IPC Midwest 2011

The Uncertainty of Surface Insulation Resistance/Electrochemical Migration Performance of Completed Assemblies

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Executive Summary:

The breadth of materials and processes used in today's electronic assemblies may make it impossible to predict SIR/ECM performance without adequate testing of material and process combinations. Some materials behave very well when tested singularly, yet behave very poorly when used together. This is of great importance as most possibilities coexist on real-world industry product. This presentation will provide a survey of actual results with broad, non-brand specific categories of materials and process combinations. Some trends will be presented to help the audience appreciate areas of possible concern.

IPC Midwest Technical Conference Session S01

Test and Measurement Solutions

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The Uncertainty of SIR/ECM Performance of Completed Assemblies

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Overview

- Many materials and processes are used
- They are usually qualified singularly
- Some materials behave very well when tested singularly, and very poorly when use together.
- This presentation uses a survey of actual results to expose some observations/trends

Scope of the data used

- 5 OEMs
- 6 Contract Manufacturers
- Dozens of material suppliers
- ~15k channel weeks of IPC-TM-650 method 2.6.3.7
- B-24, B-25 and B-52 vehicles

Trend #1: 40/90, 25V/mm, and frequent monitoring

(who's afraid of the new method?)

- Conclusion: from our survey, method 2.6.3.7 has proven to be more rigorous than 2.6.3.3 (85/85) for all materials except some high solids fluxes
- Which variables make it more rigorous?

  (All, of course)
- Current carrying capacity of dendrites shouldn't be underestimated

Trend #2: Sample Preparation (the devil in the details)

- Singularly, materials not only behave better, but it is easier to make a pristine sample
- Long & Hot or Short and Cool?
- Hand soldering just not well suited to comb patterns
- O_2 vs. N_2- is the flux designed to chew on oxidized Cu or not?

Trend #2: Sample Preparation (the devil in the details)

- Flux volume, pooling, debris
- Do we really want to test all of the fluxes on top of each other?
- Not trivial to mimic actual printing, cleaning, coating processes
- Conclusion: if you want to pass the test, become an expert sample preparer

Trend 3: Chemistry

- Aggressive flux- obvious
- Generic, poorly cured coating- obvious
- Exposed silver- obvious
- Spongy soldermask- almost obvious
- Not soluble in wash- almost obvious
- Reasons why many other chemistries don't play well together- voodoo

Trend 4: Bare Copper or Silver

- A huge number of test failures are directly related to bare copper on edges of comb pattern traces.
- Ask yourself (or your customer) should bare copper be expected in the real-world and therefore assessed?
- Same goes for Ag.

Ag near condensation + Sulphur = disaster

Trend 5: Non-homogeneous residue

- Anything that causes localized high concentration of flux residues, including assembly of parts onto board (oh-oh that's a problem) can be a deal-breaker
- Watch out for hand soldering test vehicles + performance criteria
- This appears to be the prime driver in the rigor of the B-52 test

Trend 6: Cleaning

- If you aren't going to heat any flux "well", you better prove to be benign, or clean it
- No cheap/easy way to prove residues you are cleaning are soluable in the wash chemistry. Contact the specialists
- Always the possibility of dirty wash, or pushing the residue into a high concentration

Trend 7: Bare board

- Do not overlook the ½ decade drop (or more) from leaky bare boards
- Ideally, qualify your actual vendors. The new H coupon matches B-52 track/gap
- Clean and SIR test your bare boards prior to (the most expensive part) sample prep

Trend 8: Conformal Coat

- Leave plenty of time to qualify your coating
- Many surprises
  - Dissolution of finish into CC
  - Nasty ECM through the CC
  - Nasty reactions in the CC
  - Nasty ECM under CC that lost adhesion