analyzers can access, and to simplify data transfer to spreadsheets and databases.

The HP 4155B/4156B semiconductor parameter analyzers offer improvements and enhancements compared to the popular HP 4155A/4156A, which they replace, without compromises in accuracy, reliability, or flexibility. Throughput of the HP 4155B/4156B is up to five times faster — the highest of any front-panel parametric test instrument — and the new analyzers have a LAN capability that allows convenient data and setup sharing on a site-wide or even a worldwide basis. In addition, a powerful new user command language, HP Fast Language for EXecution (FLEX), gives direct and fast control over the instrument hardware. Finally, the HP 4155B/4156B supports the popular open-system standards of the VXI plug&play alliance. The plug&play drivers allow the user to choose the programming language with which they are most comfortable (examples of which include: C/C++, LabVIEW, LabWindows, VEE, and Visual Basic).

The improved throughput and LAN capability of the HP 4155B/4156B create beneficial productivity increases. The new 10BASE-T LAN capability removes the obstacle of inefficient data transfer via floppy disk, and allows the creation of convenient centralized setup libraries and data files that all of the LAN-connected HP 4155B/4156B instruments can access. The network connectivity also makes transferring data from the HP analyzers to PC spreadsheets or other database formats as easy as typing a few keystrokes — extra efficiency that aids the fight to stay ahead of the competition.

Software eases automation

HP offers software programming options for the HP 4155B/4156B that can meet the needs of virtually any instrument-based semiconductor parametric test challenge. The new HP FLEX user commands allow direct control of the instrument hardware, and are ideal for situations that demand the highest possible throughput. They can be accessed directly from a variety of text-based programming languages, including C/C++ and Basic. The HP Visual Engineering Environment (VEE) visual programming language, a more intuitive, programming option for automation, offers programming efficiencies only slightly slower than those of HP FLEX. For lab setups where automation is not a concern, the HP Interactive Characterization Software (ICS) is available with its convenient built-in semiconductor analysis features.

Both the HP 4155B/4156B semiconductor parameter analyzers come with four medium-power source monitor units (SMUs), two voltage source units, and two voltage monitor units. The HP 4155B analyzer's SMUs have 10 fA resolution and attach via non-Kelvin triaxial connectors, to satisfy most general purpose parametric measurement needs. For high-precision measurements, the HP 4156B analyzer provides 1 fA resolution and full Kelvin triaxial SMU connections. ●

The higher throughput and LAN capability of the HP 4155B and 4156B semiconductor parameter analyzers increase productivity.



DID YOU KNOW

Delving deeper into Deep Blue

The latest iteration of Deep Blue, Garry Kasparov's renowned chess opponent, is a 32-node IBM PowerParallel SP2 high-performance computer. Each node of the SP2 employs a single microchannel card containing eight dedicated VLSI chess processors, for a total of 256 processors working in tandem. Deep Blue's programming code is developed in C and runs under the AIX operating system. The net result is a scalable, highly parallel system capable of calculating 50 to 100 billion moves within three minutes, which is the time allotted to each player's move in classical chess.

Deep thought

The predecessor of Deep Blue, called Deep Thought, contained 250 chips and two processors on a single circuit board. This chess-playing computer was capable of analyzing 750,000 positions per second or 10 half moves ahead, for an international performance rating of 2450, which placed it in the lower ranks of the world's Grandmasters.

In October 1989, an experimental six-processor version of Deep Thought, capable of searching more than two million positions per second, played a two-game exhibition match against Garry Kasparov, the reigning world champion. Deep Thought was beaten.

The successor to Deep Thought, Deep Blue, contains a chess-specific processor chip, designed to dramatically speed up calculations. It's capable of searching two to three million positions per second. This special-purpose processor is joined with IBM's PowerParallel SP computer for a further several hundredfold processing gain over original Deep Thought.



global activities calendar

July – December worldwide calendar of events

JULY

[July 16 – July 18]
Wednesday – Friday
SEMICON West 97 — Test, Assembly & Packaging
San Jose, California, U.S.A.

[July 22]
Tuesday
Semiconductor TEST Symposium
Tokyo, Japan

[July 24]
Thursday
Semiconductor TEST Symposium (CV–IV) Seminar
Tokyo, Japan

AUGUST

[Aug. 15]
Friday
HP 4062 Users Group Meeting
Taiwan

SEPTEMBER & OCTOBER

[September – October]
Benchtop Device Characterization (CV–IV) Seminar
Northeast U.S.A.

NOVEMBER

[Nov. 1 – Nov. 5]
Saturday – Wednesday
International Test Conference and Test Week '97
Washington, D.C., U.S.A.

[Nov. 11 – Nov. 13]
Tuesday – Thursday
Productronica '97
Munich, Germany

DECEMBER

[Dec. 3 – Dec. 5]
Wednesday – Friday
SEMICON Japan 97
Makuhari, Japan





NOTE: Local training on HP's semiconductor test systems is available. For more information, please contact:

United States	(1-800) HPCLASS
Canada	(1-800) 561-3276

For Asia, Europe, Japan, and Latin America, please contact your local Hewlett-Packard sales office.

For more information on Hewlett-Packard Test and Measurement products, applications or services, please call your local Hewlett-Packard sales office. A current listing is available through AccessHP at http://www.hp.com. If you do not have access to the internet please contact one of the HP centers listed below and they will direct you to your nearest HP representative.

Semiconductor Test Web site:
http://www.hp.com/go/semiconductor

Hewlett-Packard U.S.A.
Tel: (1-800) 452-4844
Fax: (303) 754-4800

Hewlett-Packard Canada Ltd.
Tel: (905) 206-4725
Fax: (905) 206-4739

Hewlett-Packard Europe
Tel: (31 20) 547-9900
Fax: (49 7031) 14-2999

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Fax: (81 426) 56-7840

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Fax: (305) 267-4073

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Data subject to change

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