VXI Technology™

Functional Test Solutions for Contract Manufacturing

Application Note

Applications

Modular Design Based on Industry Standards

Designed for Fast Test Throughput

Reconfigurable for Multiple Test Applications

Houses all Common Core Functional Test Instruments and Switching

Considerably Reduces Capital Equipment Costs for Contract Manufacturers

Overview

The need for contract manufacturing (CM) providers has grown as primary manufacturers look to outsource production in order to cut internal costs and overhead. The number of facilities offering CM has grown with the increase in market potential, and CM houses must find advantages in the services they provide in order to stay ahead of competition. Production test readiness is becoming an important element in defining the capability a contract manufacturer has for taking on larger jobs.

The CM environment can be described as one of either high-mix or high-volume and quite often a combination of both. This means that the contract manufacturer will be pursuing business where there are requirements for large quantities of a particular item and/or many different items. The level of services provided can range from board stuffing to product assembly. More often than not, testing of the product is performed by the contract manufacturer. The challenge, then, is to develop a robust test system capable of testing the product being manufactured today, as well as providing a platform flexible enough for testing product of the future. Successful companies will develop an automated test system with a core set of instrumentation, software and interfacing that reduces valuable development time and resources, which is often the difference between a winning and losing bid.

Defining the Common ATE Platform

A common ATE platform is critical for successful testing in contract manufacturing because the ability to reuse test assets and software reduces the non-recurring engineering every time a new product is introduced to the assembly floor. There is no question that products have unique test requirements and there are certain tests that cannot be planned for in advance. However, there is a core set of test instrumentation that is used across product lines for verifying general parameters such as voltages, pulse widths and frequencies, as well as providing stimulus to the unit under test via D/A's, function generators and AWGS. Defining a common platform with these functions in place is critical for two reasons. First, software drivers for a common core are developed one time, and as new systems are developed using the core instrumentation, new software drivers are required only for the instruments that are added to satisfy unique product parameters. Second, a common core will occupy a defined amount of rack space in the ATE, and minimizing the amount of space the common core occupies leaves more room for the non-standard instrumentation. The following instrumentation is typically found in common core ATE systems. These are general purpose instruments and switches which provide a very good base to build on for present and future needs. Most product being tested will use these assets during the verification cycle.

- **6.5 digit DMM** measure AC/DC volts, current and resistance
- **Counter/Timer** measures pulse width, frequency, time
- **AWG/Function Generator** provides standard waveform outputs as well as arbitrary waveforms
- **Oscilloscope** general purpose waveform analyzing capabilities
- **Serial Interface** tests products with serial communication busses (RS232, RS422…)
- **Digital I/O** TTL drivers/receivers
- **D/A's/Power Supplies** provides input biasing and power to unit under test
- **General Purpose Switching** routes multiple I/O points to DMM, power, lower frequency signals
- **RF (Coax) Mux** routes multiple I/O points to scope or counter/timer (higher frequency signals)

Selecting Common Core Instrumentation

A number of factors come into play when selecting the instrumentation that will be part of the common core. It is important to minimize the footprint of the ATE system. High-volume or high-mix production test often drives the need for multiple systems. The smaller the system the less floorspace needs to be allocated for testing. The VXIbus architecture lends itself to reducing footprint, as many of the core functions can be housed in a 19" card cage that consumes around 8U of vertical rack space (about 14"). With this in mind, modular high-density VXI instrumentation takes footprint reduction a step further by reducing the number of slots required for the common core components, leaving more room for expansion or product specific test assets. Performance specifications define how robust the test system will be, and obviously, cost is a driving factor since the core components of the system will be replicated across product lines.

VXI Technology manufactures a line of Modular Test Solutions directed at the contract manufacturing market which addresses each of these factors. Our line of modular instrumentation means that multiple high-performance instruments and switches can be housed in less slots than equivalent single-slot dedicated solutions. Not only does this mean that there is more room for unique requirements, which addresses footprint and expansion, but costs are driven down as well. The VT2000 is a single-slot VXI card that has a 6.5 digit DMM, 50MSa/s AWG and 200MHz counter/timer, each of which is treated as a unique logical address. This can be combined with our modular signal switching, which can provide coax muxes and a general purpose multiplexer in a single slot, meaning that five core functions occupy only two VXI card slots (compared to five slots using traditional dedicated instruments). A typical core system using modular instrumentation is shown below:

Summary

The world of contract manufacturing is dynamic and extremely competitive. CM houses must find creative ways to reduce overhead in the assembly test process, and many are aggressively promoting their common-core ATE platforms as a way of minimizing costs associated with test. As new products and new requirements are introduced to the production floor, additional test systems will be added to handle the workload. It is critical to maintain as much commonality across product line testers as possible to minimize development time and achieve test readiness as quickly as possible. Additionally, the test stand must be flexible, allowing for expansion and unique product requirements. Modular instrumentation and switching for contract manufacturing is a logical first step in the development of a successful common-core test platform.