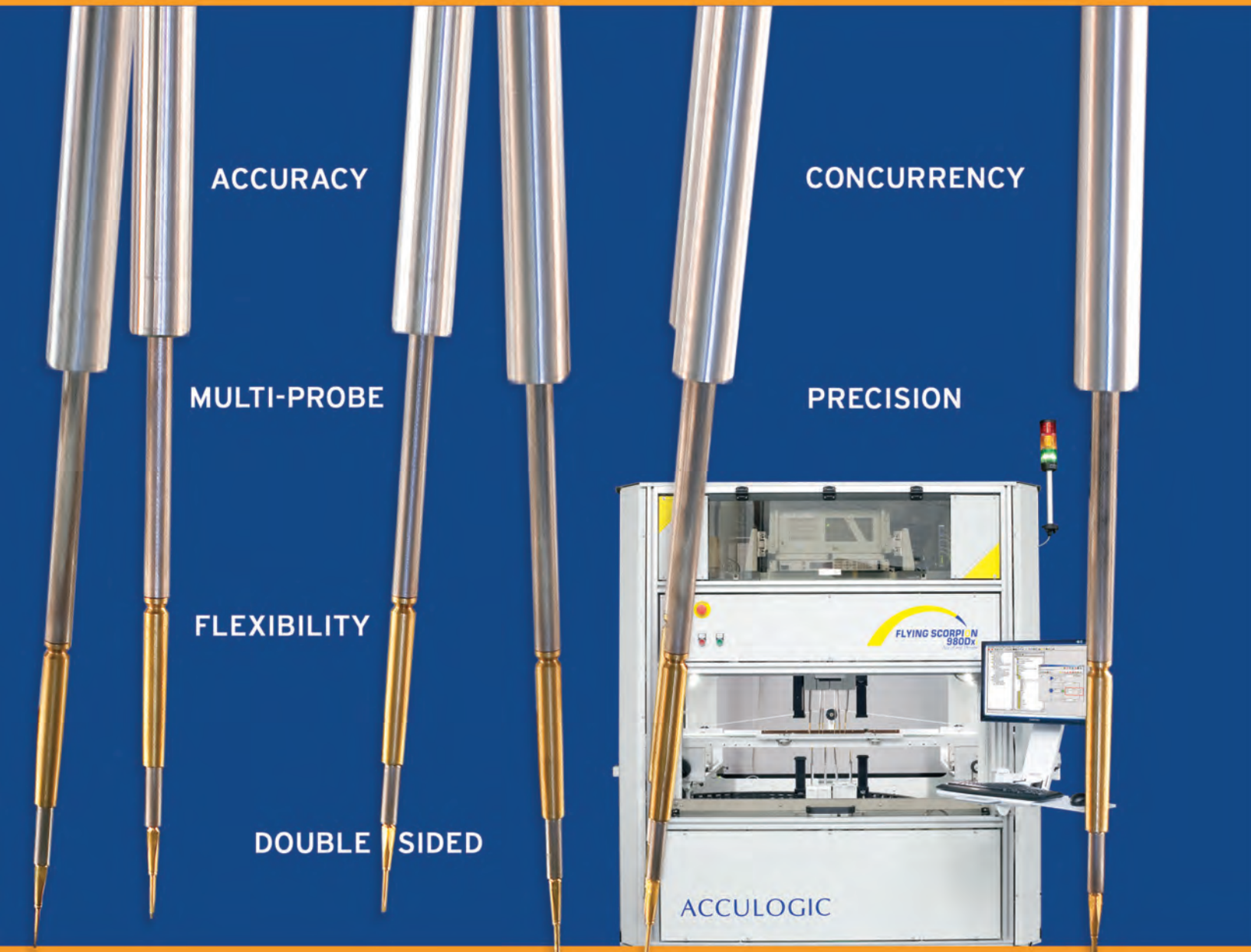
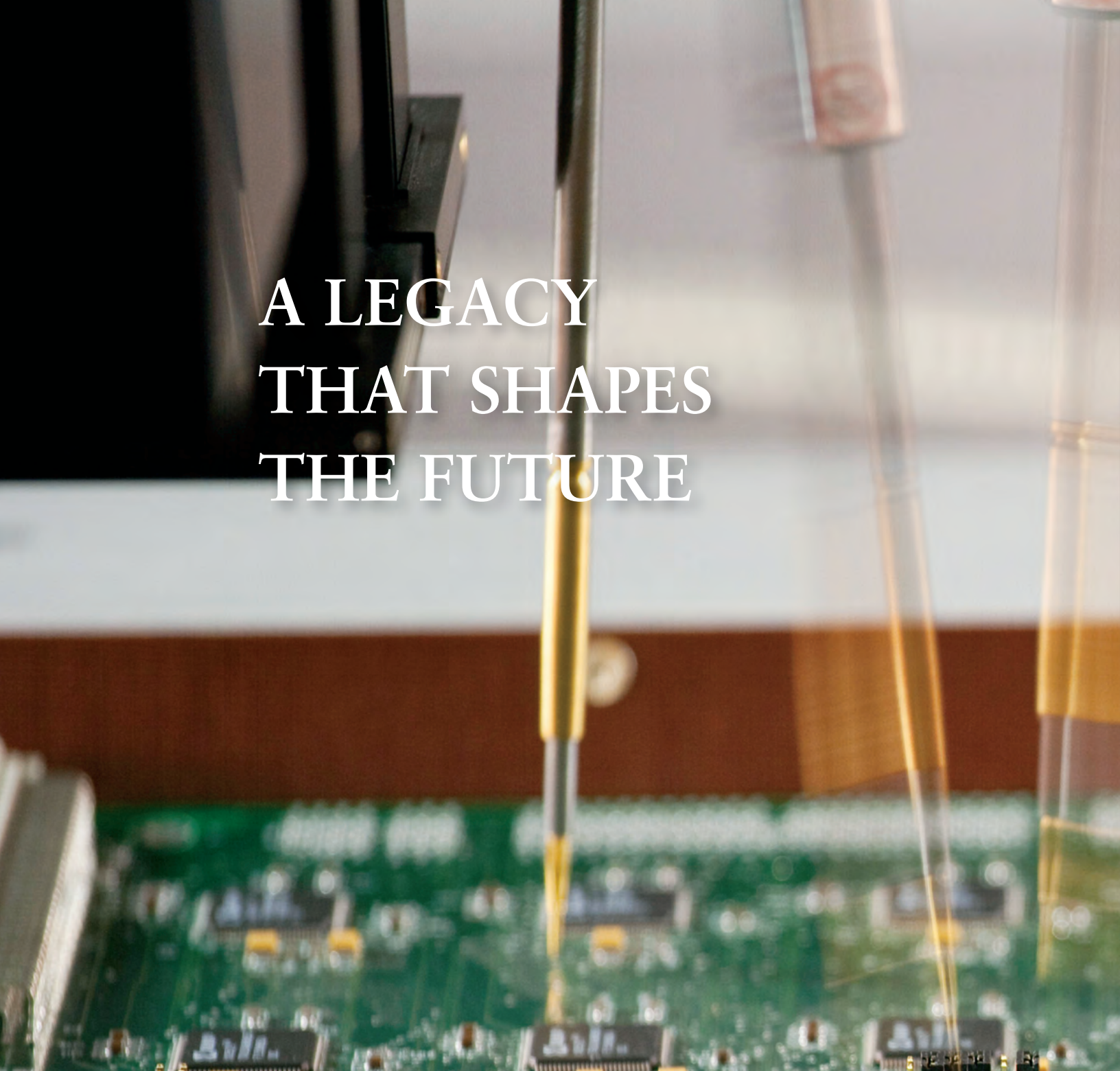


ACCULOGIC

Let's Test

THE NEW FLS980 SERIES III

THE ULTIMATE PROBING MACHINE



A LEGACY THAT SHAPES THE FUTURE

ACCULOGIC'S TESTERS ARE BUILT FOR TOMORROW.

Our flagship products, the FLS980 Series of Flying Probe testers, ICT7000™ In-circuit tester and ScanNavigator™ Boundary Scan test suite, help ensure that tomorrow's technologies don't outpace today's test capabilities. These products are highly advanced, scalable solutions made to solve a wide range of test challenges.

Acculogic's systems are made to accommodate a variety of applications and customers. At the core of our high-performance test systems lay the technologies needed to counteract next-generation test challenges.

THE ULTIMATE PROBING MACHINE

Tight quality control measures together with *time to market* pressures are compelling manufacturing companies to choose effective yet lean test and quality assurance strategies in their production processes. Flying probe test systems require no test fixturing, have few restrictions on board access, and can test boards with virtually unlimited number of nets. These systems also allow developers to complete test programs in a short time. For these reasons and more, flying probe testers have become indispensable tools in today's electronic manufacturing.

Application of new and innovative design features to increase test speed, board access, reliability, and repeatability, have opened up new possibilities for deployment of Acculogic's FLS980 series testers. As the first patented flying prober with **double sided** testing and **22 interchangeable** probe modules, the FLS980 is leading the way in defining new leaner and more efficient deployment models for production environments.

Four generations of our Flying Probe testers have been selected by original equipment manufacturers (OEMs) and electronic manufacturing service (EMS) companies across the world to meet their most demanding technological and operational requirements.

FLS980 Series III Features:

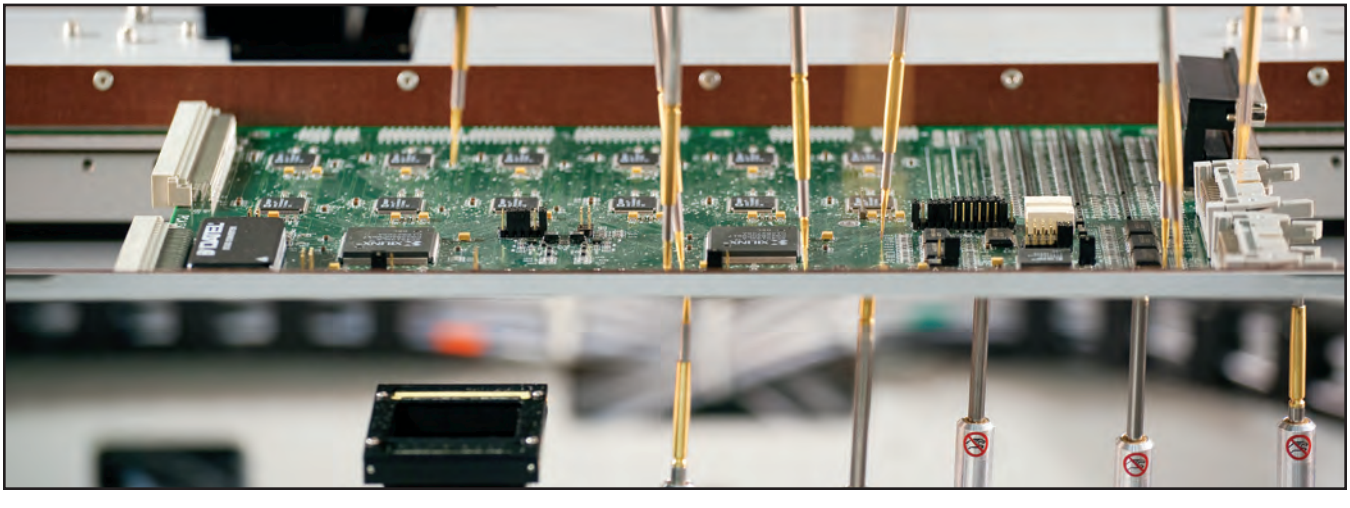
- Full Function Double Sided System
- Closed Loop AccuFast™ Drive System with ±0.1 Micron resolution
- Configurable with up-to 22 Closed Loop Flying Probes
- Programmable probe angle +6° to -6° degrees
- Extensive electrical Test capabilities including Analog, Digital, Mixed Signal and Boundary Scan
- Advanced Laser, Optical and Thermal measurement and inspection capabilities
- Power-on and advance function testing (up-to GHz range)
- Up-to 128 non-Mux test channels through fixed nails
- TraceScan™ Latent Open Detection
- REScan™ Reverse Engineering Tool kit
- Support for largest boards up-to 32"x 38" (813 x 965 mm)

ACCESS

Shrinking component sizes and denser chip scale packaging technologies are posing new challenges to test engineers. Test pads, traditionally installed on PCBs, are being eliminated from many designs thus reducing physical test access. Flying Probers are required to operate with unprecedented precision in order to meet the new challenges. FLS980 uses highly repeatable closed loop linear motor drives and joystick-like variable angle probe modules to maximize physical access and guarantee repeatable probing of fine pitch devices and **small components like 01005s**. FLS980 offers double sided probing and up to 22 probe modules on the component and solder side of the Unit Under Test (UUT) to facilitate efficient single pass testing.

ACCURACY

High resolution fiducial cameras and laser based warp profiling allow for precise board detection in the X, Y and Z planes across the testable board area. Precise Closed Loop planar linear motors (shuttles) with "AccuFast™ Drive System" (±0.1 micron positioning resolution) independently move probe modules and cameras. The probe modules utilize equal-length identical probes to contact target points on the UUT. Each variable angle probe module is able to automatically adjust its' probing angle from 0º to 6º from vertical in any direction. Combining separate shuttle and probe module (XYZ) motion ensures unmatched accessibility to test points on the UUT. You can now rely on FLS980 to test boards whose layout, size or technology encumber traditional in-circuit testers and other flying probes.

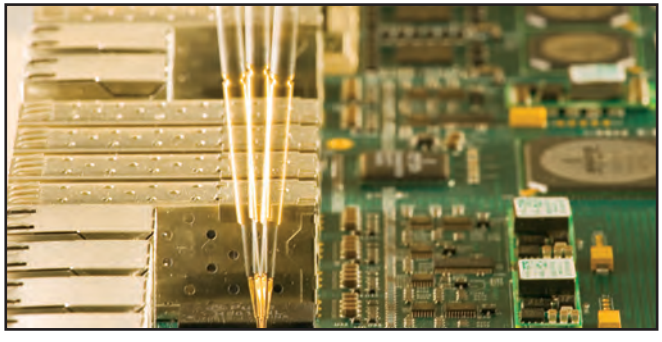


FLS980 System architecture ensures repeatability:

- Closed Loop Drives for shuttles and probe modules ensure precise and repeatable positioning of the probes.
- Riding on 20 micron air gap, shuttles travel free of friction and with no mechanical contact on the stator plane and therefore operate free of wear.
- High resolution fiducial detection cameras, precise lighting, and advanced image processing software ensure precise and repeatable detection of fiducial marks on the UUT as well as correct compensation for any offsets.
- LaserScan profiles board warpage.
- Electronic measurement system relies on precision circuits and components for reliable and repeatable measurements.
- **Integrator**™ system control software with sophisticated motion control and measurement algorithms ensures robust and repeatable operation.

PROBING ANGLE

Warpage of printed circuit boards is a common issue that should be taken into account in SMT board assembly, inspection and test processes. During Flying Probe test, board warp changes the physical position of target points by an offset.



When probing angle is 0 degrees from vertical, board warp will cause no probing errors, however, as the probing angle increases, the probing error also increases. Standard pads for a 0201 chip on a board with 0.5 mm warp using 15 degree probing angle cannot be probed dependably. Decreasing probing angle to 3 or 4 degrees reduces warp related uncertainty, and leads to reliable probing. Offering optimum probing, FLS980's variable angle probe modules rely on a patented design to tilt from -6 degrees to +6 degrees, in any direction and probe targeted test points, covering an area of approximately 60mm x 60mm on the UUT. As probing angle increases, the probe slippage increases. Probe slippage can damage pads and vias and leave unacceptable marks on the board.

PROBING AT MORE THAN 6 DEGREE ANGLE COULD MISS THE TARGET!

PROBE MODULE TYPES:

FLS980 systems can be configured with up-to 22 Probe Modules on top and bottom side to ensure maximum test coverage and minimal test time. There are three types of probe modules available for the system:

- APM 800 **Advanced Probe Module** with programmable angle (0 to +6°)
- BPM 700 **Basic Probe Module** with fixed angle (+6°)
- VPM 600 **Vertical** (+0°) **Probe Module**

System can be configured with mix of the variable and fixed angle probe modules.

The flying probe drive systems have a positioning resolution of 0.1 micron and repeatability of +/- 10 microns which provides reliable probing of target sizes as small as 100 microns (4mils) in a production environment. Acculogic continues to develop higher precision probe modules and cameras as future upgrades.

Probe Module Specifications:

- 3D Programmable Angle : 0° to 6°
  (+6° for fixed angle probes)
- Programmable Speed
- Choice of Probe Tip Radius: 50 µm – 500 µm
- Choice of Probe Tip Styles: Needle, cup, dome
- Max Probing Height: 45mm
- Maximum Component Height: 85mm

BPM 700

SPEED

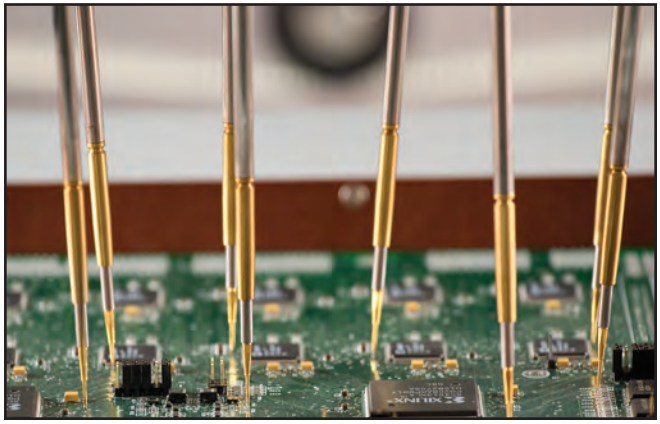
Test time on Flying Probe depends mainly on the number of test steps and speed of probe movement. Shorts Test consume a large part of overall test time. FLS980's flexible measurement system provides a host of test strategies including Boundary Scan (JTAG) and NetScan™ to significantly reduce test time without impacting test coverage or repeatability.

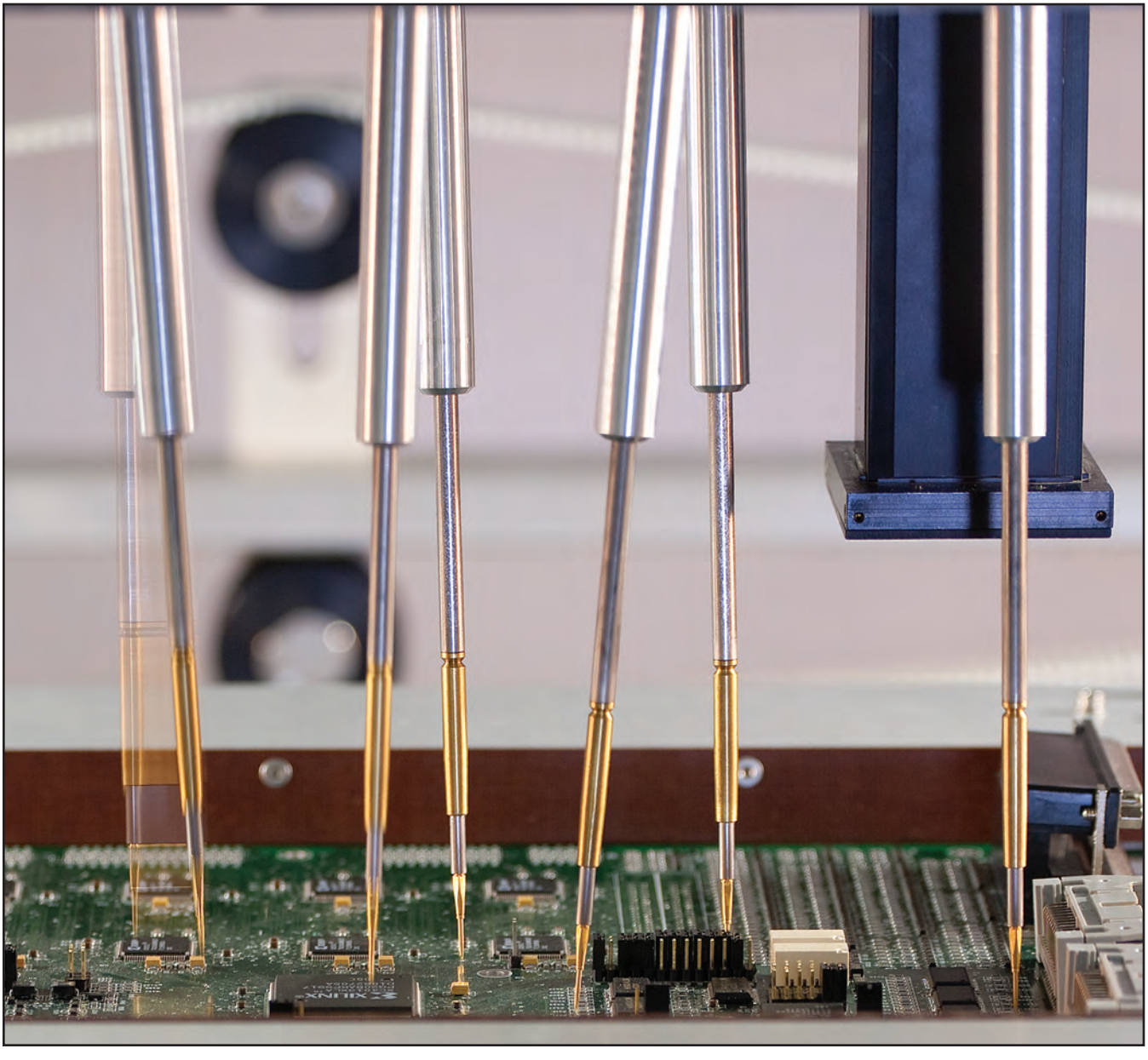
Key Features of AccuFast Drive System™

- Significantly faster than open loop systems (4x)
- High acceleration (4x)
- Enhanced probing accuracy
- Three times better dynamic response
  +/- 1 degree rotation
- Automatic orthogonality between X and Y axis
- Sensorless homing (no adjustments)
- DSP based motor controller
- Built-in linear and parabolic interpolation
  (more efficient shuttle movements)
- Low energy usage (50% reduction)

PATENTED MULTI-PROBE SYSTEM

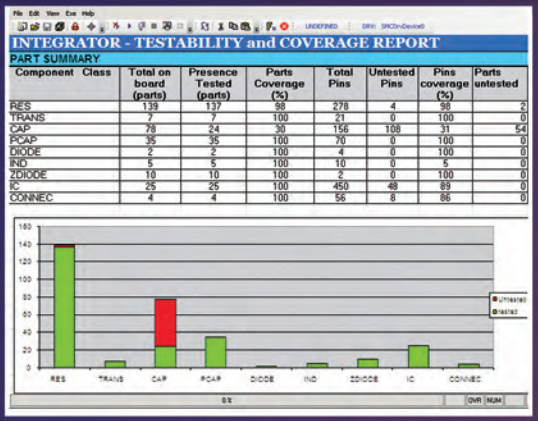
The FLS980 has a modular architecture that is expandable to 22 probes. Probe modules have easily interchangeable low cost probe tips. A range of probe tip styles are available off the shelf. In addition to providing excellent test coverage on densely populated circuit boards, this flexibility makes the FLS980 an ideal solution for testing backplanes and Test Interface Boards (TIU) where direct contact with connector pin tips is required. FLS980 systems can be configured with Acculogic's patented Flying Fixture which provides the functionality of a small bed-of-nail access in the flying probe system, i.e. "Flying Fixture". This customizable Probe Module can be used for functional testing, digital testing, boundary scan (JTAG) testing and more. Its low cost and flexibility makes Flying Fixture an indispensible addition to the system.





THE NEW FLYING SCORPION FLS980 SERIES III

THE ULTIMATE PROBING MACHINE

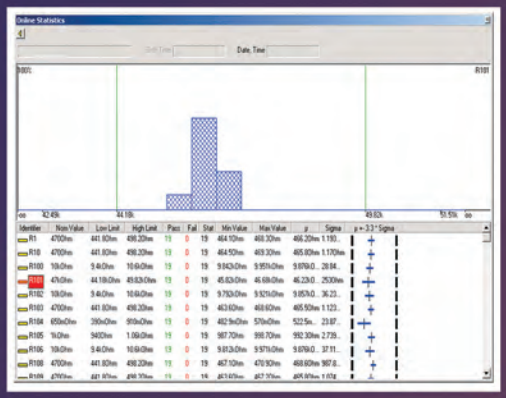


INTEGRATOR - TESTABILITY and COVERAGE REPORT

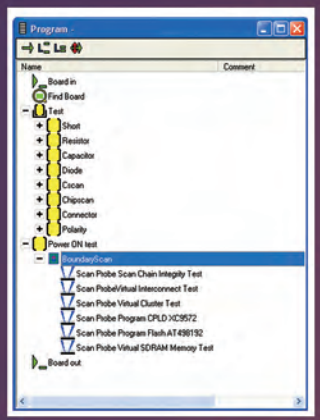
PART SUMMARY

Component Class	Total on board (parts)	Presence Tested (parts)	Parts Coverage (%)	Total Pins	Untested Pins	Pins coverage (%)	Parts untested
RES	139	137	98	278	4	98	2
TRANS	7	7	100	21	0	100	0
CAP	78	24	30	156	108	31	54
PCAP	35	35	100	70	0	100	0
DIODE	2	2	100	4	0	100	0
IND	5	5	100	10	0	5	0
ZDIODE	10	10	100	2	0	100	0
IC	25	25	100	450	48	89	0
CONNEC	4	4	100	56	8	86	0

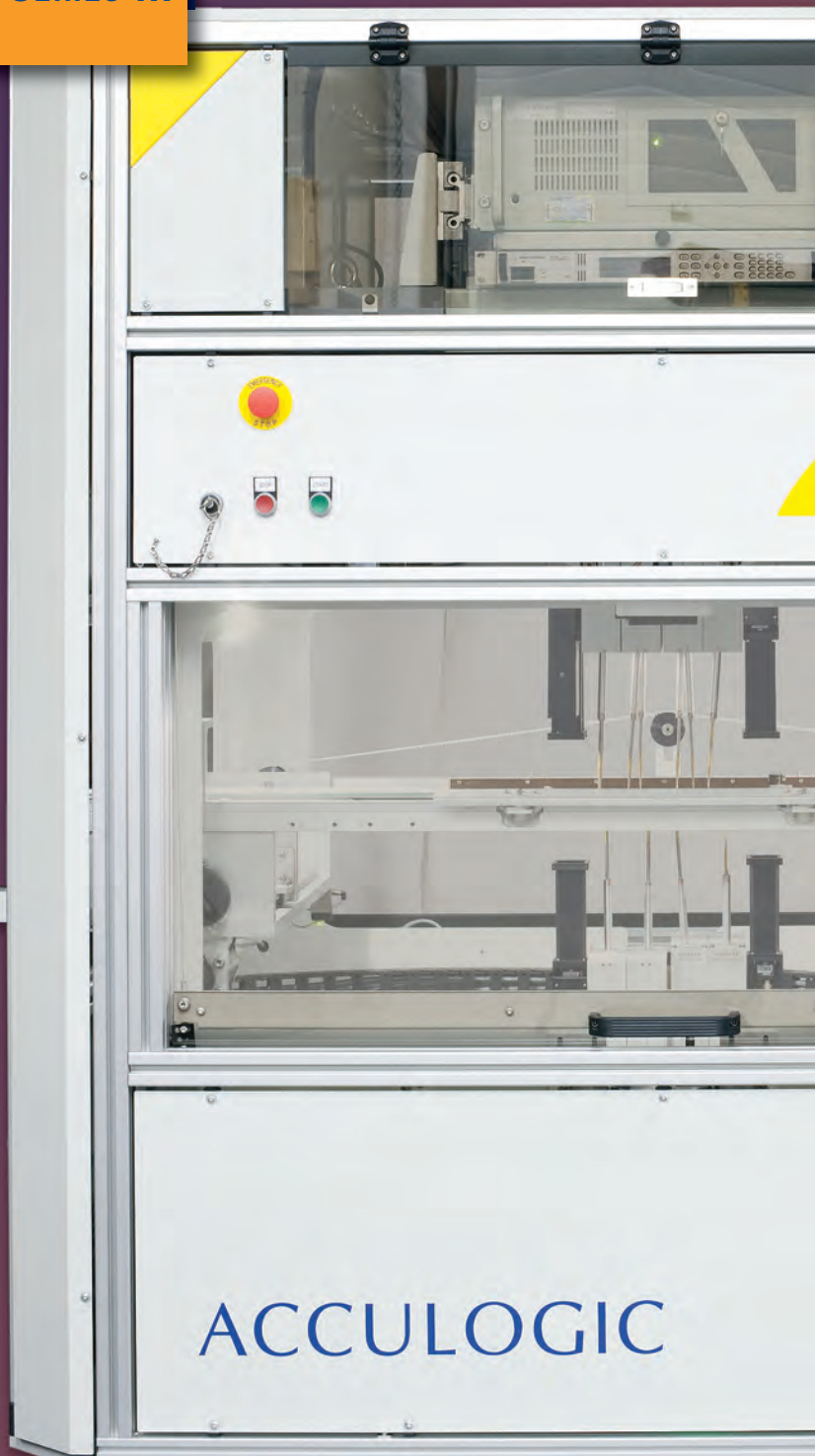
Test Coverage Report Generator (MS Excel)

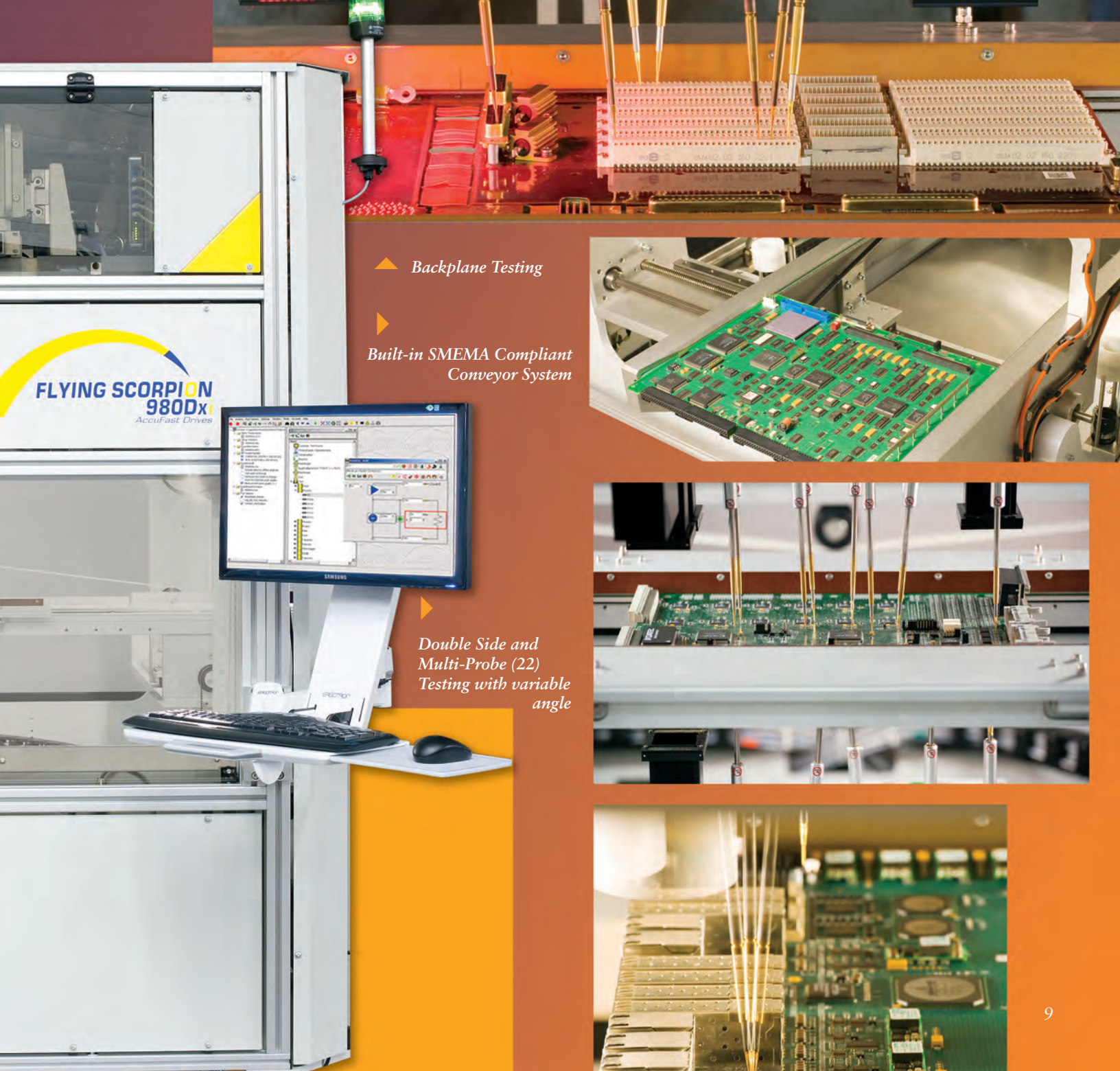


Statistics Report



Graphical Programming Environment Program Flow Control





Backplane Testing

Built-in SMEMA Compliant Conveyor System

Double Side and Multi-Probe (22) Testing with variable angle

MEASUREMENT SYSTEM

FLS980's high speed (up-to 1000 measurements/sec) analog measurement system provides 4-wire measurements capability on all 22 flying probes (top and bottom side). All probes can perform in-circuit tests as drivers, sensors, or guards on discrete and integrated analog/digital components. Analog component testing including resistors, capacitors, inductors, diodes, zeners, transistors, FETS, thyristors, opto-couplers, switches, trimmers, relays, fuses and connectors are standard on the FLS980. Test modes include 2-wire, 4-wire tests (and the unique Quasi-4 Wire measurement using Only two test points). Device ON and OFF tests using two sets of separately available stimulus/measurement resources. Also, power-on testing for voltage regulators and operational amplifiers are possible using the voltage measurement module.

SYSTEM SOFTWARE

Integrator™ Features:

- Automatic program generation software
- Built-in Boundary Scan (JTAG)
- Automatic multi-level guard assignment
- QuickTest™ for quick test program development
- Auto-debug (unattended)
- Test Sequence with logical flow control
- Interactive board description editor
  add/modify test points, package etc.
- Panelization support
- Program and motion optimization
- Powerful Script language for functional and advance testing
- Test coverage report generation
- Statistical Process Control (SPC)
- **RepairMatic™** graphical repair station software

Test program generation for FLS980-series testers is highly automated, simple and intuitive. The process starts by using the XMatic™ CAD software to translate PCB data from any of the 35-plus commonly used CAD formats. CAD data is then merged with the Bill of Materials, and other relevant information to create an output file that contains data elements required to automatically generate test programs.

Integrator™ is the automatic test program generator (ATPG) and operating software that manages all aspects of test program sequencing, debugging, optimizing, and execution on the Flying Scorpion. The Integrator software also manages all physical resources of the tester, including motion, vision, electrical stimulus and measurement. Integrator supports many different plug-in modules such as Boundary Scan, BodeScan and FlashScan etc., which enhance test coverage and increase execution speed. An easy-to-use scripting language opens up internal resources of the tester, providing users with maximum flexibility to write complex test protocols with simultaneous use of multiple probe modules. The Integrator is also equipped with an impressive set

of tools for statistical process control, test execution flow management, and test coverage report generation. Interfaces to automatic repair processes and automatic test program management (version control) are available.

OPTIONS:

BodeScan™ is a unique built in network analyzer that enables testing of low value resistors, capacitors, and inductors in complex networks.

PinScan™ for Vectorless Open Pin Detection Suite

PinScan is a complimentary suite of patented analog and digital test techniques for detecting Opens on ICs pins, including BGAs, as well as connectors and polarized capacitors.

- **CScan™** is a patented technique used in vectorless testing (power off) that use leadframe for Opens detection. CScan is used to test open pins as well as the polarity of electrolytic capacitors. CScan functionality detects open pins on devices and connectors located on the top and/or bottom side of the board.

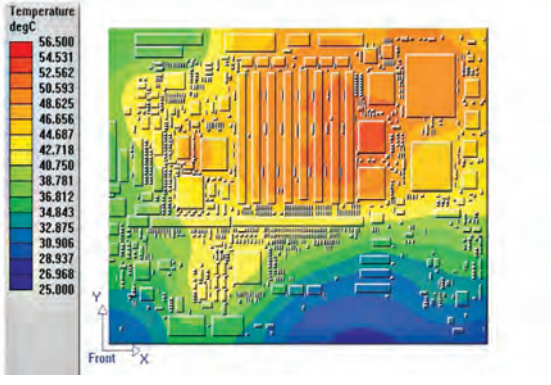
- **ChipScan™** is a patented 3-pin technique for vectorless open testing on digital IC pins. It exploits the parasitic diodes/ transistors in each digital IC, and tests each pin for open faults. Power-up is not required in order to use ChipScan. This method is particularly useful where bus structures are used. ChipScan detects wire bonding defects, open pins and cold solder joints. ChipScan functionality is available on all probes covering top and bottom sides of the unit under test.

- **Active CScan™** combines the coverage of CScan with the power of Boundary Scan. It draws the best from each technology to increase the test coverage and reduce the test time therefore enhances overall capability of Flying Scorpion.

- **ThermoScan™** uses the mechanical capability of its flying probe to automatically move an infrared temperature sensor over the PCB to measure the powered PCB temperature pattern. This new inspection method bridges the gaps between conventional test technologies.

ThermoScan™ can be used at every stage of the production process. It can be used for design verification and helps to optimize the thermal distribution. This will increase the mean time between failures (MTBF) for products in the field, decreasing warranty cost. It also can be used to efficiently repair PCBs returned from the field. ThermoScan™ quickly provides useful troubleshooting information, dramatically reducing repair time. Acculogic's ThermoScan™ can measure and analyze the thermal behaviour of single-sided and double-sided PCBs. The systems' temperature range is from -18 to 220°C with a measurement accuracy of 3 percent.

The PCB Operation involves the flow of electrical current, which produces heat when passing through a circuit having resistance. The temperature pattern on an operating IC, or assembly can be a good, repeatable indication of its operational status.



- **ScanProbe™** is a digital technique that uses flying probes to detect opens on digital IC pins of devices that are IEEE-1149.1(JTAG) compliant. ScanProbing is fast and repeatable, using the digital and boundary scan capability of the FLS980 for fault detection.

BOUNDARY SCAN

Features:

- Fully integrated hardware and software
- IEEE1149.1, IEEE 1149.6 and IEEE1149.7 supported
- Support for multiple scan chains up-to 8
- Scan and non-scan testing
- Automatic test optimization
- Automated test generation and intelligent diagnostics

Boundary scan (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 on the FLS980. Furthermore, Boundary Scan offers a comprehensive board-level protocol for programming flash and other programmable devices. Integration of boundary scan with flying probe systems is no longer an option but a requirement since the combined strategy improves test coverage and test time. Boundary scan is an integral part of the FLS980; digital test patterns generated by Acculogic's powerful ScanNavigator software are delivered to the UUT through Probe Modules or board carrier system. FLS980 goes beyond interconnect testing by providing full digital test capability when and where needed. This technological break-through is made possible by merging Acculogic's two powerful software suites, the "Integrator" and the "ScanNavigator".

FLS980's advanced boundary scan extends the testing to assemblies that contain a mix of Scan and non-Scan logic by providing Shorts Test between boundary scan nets and non-boundary scan nets where the non-scan nets have flying probe access.

Benefits:

- Significant test time reduction
- 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

VISION TEST

OptiScan™ is a multi-camera dual-sided vision system provides optical inspection for defects such as presence, absence, orientation and part markings. Test coverage is enhanced by adding this capability to electrical tests.

OptiScan software processes ultra-high resolution images at up to 16 fps using the latest GigE Vision cameras. It incorporates a 2/3-type High Speed Progressive Scan IT CCD, providing resolution of 1360 x 1024 SXGA. The camera is a robust with high shock and vibration resistance which allows for delivery of outstanding performance. The new camera is equipped with LED coaxial and lateral light control to provide homogenous light on objects and allow for compensation of ambient light variations.

OptiScan Features:

- Up-to 8 (4 top/4 bottom) high resolution CCD cameras (Minimum one per side)
- Flexible target illumination
- 1D and 2 D bar code reader
- Optical Character Recognition (OCR)

MicroScan™

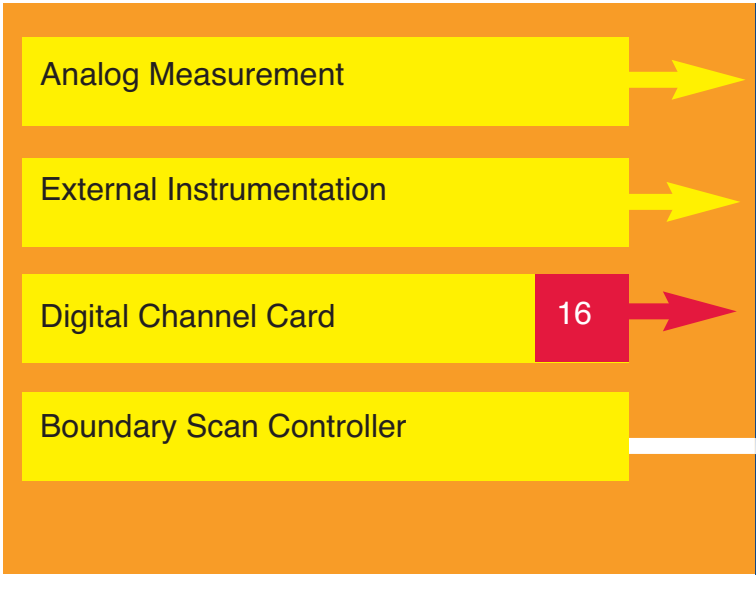
MicroScan™ is a flexible microscopy system that has been designed for viewing very small targets placed on the Flying Probe conveyors. The microscopy system can be mounted on a designated shuttle on the top or bottom stators. MircoScan is equipped with a high precision, long working-distance objective lens, cold fiber optic light, an optical column assembly installed on a vertical stage, a high resolution camera, and a focusing lens. The objective lens of the microscope can be changed to create alternative combinations and obtain different magnifications from the microscopy system.

- Magnification from 2X to 200X
- Working distance from 6 to 34 mm

As customers become more and more conscious of potential contact marking on leads, pads and fillets as a result of contact based testing, Acculogic has developed an inspection microscopy tool that will help enable users to analyze contact location and small profile contour on UUTs either in an audit mode or in production test scenario. By using a test contact location counter, customers will be able to check sites that are probed more than a given threshold, and with the use of the 20, 50 or 200 times microscope inspect the quality of the contact site.

Advanced Function Testing

FLS980 system's open architecture supports integration of general purpose instrumentation through the FSM Switch Matrix Card. Acculogic provides device drivers for an extensive list of instruments.

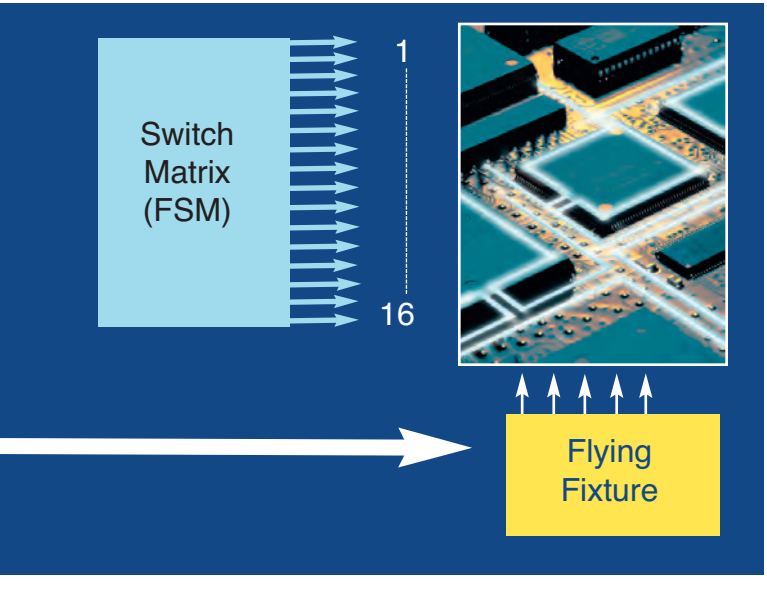


DEVICE PROGRAMMING

FlashScan™

In-Circuit Device Programming of Programmable devices such as PLDs, Flash, PROMs are frequently used on most modern circuit board assemblies. In-production-programming (configuration) of these devices provides the flexibility for on-the-fly content changes as opposed to using pre-programmed parts. Device Programming on the FLS980 improves production efficiency by removing an extra step in the production process.

FlashScan™ is a multi-vendor integrated hardware and software suite that provides the FLS980 with capability to program and verify a wide range of devices.



SPC SOFTWARE

Statistical Process Control Software

Integrator SPC 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 alleviate the causes. SPC software 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.

VOLUME PRODUCTION TESTING

(Fixture Based Testing)

Test programs developed for the Flying Scorpion are compatible with Fixture Based Scorpion systems. Adding the FiS640 bed-of-nails fixture option to the Flying Scorpion provides a practical solution in meeting the high volume production requirements.

22 INTERCHANGEABLE PROBE MODULES FOR UNMATCHED ACCESS

SYSTEM TYPE	Single Sided FLS940 Series III	Double Sided FLS980 Series III	Double Sided FLS980LX
No. of Test Heads	4	8	8
Maximum No. of Probes	11	22	22
Test Area	25”x 36” - (635mm x 915mm)	25”x 36” - (635mm x 915mm)	32”x 38” - (813mm x 965mm)
Probe Types	Flying Fixture, Fixed, Vertical and Variable Angle	Flying Fixture, Fixed, Vertical and Variable Angle	Flying Fixture, Fixed, Vertical and Variable Angle
Automated Conveyor System	Manual	Yes	Yes
No. of Cameras (max)	Up-to 4	Up-to 8	Up-to 8
AOI Test (OptiScan)	Yes	Yes	Yes
Vectorless Test	All Probes	All Probes	All Probes
Powered CScan	Yes	Yes	Yes
Analog Test	All Probes	All Probes	All Probes
Boundary Scan	All Probes and Flying Fixture	All Probes and Flying Fixture	All Probes and Flying Fixture
Mixed Signal Test	All Probes	All Probes	All Probes
Power Supplies	All Probes (100V/1A) /External	All Probes (100V/1A) /External	All Probes (100V/1A) /External
Thermal Test (TheromsScan)	Yes	Yes	Yes
Near Open Detection	No	Yes	Yes
Reverse Engineering (REScan)	No	Yes	Yes
Microscopy (NanoScan)	Yes	Yes	Yes
Upgradeable to Double Side	Yes		
In-Circuit Test (Bed of nails)	Yes	Yes	Yes

COMMITTED TO CUSTOMER SUCCESS

The mission of our worldwide customer service and support organization is to guarantee successful deployment of our products by our customers.

Our goal is to deliver parts, expertise, and problem-solving skills when and where customers need them most. To do this, Acculogic has assembled the industry's most effective team of application and service engineers around the world. Their mission is to extend the life and productivity of each and every Acculogic tester and, by doing so, protect our customer's capital investments.

When it comes to service and support, you can expect only the best from Acculogic. We offer full complement of hardware and software service contracts, extensive training classes, application development services, and a variety of flexible coverage plans.

Acculogic offers its customer the benefits of a global supplier, providing technically advanced solutions and the expertise of a seasoned ATE partnered on Acculogic since 1992. Whether it's a total turnkey system or a highly customized solution, our customers know they are receiving the most reliable, highest performance solutions available.