

Modular Data Acquisition Technology Helps Increase Yield in Large Scale Integrated (LSI) Circuits

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Abstract

As the integrated circuit (IC) has grown from holding merely ten transistors when it was first invented in the 1950s to the millions it can hold today, the level of chip complexity as well as the density of circuit components have grown comparatively. Automatic testing equipment (ATE) has done an excellent job of testing system components, but semiconductor manufacturing facilities are constantly aiming to increase product yield from any given wafer, maintain their test flexibility, while lowering their production testing costs.

Though fast, a downside to traditional ATE is that it is frequently a closed system, typically designed for a specific test application for a specific component. Often a new system or large modification is needed to implement a new test or tests for each new component. This can be a very expensive undertaking given the pace of development of IC functionality in telecoms, home entertainment, and other domains. Even with tailor-made production test systems, the results may not be reliable. Specifications can be too high, unnecessarily increasing the test cost, or too low to provide the accurate data needed.

High-speed data acquisition technology incorporated into a modular production test system has quickly gained popularity primarily due to the flexibility and cost-effectiveness that it brings to the final system. Consumer electronics manufacturers are realizing the benefits of building modular test systems that employ high-speed digitizers for multi-function data acquisition for use with their large scale integrated (LSI) circuit ATE systems.

One recent example of such a development, involves the testing of LSI components that are used in DVD players and recorders. A large and very well-known consumer electronics manufacturer decided to build a modular production test system for the testing of components used in home entertainment systems. Using a high-speed Agilent U1061A as the core data acquisition component, a test system was developed for testing video circuits and noise pick-up through the component's DVD read-write channel.

LSI Circuit Production Test System
Agilent U1061A Acqiris High-Speed PXI Digitizer



Their final modular system can be reconfigured for new tests and upgraded as new technology is implemented on their circuits, such as HD DVD and Blu-ray disc – with the test system cost roughly 1/10th of their previous closed ATE system.

The consumer electronics manufacturer was able to quickly develop supporting software using the tools supplied by Acqiris, including driver libraries and software demo code. Acqiris digitizers are fully programmable and run under Microsoft Windows, Linux and VxWorks operating systems and off-the-shelf software packages, such as National Instruments' LabWindows/CVI, LabVIEW and Mathworks' MATLAB making it easy to incorporate this module into the test system.

By developing a modular production test system the manufacturer has been able to significantly improve the accuracy of its semiconductor tests and its final products, whilst maintaining the lowest possible costs. The result is an easily upgradeable and cost effective test system which incorporates the latest in state-of-the-art instrumentation.