HDP User Group International, Inc.

Reliability of Halogen-free Printed Circuit Board Assembly

ITRI, Taiwan

2007/9/19

Purpose

- DELL has built up the guidelines and database for the properties of halogen-free materials, we think the next step is to prove the halogen-free components and PCBA are reliable.
- In the phase one, the suppliers of solder mask, CCL, RCC, PCB and EMC will be invited to join this project, especially Taiwanese supplier.

Objective

- We will lead the halogen-free materials made by the Taiwanese suppliers, such as Nanya, Eternal, Edale and Career in this project and qualify the reliability of components and PCBA. The results will be benefit to all the HDP members to plan your roadmap for halogen-free.

Project Goals

- In phase 1, we will focus on the PCB materials, such as CCL, RCC and solder mask, and EMC. Celestica is in charge of PCBA, and ITRI takes charge of the fabrication of PCB and reliability tests. We will have,

  1. a completed report in member meeting
  2. conference papers in IPC and ECTC

Reliability of Halogen-free PCBA

Project Task	When Complete
Plan Project	200711
Board design and verification	200801
Approval by project members	200802
All components received	200804
Fabricate and electrically test boards	200805
Prepare wiring for Data Acquisition Sys.	200806
Assemble & inspect boards	200807
Data Acq. wiring soldered to all boards	200807
Start Thermal Cycle (ATC) Tests	200808
Run Shock and Vibration Tests	200808
Stop ATC Tests	200809
Start Failure Analysis	200808
Complete Failure Analysis	200810
Complete Project Report	200810
Publish report to HDP Membership	200810

Technical discussion

- The expected test vehicles in this project are cell, GPS and NB, Taiwanese suppliers will provide all the halogen-free CCL, RCC, solder mask and will make the necessary PCB. The member(s) of package house will also receive the halogen-free EMC from us. Celestica will be in charge of the PCBA, and ITRI will play as an integrator and take charge of all the reliability tests.

Resources

- Up to now, we already prepare most halogen-free materials, and build up the capabilities of PCBA and reliability tests. However, we still need your supports on the design of test vehicles, providing the halogen-free substrate, and packaging various active components. If no member can provide the passive components, ITRI will purchase them via outsourcing.

Current Team Members

- ITRI and IST (Reliability tests and FA)
- DELL (NB test vehicle)
- Celestica (PCBA)
- Nanya (Halogen-free CCL and RCC),
- Career (Rigid-Flex PCB), Tripod, Unimicron
- Eternal (Halogen-free solder mask)
- Edate (Halogen-free EMC)
- Shenmao (Halogen-free solder paste)

PCB-level reliability test

Suggested Tests – TBC by project definition team

- Pad peeling test (Nanya)
- ICT (ITRI)
- CAF resistance (Career and ITRI)
- SIR and EM (ITRI)
- Barrel test (Career and ITRI)
- Pad Cratering (ITRI)
- Solderability (ITRI)
- Delamination (Career and ITRI)
- T_g, T_d and CTE (Career and ITRI)

Package-level reliability test

Suggested Tests – TBC by project definition team

- Moisture sensitive level
- TCT
- TST
- HAST
- PCT
- High temperature storage

All the tests should be performed by the team member of package house.

Board-level reliability test

Suggested Tests – TBC by project definition team

- TCT (ITRI)
- Mechanical shock (ITRI)
- Drop test (ITRI)
- 3-points bending (ITRI)
- Random vibration (ITRI)
- Others suggested