
EE434

ASIC & Digital Systems

Introduction

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Goal of Testing

- Ascertain whether a system behaves correctly.
- If incorrect behaviors are detected, diagnose (locate) the cause of the misbehaviors.

Causes of Errors (Human Errors)

- Design errors
 - Incomplete/inconsistent specifications
 - Incorrect mappings between design levels
 - Design rule violations
 - ...
- Fabrication errors
 - Wrong components
 - Incorrect wiring
 - ...

Causes of Errors (Human Errors)

- Fabrication defects
 - Result from an imperfect manufacturing process.
 - Short defects
 - Open defects
 - Mask misalignment
 - ...
- Physical failures
 - Component wear-out
 - Electromigration
 - Corrosion
 - Environmental factors (temperature, humidity, ...)

Classification of Physical Faults

- Permanent
 - always present after their occurrence
- Intermittent
 - only during some intervals
- Transient
 - one time occurrence caused by temporary changes

Terminologies

- On-line testing
 - Testing is performed during normal system operations.
- Off-line testing
 - Testing is performed as a separate activity.
- Self-testing
 - Sources for stimuli are within the system itself.
- External testing
 - Sources for stimuli are applied by an external device.

Terminologies

- At-speed testing
 - Stimuli are applied at the normal operating speed.
- Compact testing
 - Some function of output patterns (instead of output patterns themselves) are observed.