

Complete Structural and Functional Test and Programming for Prototype Development

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Overview

Application processors continue to grow in power and complexity. While these newfound capabilities allow designers to create advanced user interfaces with improved graphics, video, and connectivity, they also create greater testing challenges. Shrinking package technologies, loss of physical access, and faster processing speeds have become major obstacles in being able to reliably bring-up and test products.

Thankfully, one organization in particular, the Joint Test Action Group (JTAG), foresaw these problems decades ago and established the IEEE-1149.1 standard, defining a common test architecture inside silicon devices as well as identifying the means to access that test architecture. Since then, JTAG has become a familiar name in the engineering community. Although many engineers associate JTAG with a hardware box or individual applications such as manufacturing test, built-in self test (BIST), device programming, or emulation, the reality is that the term JTAG applies to all of them.

This article focuses on a new, ready-to-use JTAG test solution which provides free downloadable test procedures for common reference board designs such as the TI OMAP35x Evaluation Module (EVM).

Using JTAG for Design and Development

When designers are asked whether they use JTAG, they typically respond by saying they are using a JTAG-based emulator, such as Blackhawk, or using JTAG to program devices on their board. When asked about using JTAG for board level test, most respond either with a flat no or indicate that their manufacturing department is responsible for board level test. Some even indicate they use the JTAG emulator for board bring-up and test.

While emulators are great for writing, debugging, and testing application code, they are not the ideal tool for performing board test – they are fundamentally a development tool. One of the biggest advantages of using JTAG for board bring-up is that the board itself

doesn't require application code or an OS to be loaded—testing can take place much sooner in the bring-up cycle. Boards that don't respond, initialize, or power-up to an expected state are ideal targets for JTAG test.

JTAG has become a staple in manufacturing test, although using it in the design environment for prototype testing has been adopted at a much slower pace. Nevertheless, basic tests, such as ensuring the scan chain works correctly, and verifying inter-connection between the processor and peripheral devices play a critical role at the prototype level. Identifying opens or shorts during board bring-up is extremely beneficial, especially when BGA components are utilized making any type of visual inspection impossible. Even running a JTAG test that fully passes provides designers value in reassuring them that the hardware is working as expected, giving them confidence to focus on product development.

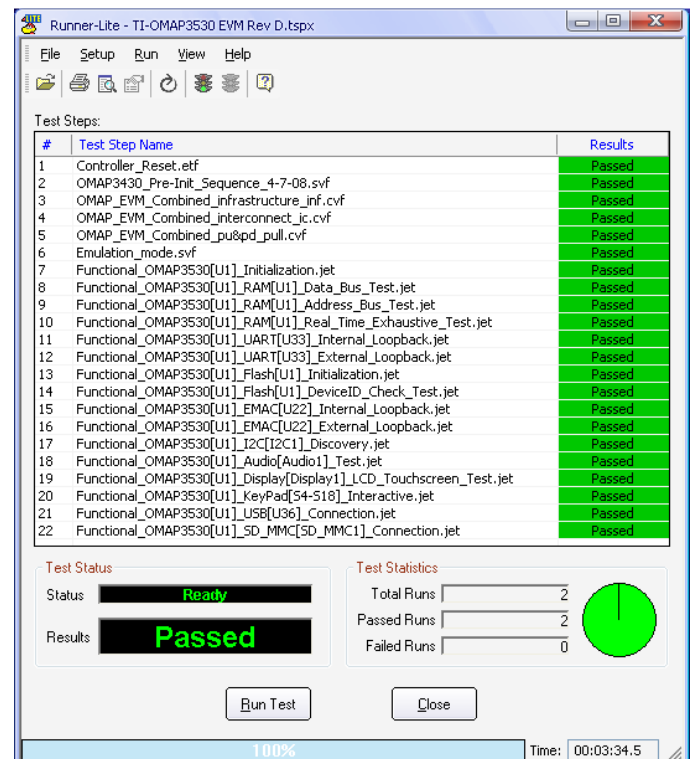


Figure 1: Runner-Lite Test Executive

Runner-Lite, Free JTAG Test Executive

To provide design engineers visibility, awareness, and easy access to prototype level JTAG testing, Corelis has developed a new product called Runner-Lite, a free version of its boundary-scan test executive (Figure 1). Runner-Lite allows designers to download and execute pre-built test procedures to perform structural and functional tests on specific reference board designs. The inaugural launch of Runner-Lite targets TI's own OMAP35x EVM. Runner-Lite offers full compatibility with Blackhawk XDS560-class emulators meaning most TI developers already have the hardware necessary to start using JTAG for prototype test.

Runner-Lite offers designers using JTAG enabled TI processors and users of Blackhawk emulators the ability to perform full featured structural and functional testing in addition to in-circuit Flash programming. The pin-level fault diagnostic module provides unparalleled visibility into board faults (Figure 2).

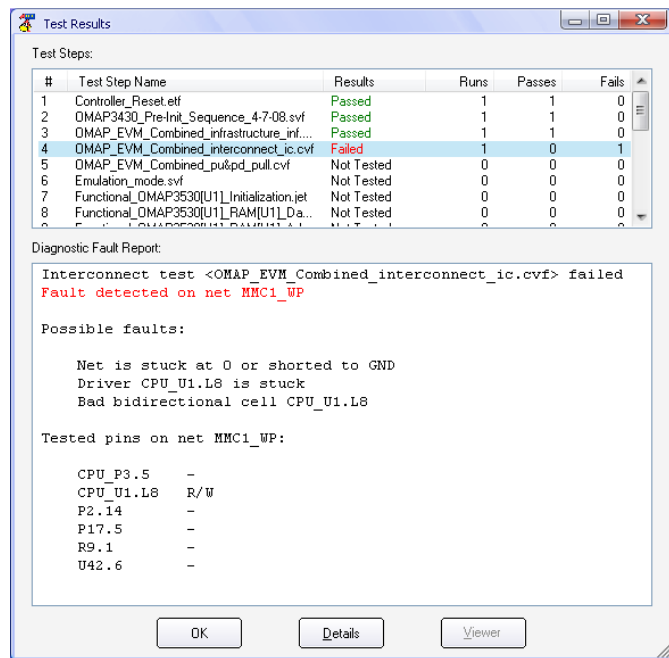


Figure 2: Pin-Level Fault Diagnostics

Benefits of Runner-Lite include:

- Complete, ready-to-use board test solution, including at-speed functional tests
- No test fixtures and no physical test probes
- Relieves software engineers from the necessity of developing test code
- Quickly identifies hardware faults allowing designers to focus on product features

- Board does not have to be in a bootable state for fault diagnostics
- Flash programming at maximum theoretical programming rates
- Allows complete control and visibility of UUT resources

Conclusion

JTAG is more than just an emulator, programmer, or manufacturing test tool. Especially now with the majority of processor emulation capabilities channeled through the JTAG port, using a single product to address multiple board bring-up functions is easier than ever. Runner-Lite truly offers design engineers a robust and powerful toolkit.

Designs based on a reference board in most cases can use the prebuilt test procedure as-is. Users deviating from the reference design can upgrade to the full version to customize their tests to any particular board.

Not having the right test tools can be like trying to hammer a nail with a pair of pliers. It might work, but it won't be fast or pretty. Runner-Lite is the right tool for prototype testing. Download the free version today to find out how simple JTAG testing can be.

For more information, visit:

<http://www.corelis.com/runner-lite>

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