

EUFANET Workshop 2011

Advanced FA challenges in modern non-digital products

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Success Analysis
Accelerate Product Release

PRESTO
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Contents

- **“Analog Products” : why different for F.A. ?**
- **FA flow and analog challenges**
- **Laser Stimulation / Soft defect localization**
- **IR Thermography**

Analog product...Analog World

- **Integration trend : at package level**
 - “Black box” system
 - 3D trend (Power IC, TSV)
- **Assembly & Process mix : pick-up your flavor**
 - Au,Cu,Al wirebonding, Flip-chip...
 - Si, SiC, AsGa... : which FA camera wavelength is best ?
 - MEMS, Power components, small and large ICs
 - Full analog to Mixed IC in CMOS 45nm
- **Analog FA : fuzzy logic ?**

Maybe Yes ... Maybe No

FA flow : Some challenges ?

Electrical diagnosis

- As complete as possible
- FA board vs. Test board : understand differences
- Identify environment sensitivity (parasitic / noise)

Non destructive analysis

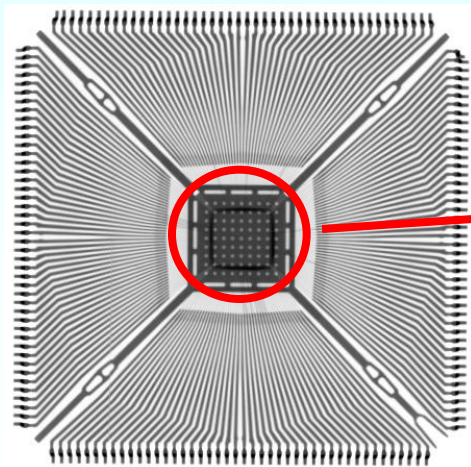
- Often insufficient for root cause but...
- Bypassing it is hazardous
- Check the evidence.

Sample Preparation

- Front side or Back side analysis ?
- Where is your Region Of Interest ?
- Can you still test your product after preparation ?

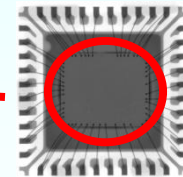
FA flow challenges

- **Package decapsulation & Electrical testing**
 - Keep electrical functionality & provide IC access for analysis
 - Small package & large IC is a challenge
 - *Mechanical stress induced by decapsulation (molding / leadframe)*
 - *Package contact with PCB after decapsulation*
 - *Dedicated low profile open top socket required for EMMI/TLS*
 - *Repackaging strategy for FA not always considered (+ risk).*



QFP package

**Optical
Area of interest
For FA**



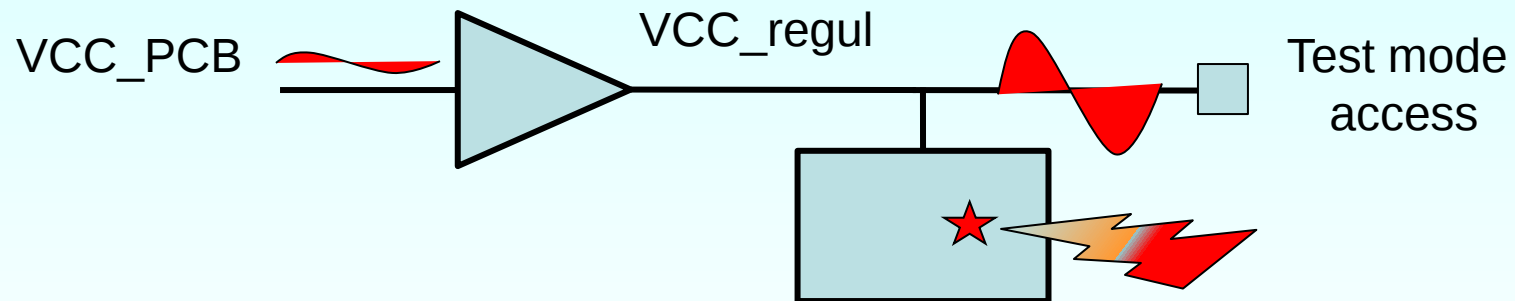
QFN package

FA tool : Laser stimulation

- **TLS (Thermal Laser Stimulation)**

- Powerful FA tool for analog
- Need external symptom that a change due to Laser occurs.
- Access to internal nodes to bypass “blocking” functions :

Design For Analysis (DFA) approach

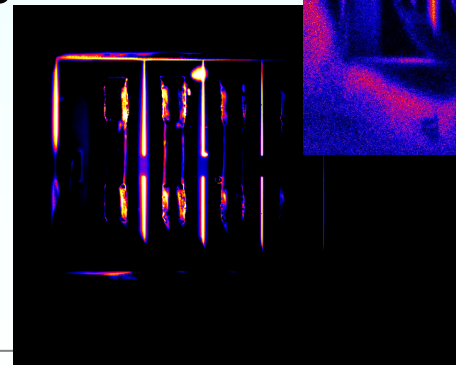
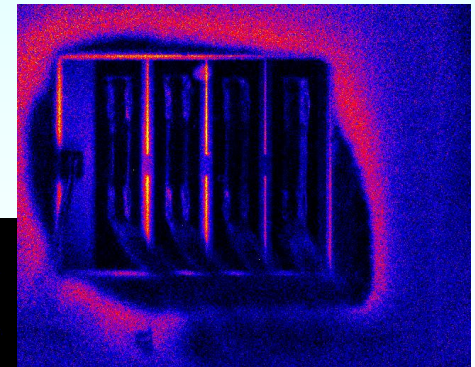
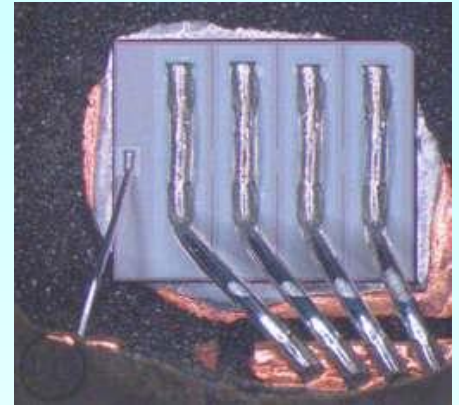


- **TLS + SDL (Soft Defect Localization)**

- Close the loop of the TLS with an external diagnosis box.
- Product performance : limited only by FA measurement.
- Not only on a pass/fail criteria : use of analog scale !

FA tool : IR thermography

- **FA analysis issue for Power MOS :**
 - High power testing on stand alone component
 - FA tools (TLS, EMMI) limited by top metal layers blocking information.
 - Backside FA (through silicon) means more invasive sample preparation
- **IR Thermography**
 - Package top decapsulation is enough
 - ~ possible resolution of about 5 μ m
 - Lock-in mode for hot spot detection
 - Well suited for low ohmic short



Thanks for your attention

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