Accelerated Lifetime Testing:

Background Research and Protocol Development

Mani G. TamizhMani
Arizona State University

manit@asu.edu

Solar ABCs

PV Stakeholder Meeting

October 15, 2010

It is a two-part study

Limited to crystalline silicon

Part 1: Background Research

- **Typical failures** *(not universal or specific climate)*
  - **Identify field failures**
    - ***Visual/cosmetic/degradative & Catestrophic***
  - **Classify field failures**
    - ***Failure Mechanism, Mode, Cause & Effect***

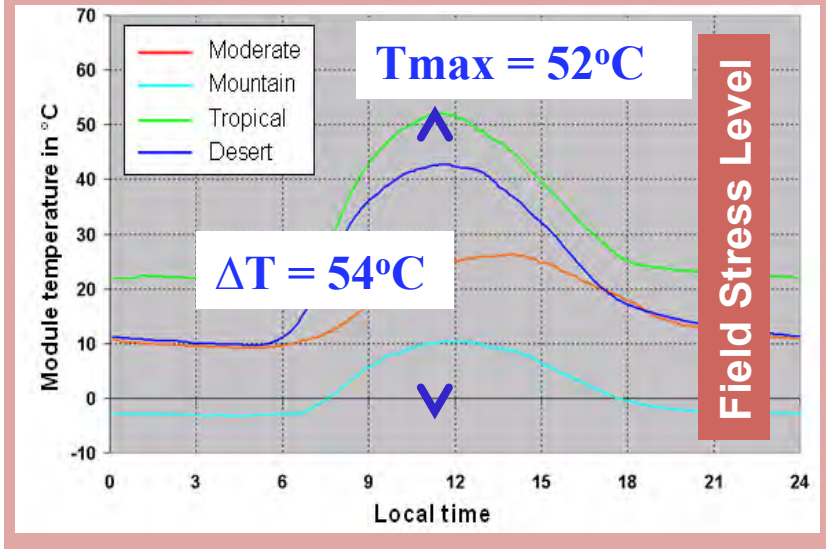
Typical failures – A few examples

- Delamination
- Bubble generation
- Encapsulant discoloration
- Interconnect discoloration
- Cell discoloration
- Broken interconnects
- Broken cells
- Corrosion
- Solder bond failures
- Broken glass
- Hot Spots
- Ground faults
- Junction box detachment
- Junction box arcing
- Interconnect arcing
- Cable/connector deterioration
- Backsheet cracking
- Backsheet burning

Part 2: Testing Protocol Development

- **Typical protocol** ***(not universal or specific climate)***
- **Cost consideration**
- **Time consideration**

Part 2 – Testing Protocol Development:
An Approach



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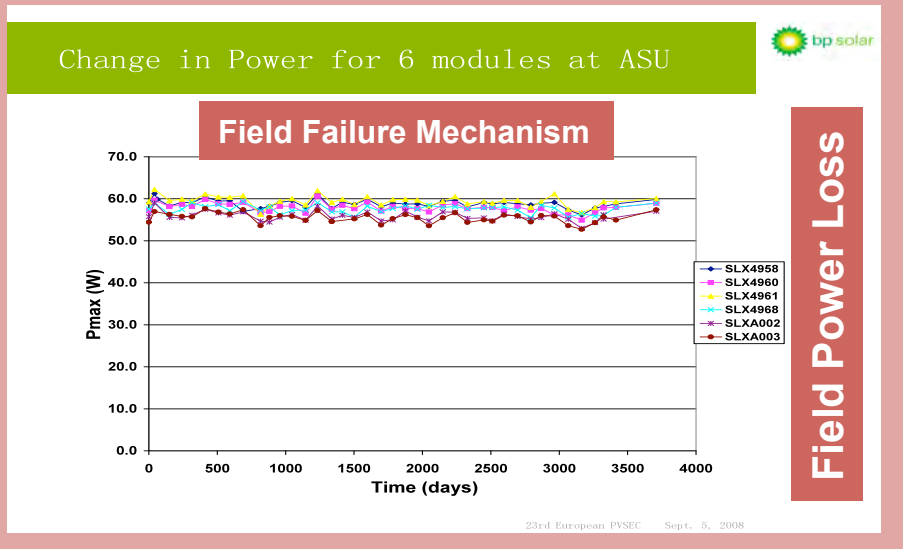
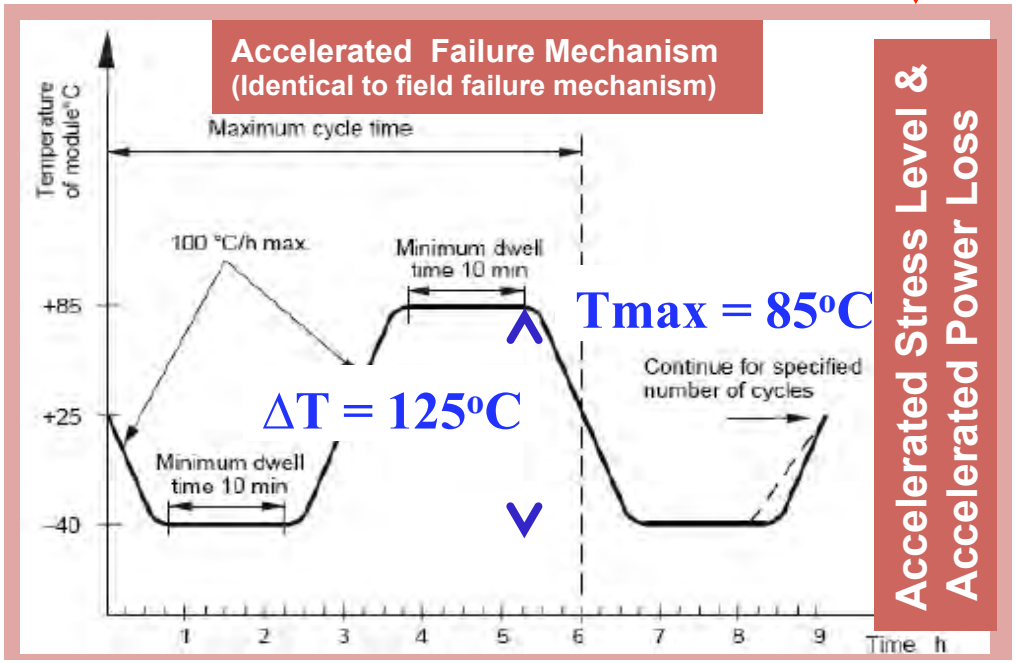
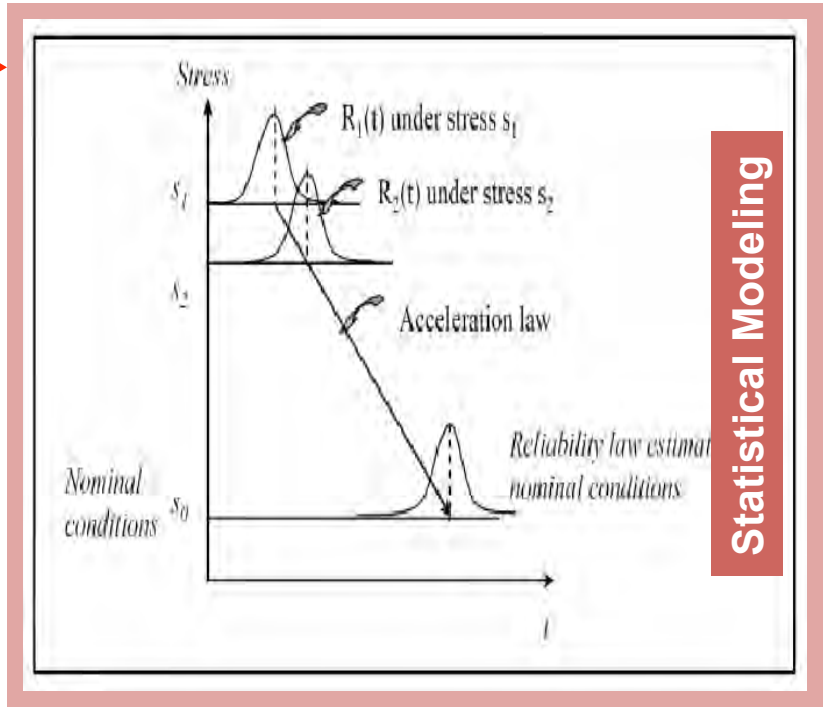


Determine acceleration factor



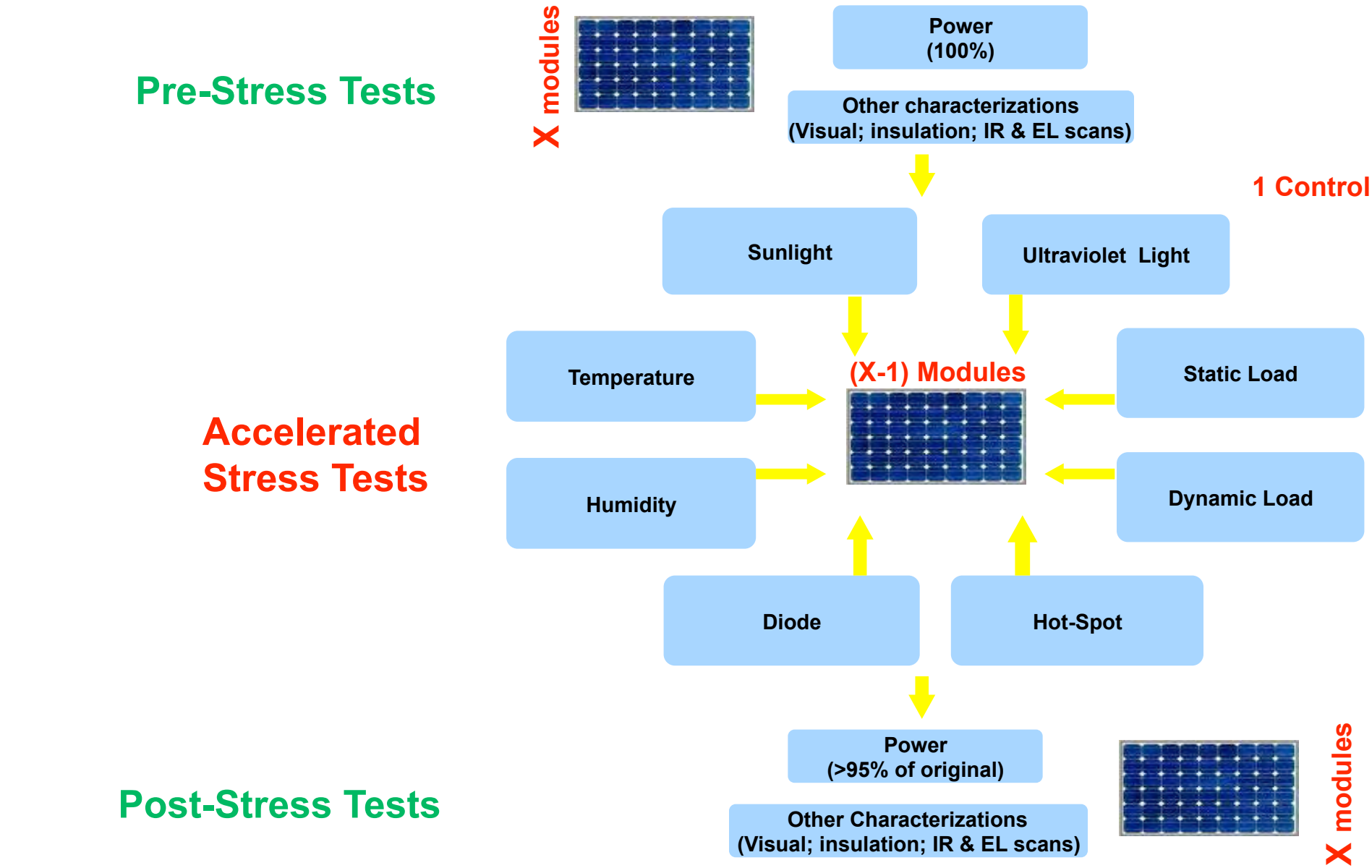
Determine Lifetime



Part 2 – Testing Protocol Development:

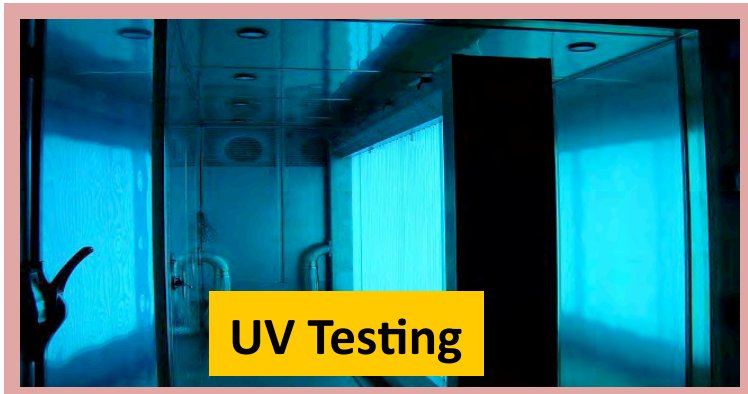
Goal 1: Identify accelerated tests and test sequences *(Multi-stress: series/parallel/simultaneous)*

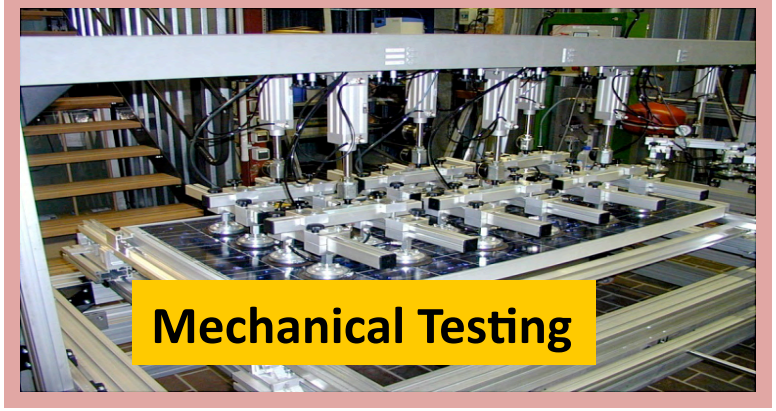
Accelerated Testing Concept



Part 2 – Testing Protocol Development:
Goal 2: Identify required test equipment and test results

Test Equipment Used





Pre- & Post-Test Results