



Helping Your Bottom Line Series



Is JTAG Testing Right for Your Product?

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JTAG testing can represent a low cost solution for many low-to-medium volume products. The team at Burton Industries has prepared this whitepaper to provide an overview of this test technology, along with its benefits and design considerations.

Overview

The Joint Test Action Group (JTAG) originally developed the test method in the late 1980s to test printed circuit board assemblies (PCBAs). The resulting standard is IEEE 1149.1 Standard Test Access Port and Boundary Scan Architecture.

The goal of this test method is to address the issue of test in PCBAs with limited test access by creating a serial test bus utilizing a serial scan chain method for accessing a five-pin Test Access Port (TAP) in JTAG-enabled devices. The pins are defined as:

- TDI (test data in)
- TDO (test data out)
- TCK (test clock)
- TMS (test mode select)
- TRST (optional test reset).

Benefits

The biggest benefit of this test methodology comes from its ability to test perimeter and full array packages such as BGAs, whose interconnections are not accessible or easy to visually inspect, since this test methodology allows signals on JTAG-enabled devices to be controlled and monitored without direct physical access. It is also a good option for densely populated PCBAs with limited test point access.

Cost is another significant benefit. JTAG testing can be fixtureless and is faster than flying probe testing. And while some test customization maybe required, the standard JTAG/boundary scan interface reduces test development time by enabling a generic set of test models to be used.

The JTAG interface also allows for programming, enabling test and programming to be combined in a single station. This reduces overall time, floor space and personnel.

When debug logic is also designed in the central processor unit (CPU) core, the JTAG interface can be used with debugger software to perform software debug operations, as well. This interface can also be used to connect to units that do not have working boot code or I/O drivers, making it an option for debugging “dead” PCBAs.

Design Considerations

Running boundary scan testing requires basic information on the JTAG capabilities of any JTAG-enabled devices. This information is contained in the Boundary Scan Description Language (BSDL) files, which are normally available from the silicon vendor if the device is labelled IEEE Std. 1149.1-compliant.

Burton Industries’ Role

Burton Industries’ team utilizes the XJLink 2 USB JTAG controller as the interface in its XJTAG development system. This small and portable device provides a high speed interface to up to four PCBA JTAG chains on the unit under test (UUT). It is re-configurable and features advanced capabilities such as programmable JTAG signal pin position,

switchable power supply and auto signal skew. Because it has a variable signal termination, it can handle PCBAs with and without signal termination.

Burton utilizes the following software with their JTAG development system:

- XDeveloper
- XInvestigator
- XRunner
- XAnalyser

The team is currently utilizing the system in several ways. In one case, JTAG test has proven to be a viable option for a medical project involving legacy product. The customer's consigned test equipment had reached the end of its useable life. Utilizing JTAG as the test method going forward has eliminated the need for \$10-20K in new fixturing that would have been required had the older test equipment been replaced with similar new equipment.

The team has also used the JTAG system to reduce time in test troubleshooting on other projects, which has also improved the speed at which the manufacturing team gets feedback on failure trends. The system is also providing better identification of component failure issues.

In the product development phase, Burton's test engineering team can work with your product development team to develop a test strategy in line with your cost and coverage goals and make recommendations on JTAG-enabled device options.

Contact a member of our team at (906) 932-5970 to learn more about ways Burton Industries can support your JTAG-related testing needs.

About Burton Industries

For 40 years, Burton Industries, Inc. has had a long tradition of providing customized manufacturing solutions to OEMs in the medical, industrial, motor control, specialized consumer, security, building controls, defense and professional tool markets. We support the full product lifecycle from product development through end market support services.

We've built our business by listening to customer needs and efficiently supporting high mix, variable demand projects at both PCBA and higher level assembly (HLA) stages. Our manufacturing strategy includes:

- *Extraordinary communication with customers*
- *Teaming with suppliers*
- *Optimizing test*
- *Eliminating hidden cost drivers.*

Our primary manufacturing location is in Ironwood, MI and additional HLA manufacturing capability is located in Hazelhurst, Wisconsin.