

Looking for a Contract Manufacturer Who Can Provide Comprehensive Test Coverage at Lower Cost?

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Both in-circuit and functional test of circuit boards are valuable tools; knowing how and when to use both, while having a cost-effective approach, is often the best test strategy.

The simple word “test” covers a wide range of definitions and activities. It can be a major differentiating factor between contract manufacturers who otherwise offer comparable capabilities and services, **Figure 1**. Functional test can be a low-cost option that can assure that the assembled circuit performs to target specifications.

Typically, this testing is done at full power and operating speed, and generally interfaces via connectors. It is a stimulus/response test approach using known input signals along with measurement of corresponding outputs. As a result, it excels at finding functional shortcomings or marginal operating situations that may be due to cumulative effects of tolerance buildup or other subtleties. However, many OEMs decide to skip functional test due to their assumption that there are relatively high up-front costs associated with designing and building the tester for their unique end-product circuitry and its form factor.

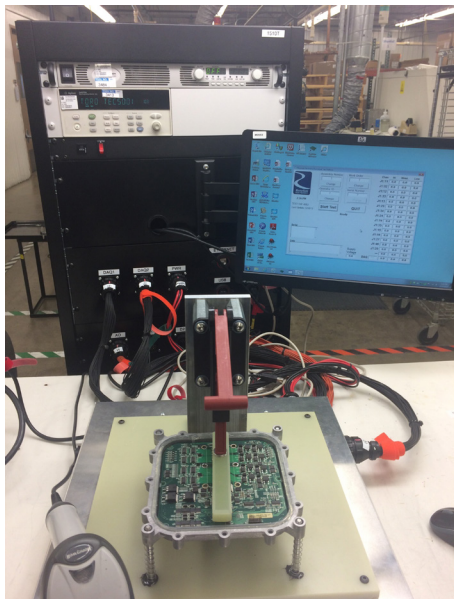


Figure 1: Although contract manufacturing may appear to be primarily about sourcing and assembly, test of the final assembled product is critical to on-time delivery of fully functioning products.

Yet with the right strategy, this does not have to be the case. [RiverSide Electronics](#) can provide robust functional testing that is both operator and debug technician friendly, and can also control these costs while staying within the available NRE (non-recurring engineering) budget. Key to the approach is having a high utilization factor for the expensive components that are critical to functional test (such as frequency generators and data acquisition modules), supplemented by a focused, and dedicated use of custom features such as the PCBA fixture.

By incorporating a quick-to-create custom interface, this approach provides a test capability that rivals systems costing much more. RiverSide’s internally developed automated tower, **Figure 2**, provides low-cost, functional-fixture options. Its functional module can measure AC/DC current, digital I/O, frequency, and resistance, **Figure 3**. The tester also includes a variable power supply that can source 0 to 60 VDC from 0 up to 12.5 A, and has serial-communications capabilities.

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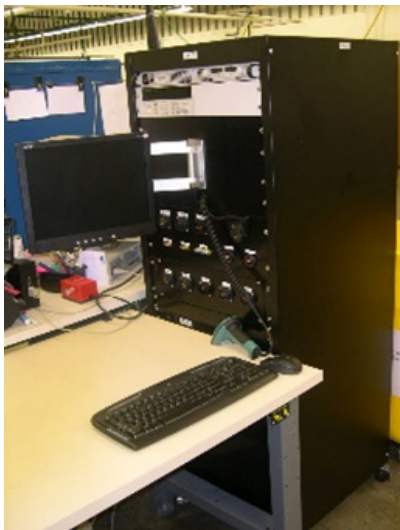


Figure 2: The RiverSide Electronics Universal Portable Test Tower provides a high level of functionality along with ease of set-up and test efficiency

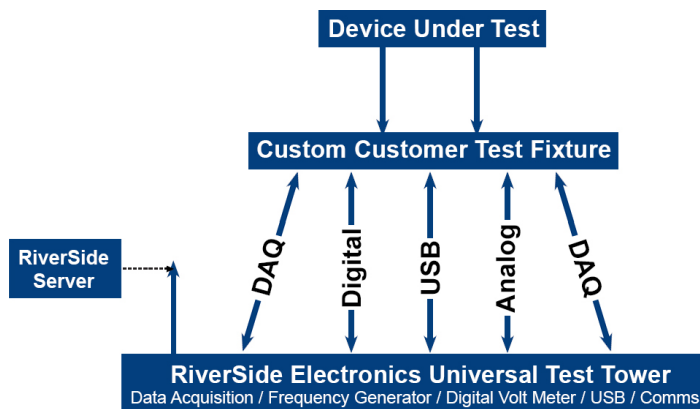


Figure 3: The functions provided via the RiverSide Electronics Universal Portable Test Tower encompass nearly all aspects of functional PC board test.

Functional test versus in-circuit test: alternatives or complimentary?

Functional test can be the only circuit-board test technique employed, but good practice is to use it in conjunction with in-circuit test (ICT) even for PC boards of medium complexity. ICT uses a “bed-of-nails” test fixture to gain access to circuit nodes on a board and measures the performance of the components, regardless of the other components connected to them.

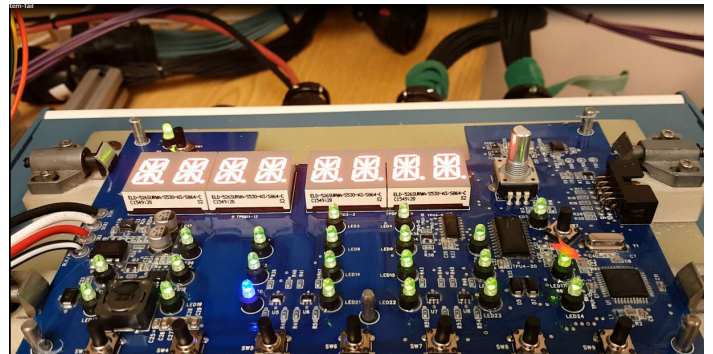
By checking for short and open circuits, and measuring resistance, capacitance, and other basic electrical quantities, it implements a “schematic verification” of the individual components of a printed circuit board and thus determines if the fully populated board is correctly fabricated. Additionally, ICT can perform many tests by applying very low power to the device under test (DUT) and avoid some conditions that might damage the product.

However, while ICT can show that parts of the loaded assembly are correct, it is a static test and cannot verify that the overall board works to specification. It also does not identify the consequences of subtle variations and tolerances in the assembly that result in out-of-specification performance. In effect, ICT can reveal all the facts, but not the full story to which these facts add up. For these reasons, functional test is a good compliment to ICT.

Along with in-circuit test and full-functional circuit-board test capability, RiverSide can perform system-level integration tests, plus thermal stress testing, depending on product requirements. The level of available testing will verify product quality and functionality, and provides a source of credible data needed to monitor the internal production-manufacturing processes.

RiverSide can also provide design for testability (DFT) recommendations, test development, and test execution, all of which contribute to cost-effective tests with high levels of confidence (see Sidebar, “RiverSide Test and LED Illumination”). This effort requires a dedicated team of experienced hardware and software test specialists to develop a custom, high-performance test platform as needed; incorporate customer-supplied instruments if appropriate; and, finally, provide the software that interfaces all of the computational devices into an operator-friendly pass/fail test application.

Sidebar: RiverSide Test and LED Illumination



In addition to electrical testing, a flexible functional-test system allows you to add error-proofing features. For example, suppose you have a group of discrete LEDs on an assembled board that need to be tested to verify that they actually illuminate as intended. A standard test protocol would be to power them in a defined order and have the test operator confirm, via a basic yes or no response, that each of the LEDs turns on as directed by the functional-test program.

A better way to conduct this test would be to have the LEDs illuminate in a random order as directed by test code, which is simple to generate. The test operator then verifies that the correct, intended LED actually illuminates, which will produce better results.

In addition, RiverSide uses a visual automatic optical-verification module for the LEDs to eliminate the possibility of operator error due to fatigue, distraction, or other reasons. This module includes a high-speed camera that measures light intensity with different optical filters to differentiate among the various LED colors. The result is a cost-effective, efficient, error-free test, which provides a high level of confidence along with comprehensive documentation.

About RiverSide Electronics

For over 33 years, RiverSide Electronics has provided contract Electronics Manufacturing Services (EMS) to Original Equipment Manufacturers (OEMs) who demand the highest level of quality, service, and value. RiverSide specializes in low to medium volume, high-mix, electronics manufacturing – from printed circuit board to electro-mechanical and box build assemblies.

RiverSide Electronics is fully certified to ISO 9001 and also meets other industry standards for workmanship, quality, inspection, and audit, all driven by extensive process data and analysis. In addition, RiverSide Electronics works with customers early in their product-design cycle to improve quality, simplify assembly, reduce costs, and enhance testability.

For more information about how RiverSide Electronics can help with your assembly and test challenges, contact them at www.riversideelectronics.com.



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