

# Outsource the Test to Focus on Your Specialty

## Today's Best Test Methods

We all understand that functional test cannot be eliminated as a final gateway to make sure the product is working towards product specification before it can be shipped out. However, it is very risky to leave any workmanship defects on the board level before power up the board for functional test (FT). First, it might damage the board especially for those very expensive BGA devices. Second, functional test might not be able to detect all problems on the board. End up those problems will be appeared at the end user side.

For prototype boards, it is better to test on flying probe in-circuit test in conjunction with boundary scan test so that completely tested prototype boards can be released to the design engineering group in days to continue the development stage without losing expensive engineer time to troubleshoot the board.

For production boards, it is better to test on either flying probe in-circuit test or bed-of-nail in-circuit test (ICT) in conjunction with boundary scan test based on the circuit board design and production volume.

## Device (Flash / CPLD / FPGA) Programming Service

### Limitation on ICT Test

Today's board is getting complicated with semiconductor devices getting higher pin counts and space on board is getting tighter. Some boards cannot be tolerance to assign test points between IC pin and IC pin due to the noise issue. Lack of test points is the real challenge for today's board.



Vectorless methods like TestJet, FrameScan on current ICT tester still cannot detect open issue correctly even test points are available because it picks up the signal from the other connected ICs.

As a conclusion, even we have very powerful ICT tester, we still cannot detect 100% interconnection problem on semiconductor devices such as solder bridge, open solder ...etc.. End up the test coverage on ICT is very low.

### Advantage of Flying Probe Test

The test method of flying probe tester is similar to ICT tester. It uses multiple mechanical flying robots to contact the component under the test on the board. Therefore, we can eliminate the costly bed-of-nail test fixture and also we can speed up the test preparation time down to days.



### Why do we need Boundary Scan (JTAG) test?

Boundary scan is a method for testing interconnects (wire lines) on printed circuit boards or sub-blocks inside an integrated circuit. Boundary scan is also widely used as a debugging method to watch integrated circuit pin states, measure voltage, or analyze sub-blocks inside an integrated circuit.

We can take the advantage of many semiconductor devices with build-in boundary scan to design our circuit board. Boundary scan only requires 5 test points on the board. Then, we can design the test to exercise all semiconductor devices for interconnection problems. The application development is very fast and not so high cost as ICT program. Even we can connect the JTAG connector manually to reduce fixture cost. The test time is very fast and it has the capability to detect down to pin level on the fail devices for easy repair.

### Program Device while Test

During the boundary scan test, program the Flash / CPLD / FPGA device by using JTAG port in parallel to speed it up. Then, confirm it before ending the test. It can save the cost by purchasing the bare devices (w/o pre-programmed) and reduce the need of re-confirmation process after boards have been assembled which means to reduce cost too.

## Ownership vs Outsource

The total cost of ownership to have test expertise is extremely high. The capital equipment investment could be over few hundred thousand dollars, plus the on-going maintenance cost, annual maintenance contract, spare parts, repair ...etc.. Most important you must need to have dedicated experience full time test engineer in place which is easily talking about \$100K annually. In case of only few applications per year, the total cost of ownership is extremely high per application.

On the other hand, outsourcing is the industry trend because you can use their dedicated resource and specialty without your huge investment and you can focus on your specialty.



## EMS Partner Program

We understand that EMS companies especially for small to medium size need to stay in a very competitive edge all the time. They have to focus on their production capability by putting most resources on this area. Testing is necessary for some critical good customers, but very expensive in terms of capital equipment investment, test engineering team. We have an EMS partner program to team up with EMS companies to use our test specialty to assist any pre-sales or post-sales request either to EMS or to their end customers directly.

## Service Provided

### Test Service

- Boundary Scan Test Service
- Flying Probe In-Circuit Test Service
- In-Circuit Test Service
- Integrated Boundary Scan with Flying Probe or ICT Test Service

### Device Programming Service

- Flash / CPLD / FPGA In System Programming Service

### Application Development Service

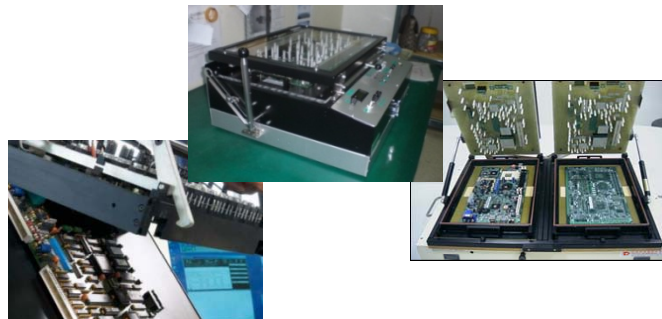
- JTAG Technologies Application Development Service
- JTAG Technologies Flash / CPLD / FPGA In System Programming Development Service

### Other Services

- Design for Test (DFT) Service
- Test Fixture Development and Manufacture

## Various Fixture Options

- Fast access without additional hardware cost by cable connection manually for Boundary Scan test
- Low cost mechanical fixture box
- Robust pneumatic / vacuum fixture box



## Equipment List

- JTAG Technologies ProVision Development Station
- Takaya APT84XX Flying Probe In-Circuit Tester
- Teradyne Z18XX In-Circuit Tester
- Tescon Point88 In-Circuit Tester
- Kyoritsu QS-8200 In-Circuit Tester
- Siemens Test Expert (FabMaster) Station



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