Detecting Counterfeit ICs
Risk mitigation with electrical test
Solutions for Maintenance and Sustainment of critical electronic systems

- Increased Asset Availability
- Shorter Repair Times
- Cost Savings and inventory reduction
- Ability to support legacy and 3rd party equipment
- Independence from OEM
- Control Obsolescence
- Component, Asset and Stock Validation

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• Over 20 Years addressing “how to test” components In-Circuit.
• Validating the functionality of IC’s and identifying:
  – defective, incorrect, damaged and good parts.
• Diagnosys developed functional test programs for over 50,000 different components.
• Worked closely with Defense groups in many countries
• Contracts with most of the major Primes
• The US Navy (NAVAIR) has standardized on our IC validation tools in their circuit board repair depots and on ships in the fleet.
Key Affiliations

NAVAIR PMA-260 established PinPoint II-R as part of CCTARS

AMCOM EXPRESS – U.S. Army Aviation and Missile Command (AMCOM)

Tactical Missiles Supplier Preferred Vendor program

Alliance Partner - VAR Plus status

Approved Contract Holder since 1999

Active member of the National Defense Industrial Association

CMMI Level 2 Certified – working to Level 3

ISO 9001:2008 Certified
Counterfeit Focus Area

- Component Validation and Risk Mitigation with Electrical Test.
  - Validates the component functions they way it should
  - Validates the component is operational
  - Validates the component can operate at varying temperatures
  - Assesses if there is any likely ESD damage
  - Does not require a Golden unit
  - Non destructive methods used
## Solution Comparison

<table>
<thead>
<tr>
<th>Issue</th>
<th>Mitigation Solutions</th>
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<tbody>
<tr>
<td></td>
<td>Physical inspection</td>
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<tr>
<td></td>
<td>Electrical test</td>
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<tr>
<td></td>
<td>Optical</td>
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<td></td>
<td>X-ray</td>
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<td></td>
<td>Curve Tracer(VI)</td>
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<td></td>
<td>Functional Component Test</td>
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<tr>
<td>Re-labelled device</td>
<td>Yes</td>
</tr>
<tr>
<td>Wrong functionality</td>
<td>Yes</td>
</tr>
<tr>
<td>Empty package</td>
<td>Yes</td>
</tr>
<tr>
<td>Wrong die</td>
<td>Yes</td>
</tr>
<tr>
<td>Previously failed device (power on)</td>
<td>Yes</td>
</tr>
<tr>
<td>Reference device required</td>
<td>Yes</td>
</tr>
<tr>
<td>Operates at Hot/Cold temp</td>
<td>No</td>
</tr>
</tbody>
</table>

| Issue                                      | Mitigation Solutions |
|                                            | Found                |
|                                            | Not found            |
|                                            | May find             |

Legend:
- **Found**: The solution is applicable and the issue is resolved.
- **Not found**: The solution is not applicable and the issue remains.
- **May find**: The solution may be applicable, but further investigation is required.
Solution Comparison

Cost

$<10K    $25K   $50K   $100K   $150K   $200K   $500K   $1M+

Test Services

Curve Tracer    X-Ray Inspection    Component Test

Optical Inspection

Test Coverage

Basic    Medium    High

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Pros:
- Best method to test that a device has been manufactured to the OEM design specifications and is working correctly.
- Ideal for component Characterization

Cons:
- Initial Cost of Equipment $200K and UP
- Program development cost - estimated $10K+/program
- Interface costs - estimated $10K+ for each DUT type
- Time to develop a program – weeks /months
- Component Test time - Hours
- Annual maintenance costs
- Skilled labor
Characterization:
- Extensive testing and analyzing of all technical facets of a component.
- A sampling process to prove or disprove that components will perform functions with the technical characteristics for which they were designed.
- Essential for Semiconductor manufacturing prior to volume production.

Validation:
- Electrical / Functional Test process to validate the operation and integrity of a component.
- Validates the component performs as per the OEM data sheet.
- Validates the component is operational and not defective.
- Validates the component has the correct die.
- Validates the component performs as per the Part Number.
- Validates the component operates at specific temperatures ranges.
A Low cost electrical test platform with:

- Low cost program development
- Rapid Program development
- Flexible Interface adapter to accommodate different package styles
- Extensive Program Library with pre-written tests
- Simple operator interface for ease of use
- Environmental test option (Hot/Cold)
- Test results showing what passes and what fails
- Traceability: Proof that what you are providing your customer is not counterfeit.
PinPoint Alpha and Sigma series
- Dynamic electrical test systems
- 48 to 640 Test Channels
- Test Rate Programmable up to 25MHz
- Configurable and Upgradeable
- Digital, Analog & Mixed signal test vectors
- LCR Bridge
- Self contained DUT power supplies
- Standard library with >50,000 programs
- Boundary Scan where compatible
- Compact Bench top system
Functional Test Vectors

- Uses test vectors (input and output patterns) in a test routine
- Test routines are created from the OEM datasheet
  - Extensive PinPoint library of over 50,000 proven test routines
- Provides an in-depth power-on test of device functionality
- Rapid test delivering confidence in IC functionality
- Can be digital, analog or mixed signal test vectors
- Will identify
  - Wrong die / function
  - Faulty device
  - Electrostatic damage (ESD)
  - Empty package
  - Wrong pin-out
  - Shorts and open

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Test Program Development Services

- Typical development time 1 to 2 weeks
- Express development available for program conversion
- Different levels of component programs available
- Remote validation of programs (Ultra VNC)
- Boundary Scan - BSDL conversion
- Curve Trace from Golden unit – (option)
- User Programmable option
Universal Component Interface Adapter - UCIA

- 96 to 640 Pins
- Routes Digital and Analog signals
- Programmable Power Supplies
- Automatic Power Routing (APR)
- Quick-Connect interface for easy switching of DUT Carriers
- Simple operator mode
Flexible DUT Interface

• Features
  – Device Under Test (DUT) Global Unique Identifier (GUID).
  – Low Cost DUT Carrier (DUC) design
  – Customer Controlled Design
  – Flexible design architecture for virtually any Package style:
    Includes:
    DIL, SOIC, PLCC, SSOP, TSOP, PQFP, PGA, BGA
    Transistor Module
Dynamic electrical test will:

- Find faults other methods can’t
- Provide confidence at In-Bound Inspection
- Validate stock holding
- Increase customer confidence
- Eliminate or reduce the need for external testing
- Mitigate the risk of counterfeit devices
QUESTIONS?

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