...We are boundary-scan.

Test and programming solutions forged on IEEE 1149.1

WWW.JTAG.COM
Ball-grid arrays, chip-scale packages, and other high-density, high-pin-count IC package outlines - you rely on such complex components to provide needed and necessary functionality and miniaturization of your products.

Your day-to-day challenge is the increasing difficulty of accessing printed circuit boards (PCBs) for testing and on-board device programming. Boards are much more crowded, component complexity increases, circuit performance issues become ever more demanding.

The solution to restoring pin-level access to even the most crowded assembled - regardless of the device packaging technology used - is boundary-scan technology. Your boundary-scan tools of choice should come from JTAG Technologies, the pioneer and industry leader.

Advanced in capability, easy-to-use in day-to-day applications - JTAG Technologies delivers a complete set of integrated design, production, and hardware products that fully comply with the IEEE 1149.1 and related boundary-scan standards and are targeted to your success.

We help you build practical solutions that are implemented quickly, deliver immediate benefits and produce measurable cost savings. JTAG Technologies solutions, used throughout your business and that of your subcontractors, establish a common platform for development, prototyping, production, and field service.

Track record: continuous improvement
Open your market window
Today’s demanding business climate often dictates quick-to-market timelines and shorter product life cycles.

JTAG Technologies boundary-scan solutions, used throughout your product life cycle, optimize your investment, get you to market quicker, and save you money.

Gain access to high-density PCBs
- Build testability and programmability into products.
- Access BGAs and other high density packages without in-circuit and optical testers.
- Reduce functional test times to handle highly complex circuits.
- Obtain precise fault diagnosis and reduce repair time.

Increase quality on all fronts
- Know the testability of your designs; take corrective action prior to board layout.
- Verify correct PCB assembly at prototype stage and in production.
- Program flash memories and PLDs in-system at high throughput rates.
- Improve manufacturing operation with valuable process information reports.

Reduce time-to-market with our time-saving automated tools
- Decrease debug time for hardware prototypes and expedite re-programming PLDs and flash memories during firmware debugging.
- Start test engineering earlier, based on pre-layout design information.
- Ready test programs at the start of production, complete with high-resolution diagnostics for repair.

Lower manufacturing costs
- Share test programs between design and production to increase accuracy and consistency of results.
- Cut fixturing costs by reducing or eliminating discrete test points.
- Reduce repair times with improved coverage and precise diagnostics.
- Maximize fault coverage.
- Eliminate stocking and logistics of pre-programmed parts.

Whether you build 100 boards a week, 1000 boards a day, or more, JTAG Technologies boundary-scan solutions help you save real costs - both time and money - while improving your product and process quality.
**Design**

**Develop complete applications with ease:**

**JTAG ProVision™**

Consider the benefits of simplifying and accelerating test program and ISP application creation - quick preparation of even the most demanding applications with a minimum of training and effort.

**Then consider JTAG ProVision.**

The built-in wizard guides you step-by-step through the development process, drastically reducing the getting-started learning curve. Project-oriented with support for virtually any level of system complexity, JTAG ProVision accommodates single-board designs as well as projects containing multi-board assemblies. Upon completion, your test engineers and designers can port applications simply and easily to any run-time environment - in your own factory or at a contract manufacturer - for prototyping, production, and repair.

**Generate boundary-scan applications thoroughly and easily**

Within JTAG ProVision, application generators analyze your design’s netlist in combination with BSDL descriptions for boundary-scan devices. Scan-chain topology is automatically constructed, even for complex multi-TAP arrangements. Using models for non-boundary-scan devices, JTAG ProVision controls the board for optimum test coverage and ISP performance while providing safe conditions on all board components.

JTAG ProVision includes integrated fault coverage analysis with details of the net and pin-level testability. If your coverage goals are not met, you can take corrective action prior to board layout. JTAG Visualizer is also tightly integrated in ProVision, allowing you to literally see your design as it progresses, right on your schematic and layout drawings.

For special applications that cannot be covered by the automated test generation tools, JTAG Technologies’ High-level Scan Function Library (HSL) provides extended flexibility and support via a set of DLL-based functions. Typical HSL functions are:

- Testing processor peripheral devices in complex clusters
- Testing digital/analog and analog/digital converters
- Testing thermal sensing devices on an I2C or SPI bus
- Reading board calibration data and storing in EPROM

**Beyond IEEE 1149.1 applications...**

- JTAG ProVision supports testing of circuits compliant to the IEEE 1149.6 standard. It automatically generates tests and fault analysis of advanced digital networks such as low-voltage differential signaling (LVDS).
- Concurrent PLD programming as defined in the IEEE 1532 standard is also fully supported by JTAG ProVision.
- The IEEE 1149.4 standard defines the architecture for analog boundary-scan. JTAG Technologies offers an evaluation kit to familiarize you with the standard and its benefits.
See test coverage and fault locations within your PCB schematic and layout

JTAG Visualizer graphically views and explores boundary-scan results in your schematics and layouts. Identify specific nets, components and pins in the schematic and layout quickly and simply. Navigate your design intuitively with browse, zoom and cross-probe controls. Flexible color assignments simplify boundary-scan analysis and fault class recognition. Among the benefits:

- Portray boundary-scan architecture and test results right on your PCB schematic and layout
- Eliminate guesswork and reduce paper-shuffling
- Optimize your test coverage during design, minimizing the number of design cycles
- Easily identify the location of suspected faults and reduce the time to repair

Using JTAG Visualizer in design

JTAG Visualizer is integrated with JTAG ProVision to give you an easily understood picture of the test coverage attainable on your board with boundary-scan - before layout. Testable and non-testable portions are shown clearly and precisely, right on your schematic. Use the paintbox-like function to examine areas of interest within the design, guiding the process of improving test coverage prior to board layout. When coverage goals have been met, you can proceed to layout with confidence.

Using JTAG Visualizer in manufacturing

At run-time, when your boards are tested in the production area, Boundary-Scan Diagnostic (BSD) software analyzes the results. The BSD report links directly to JTAG Visualizer showing you the fault locations graphically in the schematic and layout drawings. Nets and pins associated with the faults are highlighted, even in cases of multiple faults. The visual representation of the diagnostic report vastly simplifies troubleshooting and PCB repair.

**Exploration features**

JTAG Visualizer’s advanced browser provides great flexibility in probing boundary-scan applications:

- Schematic and board layout views with flexible highlighting of nets and components
- Support for hierarchical drawings
- User-configurable viewing screens
- Search and highlight functions for components, pins and nets across multi-sheet and hierarchical designs
- Cross-probing between schematics, layouts, and information files
- Flexible color assignment to simplify boundary-scan analysis and fault class recognition
Applications created with the JTAG ProVision development software run smoothly in your stand-alone boundary-scan test station or integrated with other existing production test systems. Use our broad range of products to easily embed boundary-scan within functional, in-circuit, or flying probe tests, or for in-line integration.

**Stand-alone production package**

Our Application Executor (AEX) turns a PC into a complete boundary-scan station. Define the desired sequence of operations for production, set conditional branches (for example, to handle alternate flash memory types), match test results with board serial numbers, and much more.

Production benefits abound - quick and easy controls; execution reports of operations and results; easy exporting of results, formatted to your existing quality management system such as TRACS for example.

**Production integration packages**

Integrate boundary-scan test and programming into your existing factory process flow. Using TestStand™, LabVIEW™, or LabWindows™? No problem. You can easily create a test plan that combines these popular test programming into environments from National Instruments with your JTAG Technologies boundary-scan applications. And with our C/C++ and Visual Basic production integrations, you can easily develop your own custom solutions.
Boundary-scan upgrades for in-circuit and flying probe testers

Symphony solutions deliver the combined benefits of boundary-scan test with in-circuit test (ICT) or flying probe test (FPT). Tests and in-system programming applications generated with our development tools are easily ported to your specific test system environment.

Combining another structural test method such as in-circuit or flying probe with boundary-scan improves access to non-scannable devices. The result is an increase in the overall test coverage of the nets on the board, even in cases of mixed-signal designs with digital and analog circuits. And you can make a significant improvement in flash/CPLD programming performance over the native ICT programming capability. Integrations are available for in-circuit testers from Aeroflex, Agilent (HP-UX and Windows), DigitalTest, SPEA, Genrad and Teradyne and for flying provers from DigitalTest, Seica, SPEA and Teradyne.

Advanced intelligent diagnostics

Accuracy and clarity are the hallmarks of our boundary-scan intelligent diagnostic (BSD’s) software, driving down your board repair times. Even in cases of multiple faults, BSD diagnostic report guides the repair process, to the pin level.

BSD runs on the error file created at run-time, so there’s no need to re-run tests in order to get the diagnostic report. Streamlining your operation in this way helps avoid test correlation issues between production and repair.

And with a floating site license, the diagnostics module can be shared across multiple production lines, increasing throughput while adding value to your finished products.

Integration Table

<table>
<thead>
<tr>
<th>Vendor</th>
<th>System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aeroflex</td>
<td>42xx</td>
</tr>
<tr>
<td>Aeroflex</td>
<td>58xx</td>
</tr>
<tr>
<td>Agilent</td>
<td>3070 (HP-UX and Windows)</td>
</tr>
<tr>
<td>DigitalTest</td>
<td>MTS300 Sigma</td>
</tr>
<tr>
<td>SPEA</td>
<td>3030</td>
</tr>
<tr>
<td>Teradyne</td>
<td>TS12x (including 228x family)</td>
</tr>
<tr>
<td>Aerosol</td>
<td>45xx series</td>
</tr>
<tr>
<td>DigitalTest</td>
<td>MTS500 Condor</td>
</tr>
<tr>
<td>Seica</td>
<td>S40 Pilot</td>
</tr>
<tr>
<td>SPEA</td>
<td>4040</td>
</tr>
<tr>
<td>Takaya</td>
<td>APT-9400</td>
</tr>
</tbody>
</table>
Proven performance
Are you planning to use boundary-scan for test, in-system programming or both? Choose from our range of controllers and parallel I/O modules to drive your target system. Proven through literally thousands of installations worldwide, all meet production-level standards for reliability and ruggedness.

Boundary-scan controllers
All JT 37x7 DataBlaster controllers employ a common scalable architecture that provides three performance classes and a range of form factors to match your application and operating environment. Should needs change, simply increase the performance class with the addition of a plug-in module.

DataBlaster controllers support our Enhanced Throughput Technology™ to maximize flash programming performance, often at a rate close to the inherent capability of the flash memory itself. Throughput is multiplied by gang operation in which up to four target boards can be programmed with a single controller. Extend throughput further with multiple controllers. For budget-sensitive applications, choose the economical Explorer/USB with two TAPs and programmable voltages.

TapCommunicator™ enables you to apply boundary-scan over an extremely long distance to the target system using standard communication protocols such as Ethernet, optical links or a wireless network. TapCommunicator is particularly well-suited for situations where human contact may not be possible, including harsh or inaccessible environments.
Parallel I/O modules for enhanced test access
High fault coverage makes a decisive difference in the cost and competitiveness of your product, because it translates directly to the throughput of your production process. JTAG Technologies’ digital input/output scan (DIOS) modules allow you to improve fault coverage by testing portions of the PCB that might otherwise be difficult to access. For example, you can use DIOS to test the integrity of your board-edge connectors and the socket test module (STM) to verify DIMM-type sockets on your board.

BSDL generation and verification tool
Boundary-Scan Description Language (BSDL) files describe the IEEE 1149.1 logical implementation within a compliant IC - vital to developing successful boundary-scan applications for test and in-system programming.

Our BSDL Verifier matches a BSDL file with the actual device to guarantee consistency. The BSDL Verifier also generates a fully-compliant BSDL file from the IC providing additional value for IC vendor engineering departments, ASIC design groups, and test engineering departments.
Support and services

World-class, world-wide

Our mission
Our sole, dedicated mission is to develop boundary-scan solutions to meet the needs of the electronics industry. We are committed to your success helping you to realize the maximum benefits of the technology.

Getting started
To assist you in applying boundary-scan in the design phase, JTAG Technologies offers the industry’s widest range of services and technical support.

- Boundary-scan tutorials and seminars, in-person or via the Internet
- Training for developers, engineers, and production personnel, including extensive hands-on sessions
- Testability reviews of your designs, prior to production
- In-system programmability reviews to maximize throughput
- Design and process consultation to optimize your test strategy
- Consultation for system level testing

Your designs achieve the greatest possible testability and programmability; and your engineers and operators quickly become effective users of the tools and technology.

Worldwide support
Our customer base includes global companies and local enterprises. Regardless of the scope of your operation, we are prepared to support you. Our worldwide professional team of field engineers, distributed throughout North America, Europe and Asia, assures you of the highest level of expertise. Support is available when you need it, where you need it - on-site, via phone or email.

Turn to us for:
- On-site support for application development
- On-site support for stand-alone and integrated production systems
- Turn-key test development and programming file development
- Access to third-party Authorized Applications Providers
- Maintenance agreements featuring regular software updates, premium support and communication services.
Delivering on the promise of boundary-scan

Boundary-scan, also known as JTAG, was standardized in 1990 as the IEEE 1149.1 specification. The technique, based on the industry-standard IEEE 1149.1 specification, enables rapid and precise testing as well as high-speed in-system programming (ISP) of densely-packed printed circuit boards.

Boundary-scan embeds test circuitry at chip level and when implemented on a PCB, forms a complete board-level test protocol restoring access to even the most complex boards and assemblies.

Since our founding in 1993, we’ve continuously expanded and enhanced our boundary-scan product line to streamline the process of preparing applications for testing, debugging and in-system device programming, and for diagnosing hardware problems.

We are boundary-scan

JTAG Technologies leads the industry in providing comprehensive test and ISP solutions to address the challenges that confront engineers who are pushing the limits of complex board design.

Our innovative solutions help customers improve quality, reduce costs and speed time to market with powerful engineering and production software and our durable, high-performance boundary-scan hardware. You’ll find JTAG Technologies solutions at work in all segments of the electronics industry:

- Aerospace
- Automotive
- Avionics
- Computers
- Consumer electronics
- Contract manufacturing
- Data communications
- Defense
- Industrial electronics
- Medical electronics
- Semiconductors
- Telecommunications

The effectiveness of our boundary-scan tools is proven in thousands of applications across every segment of the electronics industry. Users of JTAG Technologies products such as Alcatel/Lucent, Delphi, Flextronics, Honeywell, Nokia, Philips, Raytheon, Rockwell-Collins, Sanmina-SCI, Scientific Atlanta and many others have seen powerful benefits:

✓ Shorter time-to-market
✓ Reduced capital investment and operating cost
✓ Faster, automated generation of test vectors and ISP files
✓ Easier troubleshooting of structural faults
✓ Simpler flow for PLD and flash programming

Our corporate headquarters are in Eindhoven, The Netherlands, and we have offices in Canada, China, Finland, France, Germany, Sweden, the United Kingdom, and the United States. We are represented by a global network of authorized distributors and representatives throughout North America, Europe, Asia, the Middle East, South Africa and Australia.

For the latest in product information, useful application tips, or the dealer nearest you visit www.jtag.com.
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