

# SPRINT 4510 AFTS

## Mixed Signal Flying Probe Test System



PRACTICAL INNOVATIONS IN  
FLYING PROBE TEST TECHNOLOGY

### Key Features:

- Advanced, proven architecture based on 3-phase linear platen motors with air bearings for high speed, accurate, reliable and wear-free operation
- 4 identical flying probes with 6° probing angle
- Quick and easy test program generation from CAD or Gerber data
- Precision analog test
- Power-off Open Pin Detection on ICs, connectors, and other devices
- Board power on test
- Boundary scan (JTAG) test
- Mixed signal function test using external instruments
- On-board device programming
- Automated Optical Inspection (AOI)
- Advanced fault coverage report generator
- Statistical Process Control (SPC)
- Panelized board test
- Fixed stationary probes
- Advanced Fiducial Recognition system
- Barcode reader system
- Board Marking System
- SMEMA compatible operation
- Best value and quick return on investment

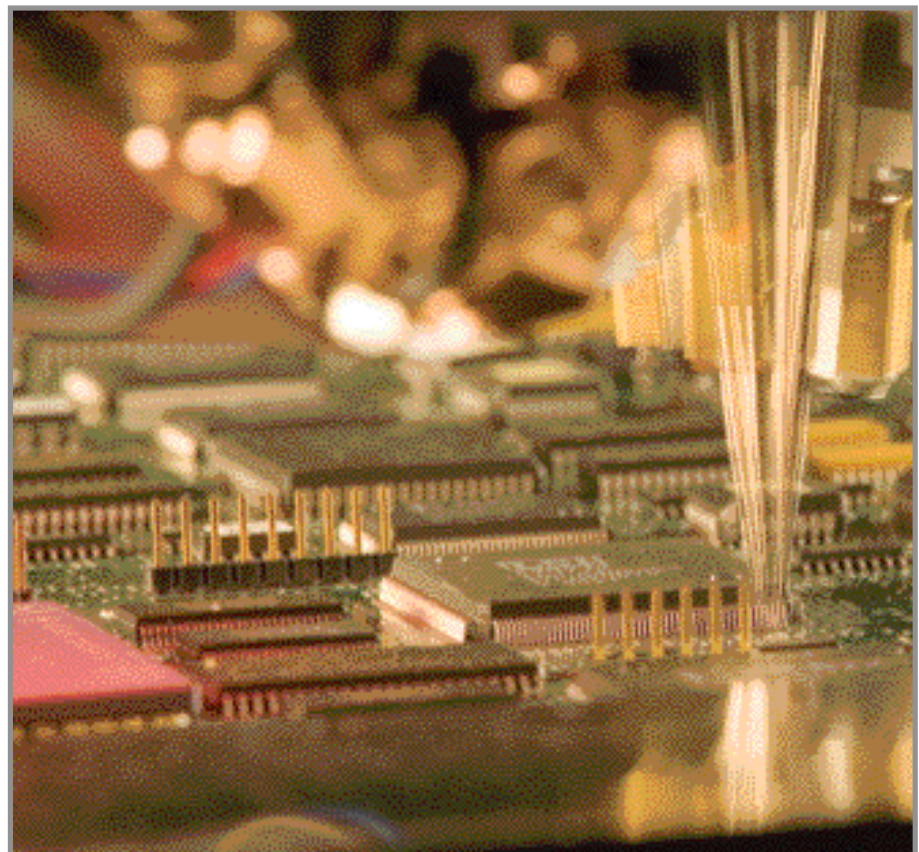
## PRACTICAL INNOVATIONS IN FLYING PROBE TEST TECHNOLOGY

There are many challenges in building densely populated electronic circuit boards. Maintaining high quality, keeping low volume production costs under control, and meeting aggressive time schedules force manufacturers to adopt lean yet effective test and quality assurance measures in their production processes.

Flying probe testers have few restrictions on access, require no test fixtures, and can test boards with virtually unlimited number of nets, allowing test developers to turn a program around in a short time. For these reasons and more, flying probe testers have become indispensable tools in today's electronic manufacturing systems.

Operating in hundreds of plants across the world, the Sprint 4510 has been selected by original equipment manufacturers (OEMs) and electronic manufacturing service (EMS) companies alike to meet their most demanding operational requirements.

Sprint 4510 is a fourth generation flying probe tester. New capabilities and features have been designed in to tackle the next generation of test and QA challenges in electronic manufacturing.



## ADVANCED MACHINE ARCHITECTURE AT THE FOUNDATION OF SPRINT 4510

Surface linear motor systems with freedom of movement in X and Y directions provide the most advanced architecture for flying probe testers. Sprint's mono-planar head arrangement allows four identical probes to contact target boards with high precision and at an optimal probing angle. Precise surface linear motors independently move the four, equal-length, equal angle probes on the same plane over the unit-under-test (UUT). A precisely controlled air gap separates motors from platens, thus providing true wear-free operation. Similar to stepper motors, linear platen motors require no feedback and operate with precision. All probes have equal geographic accessibility to the board. Better fault coverage is obtained through increased flexibility in probe usage.

An automatically adjusting printed circuit board conveyor securely aligns and clamps boards in place. A fiducial camera confirms and automatically adjusts head motion for board alignment errors.



## BOUNDARY SCAN ON SPRINT 4510 FLYING PROBE TESTER

Boundary Scan test (JTAG) is a test methodology based on IEEE 1149.1 standard. Compliant Semiconductors, when installed on a circuit board, allow the interconnecting nets and digital clusters such as memory devices to be tested using a simple external physical set-up. Boundary Scan (JTAG) also offers a comprehensive board-level protocol for programming flash and other programmable devices.

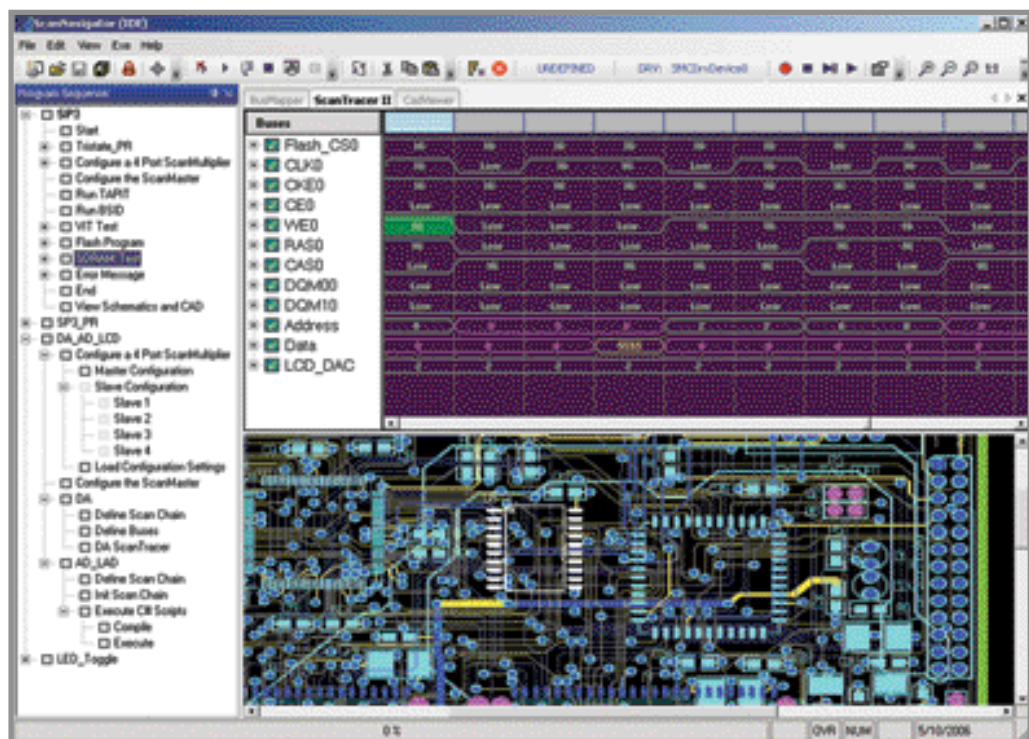
Integration of boundary scan test into the flying probe environment translates into important advantages;

- Dramatic increase in test coverage by combined use of flying probe and boundary scan resources
- More efficient shorts test using flying probes and higher throughput
- Reusable Boundary Scan test patterns

### Boundary Scan Features on Sprint 4510

- Standard dual Boundary Scan ports
- Factory integrated high-speed boundary scan controller with fully programmable TCK and drive levels
- Standard Digital I/O lines
- Optional additional boundary scan controlled digital I/Os
- Boundary scan infra-structure test
- Interconnect test, digital and analog cluster test, memory test
- Flash and in-system device programming (ISP)
- Intelligent graphical diagnostics

*Boundary Scan  
Graphical Test  
Development  
Interface*



## ADVANCED FUNCTION TEST SYSTEM (AFTS)

Advanced Function Test expands the capabilities of the Sprint 4510 beyond basic manufacturing process test. External commercially available instruments integrate directly with the Sprint 4510 and signal lines are routed to fixed or flying probes through software control.

Each instrument's graphical user interface (GUI) provides an intuitive representation of the instrument controls and functions. Configuring instruments for a measurement is as simple as setting the dials. Once the parameters for a particular measurement are configured, program steps within the Sprint 4510 environment flow seamlessly. Instrument drivers are based on Interchangeable Virtual Instrument (IVI) protocols thus allowing easy and fast instrument replacement.

### AFTS Features:

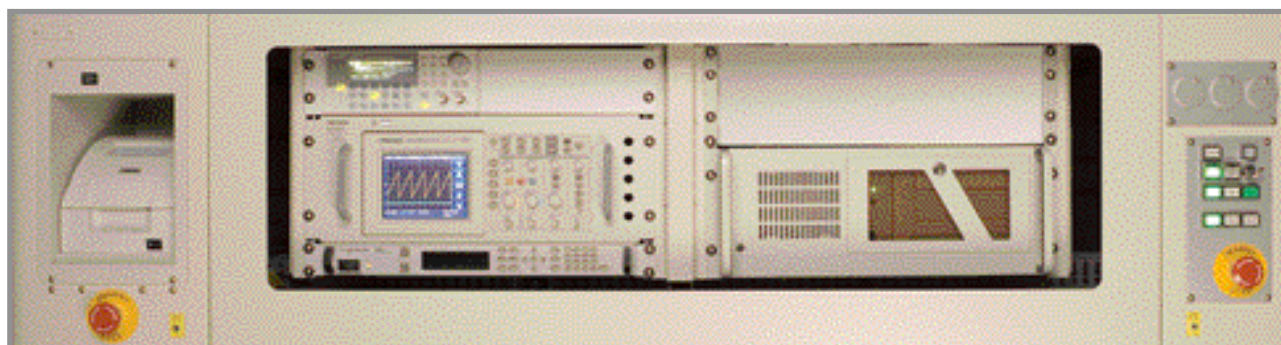
- Dual Instrument Rack - 19 inch
- Support for PCI, PXI, GPIB and USB2.0 programmable instruments
- Precision low noise auto-ranging modular power supplies
  - Standard support for up to 4 user power supplies, expandable as required
  - Voltage ranges of 5V to 60V and current ranges of 1A to 20A per power supply
  - Series/parallel wiring of power supplies provides up-to 240V or 80A
  - 25 different power supply modules to choose from
  - Quick replacement of power supply units
  - Full programmability from power supply GUI or Sprint 4510 software environment
- Digital Storage Scope - 100 MHz, 1 GS/s, programmable from Sprint 4510 GUI and instrument front panel
- Arbitrary Waveform Generator - 20 MHz, programmable from Sprint 4510 GUI and instrument front panel
- Test resources routed to Flying and Stationary probes
- Vision controlled fixed probe placement
- Power-on mixed signal testing
- IVI drivers and technical support for user selected instruments



Signal Generator User Interface



Oscilloscope User Interface

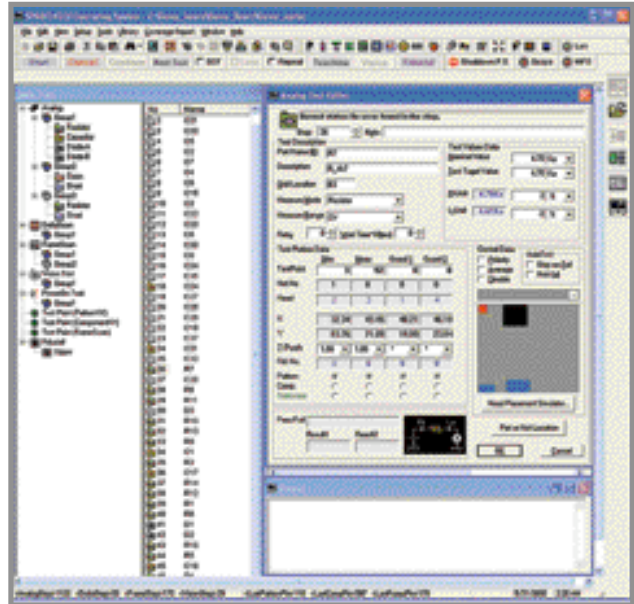


Rack Mounted Instruments And Power Supply



### Test Debug Tools:

- Powerful intuitive debugging environment
- Changeable measurement mode
- Stop-on fail, repeat, and loop
- Measure and stimulus swapping
- Measurement delay setting
- Global and step specific probe setup
- Graphical topology navigator



Detailed Drill-down Test Coverage Report

Section II: Summary of Test Coverage						
Category	Tested Devices	Untested Devices	Device Coverage%	Tested Pins	Untested Pins	Pin Coverage%
MEMORIAL	0	0	-	0	0	-
DEVELOPING CIRCUIT	36	0	100.00	578	185	75.75
TRANSISTOR	63	0	100.00	279	0	100.00
DIODE	35	0	100.00	85	0	100.00
RESISTOR	4	0	100.00	9	1	88.89
LED	0	0	100.00	13	2	86.87
CONNECTOR	125	0	100.00	430	0	100.00
SENSOR	289	14	95.36	812	30	95.33
SENSOR MEMORY	8	0	100.00	64	0	100.00
FUSE	23	1	95.75	30	2	93.75
CHIPS	6	0	100.00	12	4	75.00
CONTROL	2	0	100.00	8	0	100.00
TRAP	41	1	97.62	82	2	97.62
CONNECTION	38	14	56.25	242	167	64.94
PROBES	0	0	-	0	0	-
LEADS	1	1	50.00	2	2	50.00
Image Scan	120	8	93.33	1434	478	75.00
Data Scan	34	0	100.00	535	225	71.39
Visual Test	0	0	-	0	0	-
** Boundary Scan						
** APTS						
<b>Total</b>	<b>740</b>	<b>31</b>	<b>95.59</b>	<b>5116</b>	<b>1098</b>	<b>78.73</b>

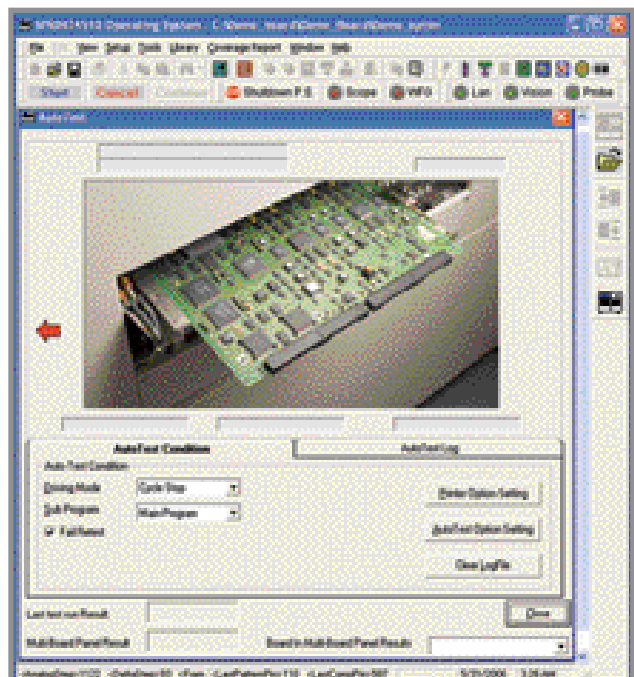
### Test Coverage Reporter:

- Generates a comprehensive coverage report
- Partitions the coverage report by device types and test methods
- Drill downs reporting from category to device to device pin
- Integrates top and bottom side test coverage
- Accumulates and logs measurement data

Production Test Operator Interface

### Production Test Software:

- Password protected user administration
- Flexible data collection and log files
- Statistical Process Control Tools
- Bar Code reader
- Board Marking System
- Graphical Repair station software
- Multicolor ticket printer



## SpeedPlus™

SpeedPlus testing is a method of reducing test times by engaging bottom side fixed position probes when performing analog tests. The use of up to 9 fixed probes on the bottom side of the UUT allows the software step optimizer to sequence tests in an order that will provide maximum testing in each movement.

## Motion Optimizer

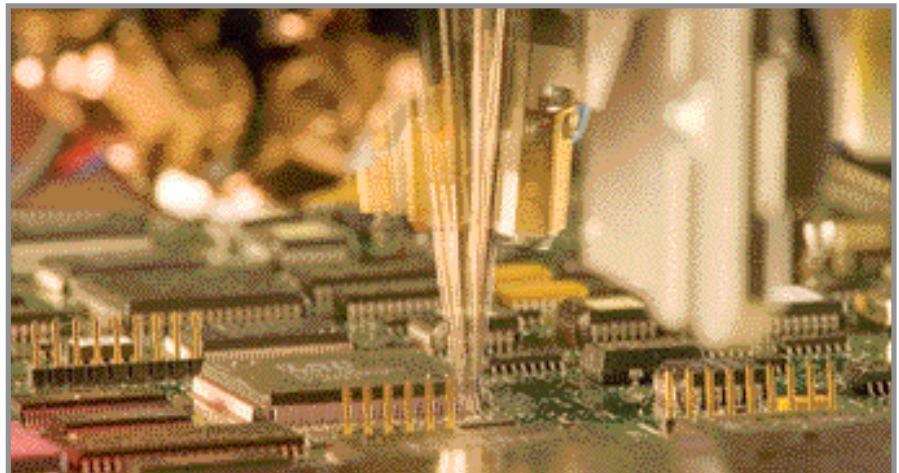
Sprint's Motion Optimizer gives the programmer the ability to sort tests into logical groups for debugging, then resort the steps to a production ready lean runtime format. The Sprint4510 with its Tandem Test Mode (TTM) enable the machine to perform up to six measurements with one movement of the 4 flying probes. With the addition of SpeedPlus and bottom side probing this number increases by four with every additional fixed probe such that by adding nine fixed probes the tester can effectively test up to 42 steps with only one movement.

## Open-Pin-Detect

Acculogic Open-Pin-Detect (OPD) toolset for power-off “**Vectorless**” detection of open pins on digital and mixed-signal devices is an important test capability. OPD provides fast programming and comprehensive manufacturing process fault coverage.

**D-Scan** and **C-Scan** Vectorless tests extend fault coverage to any IC, including BGAs and ICs with heat sinks, as well as connectors and polarized capacitors. D-Scan, which is available on any combination of Flying and Fixed probes, uses protection (parasitic) diodes built into many devices to test failing pins. One stationary probe is required per power supply node.

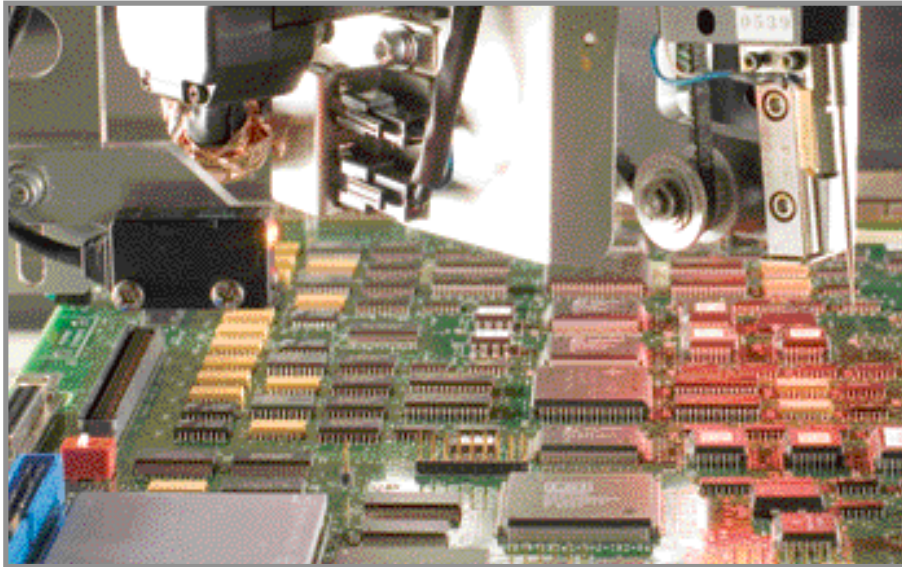
C-Scan is available on all four Flying heads and uses a capacitive coupling technique to check for open pins on ICs with no protection diodes. It can be used to check for opens on connectors and orientation of polarized capacitors. Each C-Scan probe assembly includes one retractable capacitive sensor.





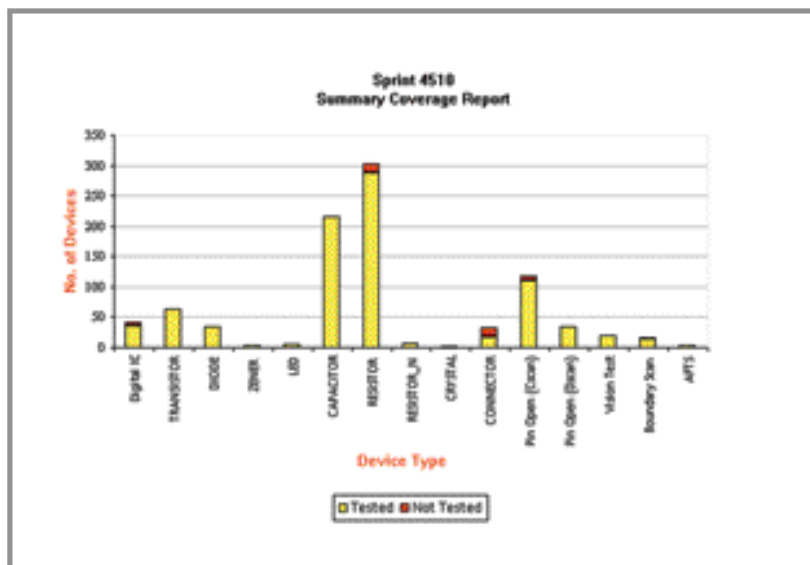
## Automatic Optical Inspection (AOI)

Vision test automatically inspects for presence, absence, and orientation of ICs, bypass capacitors, and components that are not electrically testable. Vision test is fully integrated with the Sprint 4510 APG and enhances overall fault coverage.



## Comprehensive Fault Coverage Reporting

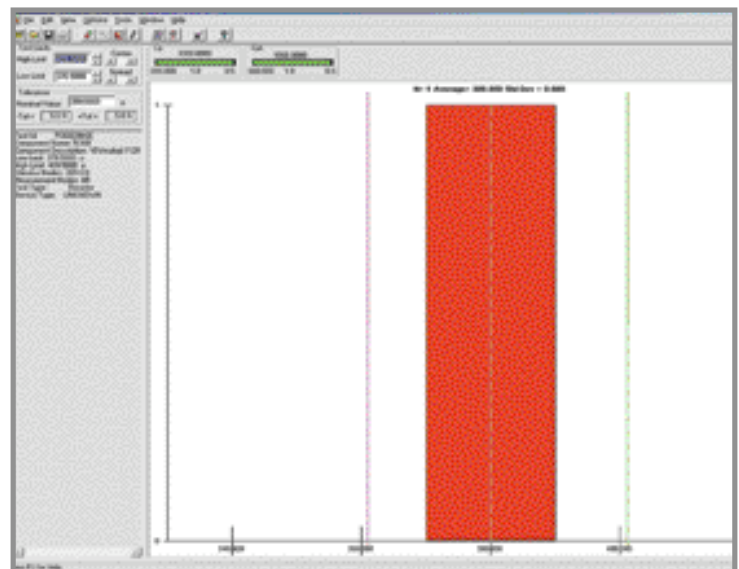
Sprint 4510 Fault Coverage Reporter automatically analyses board topology and the test program, and reports on the effectiveness of the test. Reports are compatible with Microsoft Excel format for further analysis and presentation. The coverage report starts with a summary by component type, test technique and status of test. The drill down capability allows users to examine each device on a pin-by-pin basis, thus providing a full view of the overall program fault coverage.



## StatManagerSPC™ Statistical Process Control Software

StatManagerSPC software is a powerful statistical process control (SPC) tool that analyzes and identifies variations in test results due to variations in process environment. Using a series of measurements made repeatedly on a single board or on batches of production boards, developers are able to identify measurements that are least stable. They can then examine these measurements for root causes of instability and then alleviate these causes. StatManagerSPC allows developers to analyze test variance due to noise, component variation, drift, and system variance. Test limits can be updated automatically under user control to obtain solid production-ready tests.

Test Id	Test Limits	Mean	Standard Deviation by source of var (Component)
TestPwr1[1F]0	[196.0000, 40800.0000] PS	2144.26	2144.26
TestPwr2[2F]0	[0.4000000, 40800.0000] PS	12.3011	12.3011
TestPwr3[3F]0	[201.0000, 40800.0000] PS	101.2004	101.2004
TestPwr4[4F]0	[0.11950000, 40800.0000] PS	1.21055	1.21055
TestPwr5[5F]0	[2764.0000, 40800.0000] PS	60.9690	60.9690
TestPwr6[6F]0	[862.0000, 40800.0000] PS	6.1398	6.1398
TestPwr7[7F]0	[2294.0000, 40800.0000] PS	27.9942	27.9942
TestPwr8[8F]0	[0.0250000, 40800.0000] PS	7.9571	7.9571
TestPwr9[9F]0	[2149.0000, 40800.0000] PS	72.7603	72.7603
TestPwr10[10F]0	[0.1750000, 40800.0000] PS	6.7950	6.7950
TestPwr11[11F]0	[2496.0000, 40800.0000] PS	22.0325	22.0325
TestPwr12[12F]0	[2746.0000, 40800.0000] PS	127.8926	127.8926
TestPwr13[13F]0	[2634.0000, 40800.0000] PS	39.8034	39.8034
TestPwr14[14F]0	[0.11510000, 40800.0000] PS	6.3676	6.3676
TestPwr15[15F]0	[2640.0000, 40800.0000] PS	274.2472	274.2472
TestPwr16[16F]0	[0.0300000, 40800.0000] PS	12.9299	12.9299
TestPwr17[17F]0	[0.4950000, 40800.0000] PS	6.9407	6.9407
TestPwr18[18F]0	[0.0640000, 40800.0000] PS	363.4956	363.4956
TestPwr19[19F]0	[0.1405000, 40800.0000] PS	9.0079	9.0079
TestPwr20[20F]0	[0.4820000, 40800.0000] PS	19.5243	19.5243
TestPwr21[21F]0	[0.4110000, 40800.0000] PS	19.1020	19.1020
TestPwr22[22F]0	[0.4360000, 40800.0000] PS	10.0064	10.0064



## GENERAL SPECIFICATIONS:

### System Dimensions

- 1690 mm (width) x 1430 mm (depth) x 1670 mm (height)
- 66 inches (width) x 56.3 inches (depth) x 65 inches (height)

### Weight

- 1100 kg (2420lbs)

### Options:

#### Open-Pin-Detect vectorless tool suite

- C-Scan with four sensors
- D-Scan all heads

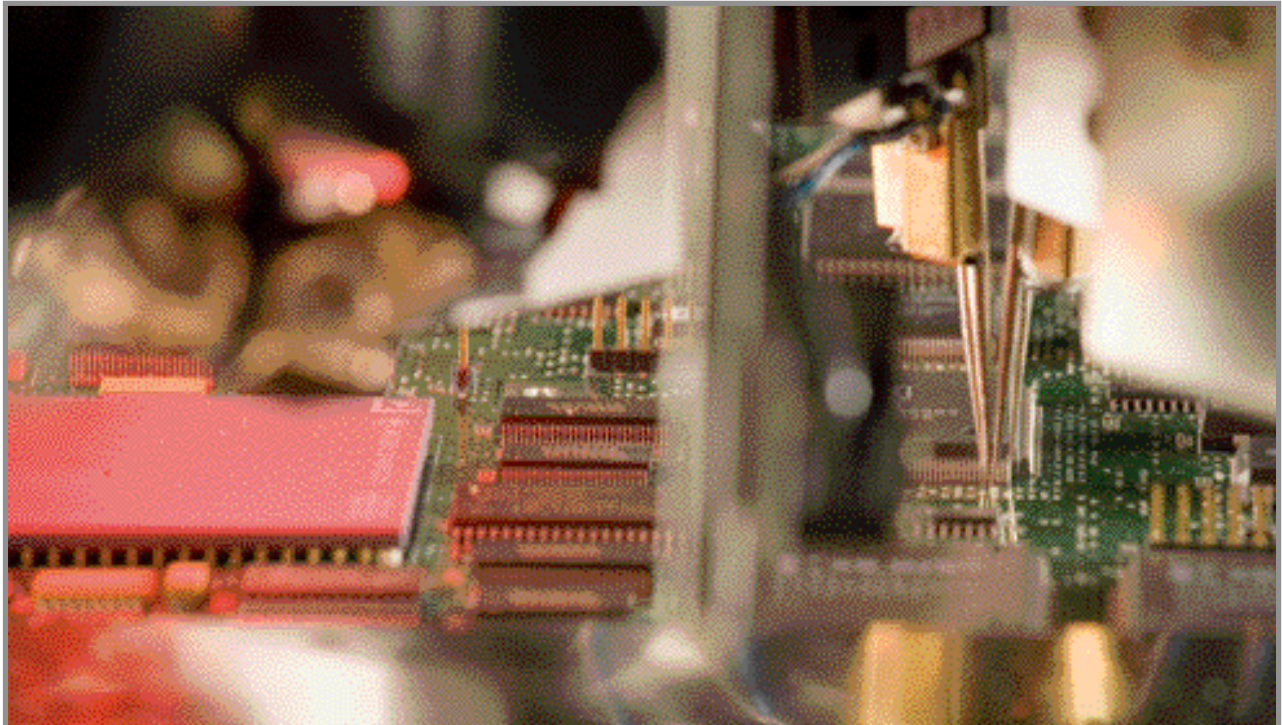
#### Vision Test:

- Test for orientation, missing, wrong component
- User graphic device library

#### Power-up Testing

- Boundary Scan Test and Device Programming (two ports)
- Advance Function Test System (AFTS)
- Timer Counter and Function Generator

**Full System Specifications Available at request. Specifications are continuously improved and updated, contact your local sales channel for a complete specification.**





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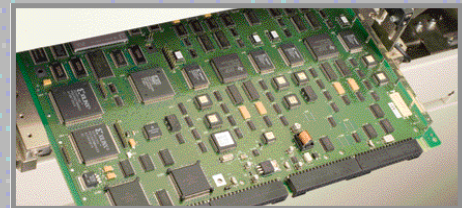
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**ISO 9001: 2000 REGISTERED COMPANY**

- Mixed Signal Flying Probe Systems
- Boundary Scan (JTAG)
- In-Circuit Test
- Automated Optical Inspection
- Application Specific Functional Test
- Quality Management Software
- Application Development Services
- Training Services



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