Universal Vector Driven Tester (VDT) :
New Test Solutions for Telecommunication Network System

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Abstract

A universal PBA (Printed circuit Boarded Assembly) tester has been developed for wireless and wire-line telecommunication network system hardware for mass production factory lines as well as hardware development. Besides considerable amount of test jig development expenses and efforts are saved, new testing features such as duplicated boards stress test, clock/alarm fault insertion, OS delivery tests and many others are added to conventional test schemes. Test vectors for these additional testing features were simulated and functionally proven on a workstation by using a virtual prototype platform, which could be used to validate the new testing features. These newly added testing features enable PBA test quality higher, and eventually enhance reliability of network systems.

1. INTRODUCTION

Unit board testing becomes a more significant issue as telecommunication network systems are getting more complex. Since such huge systems commonly consist of various kinds of PBAs (Printed circuit Boarded Assembly) even trivial errors can turn out to be enigmatic problems after integration of a system with them. Therefore, as importance of single unit board testing, which is behaved prior to a system integration testing, becomes more significant, it becomes more effective way to scrutinize every PBA 별fault.

However, more serious problems occur with conventional unit PBA testing methodologies such as ICT (In Circuit Testing) and BST (Boundary Scan Test). As for ICT, it is very difficult to secure enough holes for every net which should be utilized during a test since a signal integrity issues could arise over testing holes. In addition, with BST as far as every component on a board doesn밀have BST function so that complete test can밀 be performed. To overcome the problems above with the traditional method, a functional PBA test is used for effective testing of every net별 connectivity as well as functionality. However, whenever every single board is developed it is necessary to establish unique testing environment with existing boards or specially designed jig boards, which can cause tremendous cost and time. Therefore, a new test solution is definitely required as a universal and reusable test equipment with even better test coverage.

A universal PBA tester has been developed for wireless and wire-line telecommunication network system hardware for the mass production factory lines as well as hardware development. A new concept-based tester named Vector Driven Tester (VDT) is able to test more than 45 different types of network hardware boards by accommodating most recent IP network protocols such as Gigabit Ethernet and optic data interfaces.

Besides considerable amount of test jig development expenses and efforts are saved, new testing features such as duplicated boards stress test, clock/alarm fault insertion, OS delivery tests and many others are added to conventional test schemes. Test vectors for these additional testing features were simulated and functionally proven on computer environment by using a virtual prototype platform, which could be used to validate the new testing features. These newly added testing features enable PBA test quality higher, and eventually enhance reliability of network systems.

2. NEW TEST SOLUTIONS

2.1. Universality

VDT has been designed to ultimately cover every possible hardware features in telecommunication network systems. Every board has different I/O interface types, number of pins and the speed of each interface to meet their testing requirements.

The most typical design challenge comes from the fact that VDT should cover wide range of different I/O interface types in one single card. Commonly used I/O interface types such as LVTTL, LVDS, GTLP, RS485, RS232 and Gigabit SERDES have different standard I/O switching characteristics. Technically, I/O interfaces with target boards have no common assignment, which means connectors between VDT and target boards are different.

Besides the universality of physical I/O interface, bus functional universality must be withheld in VDT. Through the signals of the edge or front panel of a target PBA, various standard and customized bus protocols should be supported in VDT. For the bus functional universality micro-processors and FPGA devices are well organized in VDT with reconfigurable characteristics for additional functions.