Agenda

1. Introduction
2. Services
3. Capabilities
4. Team
5. Case Studies
6. Logistics
7. Contacts
Introduction

- Semiconductor IC Test Company founded in 2005
- Product Test Engineering & Application Support Services
- Focus on servicing global Semiconductor Companies
- Headquarters & Operations in Chennai, India.
- Part of Valingro Group of Companies
- Significant association with other Sub-cons
- Training Academy - AlphaOmega Institute for Semiconductors
Vision & Mission

Vision

Consistently excel in Semiconductor Test Solutions for global IC & ATE Customers

Mission

Exceed the fast emerging needs of our Customers by:

- Accelerating time-to-market thru continuous Innovation & high Quality
- Providing unparalleled Service that is Versatile & Cost–effective
1. **Business Ethics** - defines us as a Company

2. **Professionalism** - defines us as Individuals

3. **Citizenship** - defines our Contribution to Society
Corporate Objectives

1. Profit - earnings that enable achieving our other 4 Objectives
2. Client Satisfaction
3. Competence
4. Employee Satisfaction
5. Growth
Services Offered

1. Test Plan Derivation
2. Hardware load board and DUT board design & fabrication
3. Test program generation
4. Test program debugging & correlation
5. Product characterization
6. Test time optimization
7. Wafer Sort Verification & Testing
8. Final Device Testing using developed set-up
Allied Services

- Onsite Test Engineering Support
- Associated partners for the following:
  - Prototype Samples Packaging
  - Surface Mount Package – Production Assembly
  - Lead Scan / Tape & Reel Finish Process
  - New Product / Package Qualification
  - Long Term Reliability tests - HTOL, HAST, TMCL, Autoclave, etc.
  - External & Internal Failure Analysis – X-ray & Decap
  - Other Failure Analysis like ESD, Latch-up & CSAM
<table>
<thead>
<tr>
<th>SI #</th>
<th>Reliability Test Name</th>
<th>Jedec Ref#</th>
<th>Test Conditions</th>
<th>Test duration</th>
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<tbody>
<tr>
<td>1</td>
<td>Pre-conditioning test</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Initial CSAM inspection</td>
<td>J-STD-020C</td>
<td>-</td>
<td>-</td>
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<tr>
<td></td>
<td>Temperature Cycling</td>
<td>JESD 22 A113-E</td>
<td>-40°C to +60°C</td>
<td>5 Cycles</td>
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<tr>
<td></td>
<td>Stabilization Bake</td>
<td></td>
<td>125°C</td>
<td>24 Hrs</td>
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<tr>
<td></td>
<td>Moisture Soak</td>
<td></td>
<td>85°C / 85% Rh</td>
<td>168 Hrs</td>
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<tr>
<td></td>
<td>Solder Reflow</td>
<td></td>
<td>260°C</td>
<td>3 Cycles</td>
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<tr>
<td></td>
<td>Final CSAM inspection</td>
<td>J-STD-020C</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>High Temperature Storage test</td>
<td>JESD 22 A103-C</td>
<td>150°C</td>
<td>1000 Hours</td>
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<tr>
<td>3</td>
<td>High Temperature Operating Life Test</td>
<td>JESD 22 A108-C</td>
<td>125°C, Max Vdd</td>
<td>1000 Hours</td>
</tr>
<tr>
<td>4</td>
<td>HAST Test</td>
<td>JESD 22 A110-C</td>
<td>130°C, 85% RH</td>
<td>96 Hours</td>
</tr>
<tr>
<td>5</td>
<td>Pressure Pot Test</td>
<td>JESD 22 A102-C</td>
<td>121°C,100%Rh</td>
<td>168 Hours</td>
</tr>
<tr>
<td>6</td>
<td>Temperature Cycling test</td>
<td>JESD 22 A104-C</td>
<td>-60°C to +150°C</td>
<td>1000 Cycles</td>
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<tr>
<td>7</td>
<td>ESD Test</td>
<td>JESD 22 A114-D</td>
<td>-</td>
<td>-</td>
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<tr>
<td>8</td>
<td>Latch Up Test</td>
<td>JESD 22 78A</td>
<td>-</td>
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## FA Services

<table>
<thead>
<tr>
<th>SI #</th>
<th>Test Description</th>
<th>Manufacturer</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Optical Inspection at 1000X</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>X-ray Inspection for internal assembly abnormalities</td>
<td>Phoenix, Germany</td>
</tr>
<tr>
<td>3</td>
<td>Scanning Acoustic Microscopic Inspection (Through Scan, C-scan, B-scan &amp; A-scan)</td>
<td>Sonix, USA</td>
</tr>
<tr>
<td>4</td>
<td>Chemical Decapping</td>
<td>Nisene, USA</td>
</tr>
<tr>
<td>5</td>
<td>Cross Sectional analysis</td>
<td>Buehler, USA</td>
</tr>
<tr>
<td>6</td>
<td>Die Shear Test</td>
<td>HMP, USA</td>
</tr>
<tr>
<td>7</td>
<td>Ball Shear Test</td>
<td>Royce, USA</td>
</tr>
<tr>
<td>8</td>
<td>Wire Pull Test</td>
<td>HMP, USA</td>
</tr>
</tbody>
</table>
Capabilities - Product

- High Speed Digital Logic
- Clock Drivers, Buffers, PLL & VCO
- Power Management Devices
- Mixed Signal ASIC Products
- Integrated Passive Devices (R, RC & RCD Networks)
- Industrial Analog Devices
- Audio, Video & Telecom ICs
Capabilities - Platform

Existing

- Verigy 93k Pin Scale Digital Test System
- Eagle ETS 364 Mixed Signal Test System
- Credence ASL 1K Mixed Signal Test System

Proposed

- High End Mixed Signal Test System – Verigy 93K
- RF Test System
# Capabilities – Eagle ETS 364

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
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</thead>
<tbody>
<tr>
<td>Max I/O channels</td>
<td>64</td>
</tr>
<tr>
<td>Max Vector Rate</td>
<td>133 MVPS</td>
</tr>
<tr>
<td>Max Vector Depth</td>
<td>8 M</td>
</tr>
<tr>
<td>Memory Capture</td>
<td>1 M</td>
</tr>
<tr>
<td>Fail Memory Depth</td>
<td>8 K</td>
</tr>
<tr>
<td>Serial Mode</td>
<td>8 M, 16 M, 32 M</td>
</tr>
<tr>
<td>Driver Level</td>
<td>-1.0 to 7.0 V; 16 Bit</td>
</tr>
<tr>
<td>Current Range</td>
<td>32 mA</td>
</tr>
<tr>
<td>Driver Slew Rate</td>
<td>2 V / nS</td>
</tr>
<tr>
<td>Min. Pulse Width</td>
<td>4 nS</td>
</tr>
<tr>
<td>Formats Supported</td>
<td>NR, RO, RZ, CS, ZS, CPS, CPE, KN, KT</td>
</tr>
<tr>
<td>Receive Bandwidth</td>
<td>&gt; 150 MHz</td>
</tr>
<tr>
<td>Time Sets</td>
<td>4 Unidirectional Per Pin</td>
</tr>
<tr>
<td>Timing Resolution</td>
<td>&lt; 100 pS</td>
</tr>
<tr>
<td>Skew</td>
<td>&lt; 250 pS</td>
</tr>
</tbody>
</table>
## Capabilities – Eagle ETS 364

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Resolution</th>
<th>Range</th>
<th>Channels</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Voltage Force</strong></td>
<td>16 Bit</td>
<td>± 10, 30 V</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>16 Bit</td>
<td>± 100 V</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>18 Bit</td>
<td>± 10, 30, 100 V</td>
<td>4</td>
</tr>
<tr>
<td><strong>Current Force</strong></td>
<td>16 Bit</td>
<td>± 10, 100 uA; ± 1, 10, 100 mA</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>16 Bit</td>
<td>± 1, 2, 20, 200 uA; ± 2, 20, 200 mA; ± 1, 2, 40 A</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>18 Bit</td>
<td>± 1, 2, 10, 20, 100, 200 uA; ± 1, 2, 10, 20, 100, 200, 500 mA; ± 1, 2 A</td>
<td>4</td>
</tr>
<tr>
<td><strong>Voltage Measure</strong></td>
<td>16 Bit</td>
<td>± 10, 30 V</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>16 Bit</td>
<td>± 100 V</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>18 Bit</td>
<td>± 0.5, 1, 2, 5, 10, 20, 30, 50, 100, 200 V</td>
<td>4</td>
</tr>
<tr>
<td><strong>Current Measure</strong></td>
<td>16 Bit</td>
<td>± 1, 2, 20, 200 uA; ± 2, 20, 200 mA; ± 1, 2 A</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>16 Bit</td>
<td>± 500 mA</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>16 Bit</td>
<td>± 40 A</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>18 Bit</td>
<td>± 10, 100 uA; ± 1, 10, 100 mA; ± 1, 2 A</td>
<td>21</td>
</tr>
</tbody>
</table>
Capabilities – Eagle ETS 364

- High Voltage & Current Handling: ±100V, 40 A
- Per Pin Digital Architecture with On-Board DSP
- Time Measurement Unit with 5 ps Resolution
- High Precision Voltage Digitizer: 4 uV Resolution, 4 MHz BW
- High Speed Digitizer: 4 GSPS, 1 GHz BW
- Programmable Low Jitter Clock Source: 10 MHz to 1 GHz
- Programmable V/I Waveform Generator in each Analog Channel
- Robust math & data analysis Library
- True Parallel Multi-site Testing possible
Capabilities – Verigy (Agilent)

- Trained Engineering Manpower in 93K SoC systems
- Offline System with HpSmarTest for program development
- Vector Conversion Tools for wgl, stil & vcd patterns
- ATE with 128 Channel PS400 & MSDPS Resources
- Onsite Consultation & Engineering Assistance
- Closely Associated Partner for High End ATE Needs
- Mixed Signal & High Speed Digital Capability
- ATE with P1000, NP2500, AV8 & TIA Resources
### Capabilities – Road Map

<table>
<thead>
<tr>
<th>Product / Year</th>
<th>Existing</th>
<th>2012</th>
<th>2013</th>
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</thead>
<tbody>
<tr>
<td>High-End RF</td>
<td></td>
<td></td>
<td>✯</td>
</tr>
<tr>
<td>High-End Mixed Signal</td>
<td></td>
<td>✯</td>
<td></td>
</tr>
<tr>
<td>High-End Digital</td>
<td>✯</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power</td>
<td>✯</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low-End Mixed Signal</td>
<td>✯</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Low-end Mixed Signal & Power Products Capabilities since 1996*
## Capabilities – Reliability

<table>
<thead>
<tr>
<th>SI #</th>
<th>Equipment</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Burn-in</td>
<td>Blue-M, USA</td>
</tr>
<tr>
<td>2</td>
<td>Temperature &amp; Humidity</td>
<td>Blue-M, USA</td>
</tr>
<tr>
<td>3</td>
<td>Temperature Cycler</td>
<td>Blue-M, USA</td>
</tr>
<tr>
<td>4</td>
<td>HAST</td>
<td>Hirayama, Japan</td>
</tr>
<tr>
<td>5</td>
<td>Dry Heat (Class 100) Oven</td>
<td>Labline, USA</td>
</tr>
<tr>
<td>6</td>
<td>Autoclave</td>
<td>Hirayama, Japan</td>
</tr>
<tr>
<td>7</td>
<td>Steam Ager</td>
<td>Mountain Gate, Singapore</td>
</tr>
<tr>
<td>8</td>
<td>Solder Pot</td>
<td>HMP, USA</td>
</tr>
<tr>
<td>9</td>
<td>Lead Integrity Tester</td>
<td>HMP, USA</td>
</tr>
<tr>
<td>10</td>
<td>Reflow Oven</td>
<td>Heller, USA</td>
</tr>
</tbody>
</table>
Professional Team

- Promoters with proven track record
- Well Experienced Leadership
- Talented Test Engineers
- Qualified & Skilled Technicians
- Proficiency in Communicating in English
- Low Direct Labor Cost
- Ready availability of Engineering Resources for expansion
Case Studies
(more cases on our Website)

- Audio / Video Decoders
- Notebook DDR Power Controllers
- White LED Charge Pump Drivers
- Li/ Ion Battery Chargers
- Hearing Aid DSP Controller
- MEMS Clock & EMI Clock Synthesizers
- Digital Multiphase Controllers
- Power Interface Switch Products
- Dynamic Beam Steering Controller
- RF LDO, FET, Laser Diode Drivers and much more
Key Technical Highlights

- 400 MHz Base-band Frequency Measurement
- 12 Bit DAC – INL & DNL Measurements
- Serial I2C Bus Test for Various Registers Entry
- 10 pF Capacitance Measurement in guarded network loops
- Clock Generator Product Verification
- Scan Chains with 9000 FF and 3 Meg Vector Patterns
- Multi Site Solution & Test Time Reduction by 50%
Verigy Highlights

- 12 Meg Scan Vectors Conversion & Debugging
- PCIE Interface Testing @ 2 GHz using NP 2500
- 10 Bit Video ADC Testing using AV8 Module
- 16 Bit Sigma Delta Audio ADC Testing using AV8 Module
- Both Single & Differential Ended ADC Tests
- Multiple Clocks using Multi-port Technique
- Multi Site Production & Characterization Solutions
Verigy Highlights (Contd)

- HP83K/93K, Adv T6575, D10 & Catalyst ATE Expertise
- Scan/ATPG Tools Usage, Memory Repair, Bitmap generation
- Network Processor, 3D Video Graphic Processor, Port ASICs
- 10 Gig Ethernet Switch, Queuing, Memory, PCI Bridge Products
- FPGA Device Testing – 20 Sites, 1000+ Probes
- Vector Conversion, JTAG Timing, LBIST, Loopback Test, etc
Verigy Highlights (Contd)

- Strong Scripting Skills - PERL, C & C++
- Scripts to analyze tester logs for yield enhancement
- ATPG Test Data Compression for reduced ATE Patterns
- Functional Design Verification for GSR & HFR ASICs
- Knowledge of VERA & Specman tools
- Block & Chip Level Test Cases Implementation
- DFT Structures & Implementation to reduce DPPM
Logistics

- Green Channel Status for Imports & Exports
- Zero Duty
- No Open Inspection
- Clearance within 6 Working Hrs
- Easy Equipment Consignment In & Out of our Facility
- Daily Direct Flights to US, Europe & Asia Pacific
ChipTest - USP

- Turnkey Test Engineering & Production Support
- Cost-effective Test Solutions – Offshore & Onsite
- Talented Hardware & Programming Skills
- Excellent round-the-clock Customer Service
- Proven track record with Focus on long term Values
- Continuous and Standardized Training Methodologies
- Closely Associated partner for Packaging Support
Contacts

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Please visit our Website for

- Resource, Capability Details
- Projects Case Study Details
- ChipTest’s News and Events
- Indian Electronic Hardware Industry News
- Global Semiconductor Industry News
AlphaOmega Institute for Semiconductors

- Unique one for Semiconductor Training in India
- 6 months PG Diploma Course in IC Assembly & Test
- Incumbents are the Engineering graduates
- Practical Online Training with State of the Art Equipments
- Dissertation in Tester Software & Hardware in ATE
- Trained Professionals readily available for expansion
Valingro Group Profile

- Focused on Innovation & Growth
- Building Specialized Businesses
  - Semiconductor Assembly & Test
  - IC Test Engineering
  - Enterprise IT
  - Bio-Solutions
  - Engineering Design
  - Trading & Warehousing
  - Property Management
- Leadership Development & Corporate Communications
- Over 1000 people in above Companies
About Chennai, Tamilnadu

- Tamilnadu # 1 for Technical Education in India
- World Class Engineering Universities: IIT & MIT
- Abundant Low Cost Skilled Manpower
- Global Connectivity with modernized Airport and Seaport
- Investor Friendly Government Support for Hi-Tech Industries
- Quality High Speed Internet Connectivity
- Excellence in Software, IT Skills & Services
- Strong Manufacturing & Engineering Industry Base
About Tamilnadu - Continued

- 252 Engineering Colleges
  Annual turn-out 79,800 Graduates

- 230 Polytechnics
  Annual turn-out 63K Technicians

- 626 Industrial Training Institutes
  Annual turn-out 113K Operators