JTAG Test Stations for Electronic Boards
Agenda

- Market and BS introduction
- JTAG DiaTem Test Stations
- The Client-Server Model
  - The DiaServer Station
- Stations High Volume Production
  - The stations TemPlayer-HVP
- DiaTem Competitives Advantages
Traditional Test methods more and more replaced with JTAG Test Solutions.

AFTER DFT TECHNOLOGY ADOPTION

TEST IS MOVING FROM HARDWARE BED OF NAILS TO JTAG ARCHITECTURES

JTAG ARCHITECTURES ENABLES
- Access through connector
- Access to boards layers
- Access to internal design nodes.
• PACKAGES ARE GETTING SMALLER WITH MORE PINS, DO NOT HAVE EXPOSED LEADS THAT CAN BE PHYSICALLY PROBED!

BOTTLENECK

• BOARDS ARE GETTING SMALLER WITH MORE LAYERS. TRACES ARE OFTEN BURIED INSIDE MULTI-LAYER PRINTED CIRCUIT BOARDS

BOTTLENECK

• BOARDS ARE GETTING HIGHER SPEED THAT REQUIRES IMPEDANCE CONTROLLED LINES WHICH CANNOT AFFORD TEST PROBES

BOTTLENECK

TRADITIONAL ICT / FLYING PROBES METHODS RUN OUT OF STEAM
NO TECHNIQUES ON THE MARKET AVAILABLE TO GET ACCESS TO INTERNAL NODES AND TRACKS
DiaTem Key Benefits

• To identify opens, shorts and missing components
• To enable accurate diagnostic on defective components

covered by DiaTem
BOUNDARY SCAN TEST –APPLICATION 2

JTAG tests
- Infrastructure
- Interconnexions
- Memories , bus
- Clusters

Programmation
- CPLDs, FPGAs
- Memories Flash
- SPI, I2C ....

Mixed JTAG Tests
- By adding Mechanical Probes.
DIASERVER + MECHANICAL INTERFACE
Diatem Studio is composed of 4 stations to test electronics boards throughout the product life cycle.

- Engineering Station
- Industrialization Station
- Production Station
- Repair & Maintenance

A WorkStation running DiaTem

A Hardware Controller

The Unit Under Test

• UUT 1
• UUT 2
• UUT 3
• UUT 4
# Hardware Controllers

## TEMTAG / JTAG CONTROLLERS

<table>
<thead>
<tr>
<th>TEMTAG USB</th>
</tr>
</thead>
<tbody>
<tr>
<td>From 1 to 4 Ports</td>
</tr>
<tr>
<td>Tck: 1 to 25 MHz</td>
</tr>
<tr>
<td>Voltage: Swing from 1.2 to 5 Volts</td>
</tr>
<tr>
<td>1 USB port for Data and Power</td>
</tr>
<tr>
<td>Possibility to add a 5 V power supply</td>
</tr>
<tr>
<td>HE10 connector</td>
</tr>
</tbody>
</table>

## TEMIO / IO CONTROLLERS / TEST EXTENSION

<table>
<thead>
<tr>
<th>TEMIO 320</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide up to 320 digital IO on 8 connectors</td>
</tr>
<tr>
<td>40 digital IO per connector</td>
</tr>
<tr>
<td>Programmable by bank of 8 IO</td>
</tr>
<tr>
<td>I/O logic levels 1.2V to 3.3V, programmable by Sw</td>
</tr>
<tr>
<td>Tck Hz : 1 to 25 MHz</td>
</tr>
<tr>
<td>JTAG interface voltage 3.3V</td>
</tr>
<tr>
<td>I/O current capability 12mA (3.3V) limited by buffers</td>
</tr>
<tr>
<td>Fully integrated with DiaTem Sw</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEMIO 60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide up to 60 digital IO on 4 connectors</td>
</tr>
<tr>
<td>16 digital IO per connector</td>
</tr>
<tr>
<td>Tck 1 to 10 MHz</td>
</tr>
<tr>
<td>I/O logic level 3.3V</td>
</tr>
<tr>
<td>JTAG interface voltage 3.3V</td>
</tr>
<tr>
<td>I/O current capability 140mA Max (3.3V) (no bufferization)</td>
</tr>
<tr>
<td>Fully integrated with DiaTem Sw</td>
</tr>
</tbody>
</table>
DiaTem Test Flow

DTS design flow

- Import Design Files (Components BSDL & Net List)
- Create a Board Project
- Verify & Debug the JTAG Chain
- Analyze Netlist & Test Coverage
- Identify and Develop Clusters (Using Clusters Library)
- Run Automatic Tests with ATPG
- Program Components (FPGA, Flash Memories)
- Get the Defect Report
- Debug the Design Running (net viewer & interactive debugger)
- Edit a Test Plan for Production
- Export Test Files to Other Diatem Stations (DiaTem or Templayer)

Temento Confidential
DiaTem Repair

Test Plan Report

Project: Project Example
Unit Under Test: TV_Board
Variant: Default
Location: T:\Project_Example\Library\.

Test plan: Test plan

Processing begins: Tue Jan 22 17:53:54 2008

Test plan resume:
- Operation: Parameter(s)
- Test scan chain: checks scan t
- Test interconnect: .file Default
- TCL script: .file
- Result:

Processing ends: Tue Jan 22 17:54:06
Test duration: 6.6 seconds

Skipped operation(s):
- Operation: Parameter(s)
- PLD programming

Diagram of a circuit with components labeled RN10, RN11, R10, C9, and other connections.
DiaServer Test Station

A powerful DCOM architecture to connect DiaTem.exe with any test system
- DiaServer is dedicated to work with any test environment (Test benches, ICT/Customs Equipments etc.)
- Easy integration into any Testers environment using extended API or scripts
- A unique DCOM based client-server architecture (DiaServer), enables rapid third party integration
Screen shots on Teradyne Spectrum showing the calls to DiaTem sessions

(*) integration implemented with C++ interface (DLL)
(**) integration implemented with other test manufacturers Seica, Agilent ICT etc.
A product line dedicated to the production market
TEMPLAYER - HVP STATION

JTAG PRE-TEST SYSTEM CONFIGURATION

ONE PROCESSOR BOARD/ N INSTANCE.EXE / N TEMTAG 1 PORT

Test launching & result getting are independent for each JTAG port

TemPlayer Mgr monitors each DiaServer asynchronously and independently
TEMTAG      UUTs
PROCESSOR BOARD
## Product Offer & Pricing Model

### DIATEM Stations

<table>
<thead>
<tr>
<th>Type</th>
<th>Tap Stations</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classic</td>
<td>1 - 3</td>
<td>Engineering, Industrialization, Production, Repair, Diaserver</td>
</tr>
<tr>
<td>Evolution</td>
<td>1 - 6</td>
<td>Flash Programming, System Merger, Viewer, DCOM</td>
</tr>
<tr>
<td>Performance</td>
<td>Unlimited</td>
<td></td>
</tr>
</tbody>
</table>

### TemPLAYER Stations

<table>
<thead>
<tr>
<th>Type</th>
<th>HVP</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classic</td>
<td>1 - 3</td>
<td>HVP 111, HVP 212, HVP 313, HVP 414</td>
</tr>
<tr>
<td>Evolution</td>
<td>1 - 6</td>
<td>All Included</td>
</tr>
<tr>
<td>Performance</td>
<td>Unlimited</td>
<td></td>
</tr>
</tbody>
</table>

Choose and upgrade your configuration as per your needs!
- DIATEM -
COMPETITIVE ADVANTAGES
**DIATEM COMPETITIVES ADVANTAGES**

- **CA1 - CLIENT SERVER – DCOM ARCHITECTURE**
  - Enable to launch a command or to run a job from a PC (the client) over a LAN to a Server (link to a UUT)
  - Easy integration with any OLE automation tools and languages e.g./ Lab View, Visual Basic, C, C++, Tcl, Test Stand etc..
  - Then, enable to equip any test systems with our BS engine called DiaServer (integration with any bed of nails, Emulation tools, ICT and Functional test equipments e.g./ Spectrum Digital, Teradyne, Agilent, SEICA etc..)

- **CA2 - NO PROPRIETARY LANGUAGE! OPEN SOURCE**
  - DiaTem uses the popular TCL open source Scripting language
  - Easy learning, ease of use, well adapted to test programs
  - Worldwide use by a community of more than 200,000 users
  - No dependency of the JTAG tool supplier and its associated language

- **CA3 - NO COMPILATION TOOL**
  - No compilation required for your test programs
  - Any individual test can be written and applied on Fly over the UUT
  - Reduction of the time to develop and to optimize test programs
  - More powerful diagnostic and fast debugging due to the “on the fly test” adaptation

- **CA4 – DIRECT PC - UUT COMMUNICATION**
  - No programs and data storage stored on the JTAG controller
  - Enable powerful interactive debugging and test programs adaptation
  - You master your test program (no black box)
  - Reduction of the time required to apply the tests
WHY CHOOSING DIATEM PRODUCT LINE?

- **CA5 – HIGH TEST DATA COHERENCY AND ROBUSTNESS**
  - One data base per project and for all board test data
  - Very high data coherency (because the overall data base is permanently updated)
  - Better security (data located in one place)
  - Quick data access during the process flow (all data are permanently in the memory)
  - Quick data update for any modifications done by the user on data files
  - Better capacity to manage multiple versions of the same board “variant” and large systems

- **CA6 – “ALL IN ONE” PRODUCT LINE**
  - Full integrated product, Not an aggregate of several Modules.
  - All is included, only several options
  - Purchase the product adapted to the complexity of your board and not as the type of functions you need