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Joint Council on Aging Aircraft
Joint Group on Pollution Prevention



From: Denny Jarvi, ITB
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No. Of Pages: 7

Phone: 937-431-1900
Fax: 937-431-1909
Email: djarvi@itb-inc.com

*Lead-Free Solder Working Group
Teleconference
February 9, 2004*

Comments:

Attached please find the February 9, 2004 Lead-Free Solder Working Group teleconference minutes. Please further distribute as necessary.

MEMORANDUM FOR RECORD

Subject: Teleconference Summary and Minutes – February 9, 2004

Next Teleconference: February 17, 2004 11:00 a.m. EST

Minutes:

Decisions arrived at by this meeting's participants → Recommendations for group-at-large. Meeting led by Kurt Kessel, Project Integrator.

- 1) Opening: Brian Greene opened the teleconference stating that this telecon was to narrowly focus on the issue of mechanical shock testing. ACI Corp. was selected to do the tests. Several questions have been raised and this telecon will give ACI a chance to answer the group's questions.
- 2) Review of documents: Lee Whiteman quickly reviewed four documents being used as a basis for this discussion. They are: BAE's mechanical Shock Test charts, JG-PP Data Acquisition Requirements, Draft Test Procedures, and Questions for JG-PP Shock tests.
- 3) Discussion of questions:
 - a) Would the test be valid if four boards were mounted in the fixture and tested simultaneously? ACI believes the test would be valid and will reduce the time required to test one board at a time. The group agreed there is no industry standard for the number of test specimens for simultaneous shock testing. As long as all boards in the fixture receive the same shock and the reported data is based on a logical plan there should be no problems testing four boards at a time.
 - b) What should the configuration of the boards be during testing? Two tests are scheduled. Each test will use 12 boards. The 12 boards will be divided into three equal amounts. 4-SnPb, 4-SnAgCu, and 4-SnAgCuBi. The initial position was to test the boards in a 4-4-4 configuration. To prevent loss of data in case of failure, Mr. Jim Blanche suggested a 2x2 configuration might be better. Specifically, instead of testing all four SnPb boards at one time, the test would use 2 SnPB boards and 2 SnAgCu boards. Following through, the next tests would include 2 SnPb/2 SnAgCuBi boards and 2 SnAgCu/2 SnAgCuBi boards. This was acceptable to the group.
 - c) Clarify Pathfinder board testing requirements. Current JTP states, "...an extra "pathfinder" board will be subjected to both test conditions..." Test one requires three shock transients in each direction along each of the 3 orthogonal axes. Test two requires shock transients in each direction along one axis parallel to the plane of the board. Apply shocks until all parts fail or until the maximum number of shocks, 500, is reached. Two questions came out of this discussion. Can the pathfinder setup test be done with 1 pathfinder board and 3 dummy boards installed in the test fixture? Secondly, is it necessary to perform test two to the full 500 shocks? After the group discussion, it was decided that the setup test would be run with one pathfinder board and 3 dummy boards installed and that 500 shocks for test two was not necessary for the setup test. The agreed upon amount was a maximum of 50 shocks. **Action Item:** Dave Hillman will send one empty board to help with fixturing and one fully assembled board for pathfinder purposes

to Lee Whiteman.

- d) Does the Shock Table meet the test requirements? Based on BAE's shock test document, it appears that the table will not meet the JTP requirements of testing to one octave below the resonant frequency of the boards. According to BAE's information the table suggested for use is unreliable below 80 Hz. It is estimated that the resonant frequency of the boards will be somewhere between 60-80 Hz, meaning the table will have to test to 30-40 Hz. This topic is still open for discussion. **Action Item:** Brian Greene and Kurt Kessel will research why the test was written this way and who wrote it. They will report findings to the group. **Action Item:** Lee Whiteman, obtain accurate tolerances of shock table below 80 Hz.
- e) Agilent Data Loggers Vs. Anatech Event Detectors. Which one will accurately record the data required from the tests? After lengthy discussion this issue was decided. Luckily Reza Ghaffarian, who co-authored the IPC specification for these devices, signed in and was able to help the group decide. In short, the Agilent Data Loggers will not continuously monitor all channels on the board. The device is blind to failures that occur during its cycle to the other channels. This is significant and unacceptable for both vibration and for mechanical shock tests. Due to the very short duration of a possible event and its ability to continuously monitor the board, the only real choice to make is to use the Anatech Event Detectors to monitor testing and to ensure they are properly calibrated to meet the test conditions. This was agreed to by all members present.
- 4) Recommend clamping the boards in the fixture using wedge locks on two sides of the minor axes. This was acceptable to ACI. The concern was to securely clamp the test article to obtain good test data.
- 5) Dave Hillman requested the groups guidance as to should he cut up damage two boards to obtain the board's Coefficient of Thermal Expansion (CTE) or hold off until after processing. The group unanimously agreed to hold off until after processing.
- 6) Component Update:
 - a) TSOPs: As previously discussed at previous telecons, the TSOPs were not properly daisy chained. The work around offered by Practical is to bond from 12 to 14 and from 37 to 39. This means not looking at one solder joint in the center of the package. This also eliminates the need for us to solder or install jumpers on the TSOPs. The group accepted the work around as less risky than adding the jumpers and the loss of data at the center of the boards where failures rarely occur was a minimal loss.
 - b) Hybrids: Receiving the hybrids from Solitron still remains a challenge. Currently we will receive 300 hybrids around mid-February. These will still need to be sent off for tinning. Dave Hillman is confident we will not see the second 300 hybrids before the end of the building process. Earliest delivery date is the end of March. Dave asked the group to think about the best use of the hybrids and how to integrate them into the automated portion of testing. One suggestion is to not use the hybrids on the rework boards. The best data will come from the manufactured boards so use 2 or 3 hybrids per manufactured board to get best possible data. **This topic is still open and will be further discussed at the 17 Feb 04 telecon.**
- 7) Next Meeting:
 - a) 17 February 2004, 11:00 A.M. EST

- b) 24 Feb 04, APEX Conference, face-to-face meeting. Convention Center in Room 206A from 6:00 PM to 8:00 PM, dinner at a local restaurant following the meeting.
- c) Board building/kickoff at Boeing Irving. Tentatively scheduled for the week of 8 March 2004. The group is asked to review attachment 8 to confirm list of attendees

Attachment 1. Action Item Status

Open Action Items

LFS.04.02.04

Date Due: 2/17/04

Responsibility: Lee Whiteman

Required Action: Obtain accurate tolerances of the shock table below 80 Hz

Comments:

LFS.04.02.03

Date Due: 2/17/04

Responsibility: Brian Greene, Kurt Kessel

Required Action: Research who wrote the mechanical shock test requirements and why they are the way they are.

Comments:

LFS.04.02.02

Date Due: 2/17/04

Responsibility: Dave Hillman

Required Action: Send one empty board and one fully assembled board to Lee Whiteman for setup and test purposes.

Comments:

LFS.04.02.01

Date Due: 2/20/04

Responsibility: Brian Greene

Required Action: Distribute article on lead contamination written by John Paul Clech

Comments: This article will be presented at the upcoming APEX conference. Tom Woodrow will send a copy of the article to Brian Greene once the article has been presented. Brian will distribute the article to the rest of the group.

LFS.04.01.08

Date Due: 2/5/2004

Responsibility: Dave Hillman

Required Action: Contact Practical on the on the wire bonding issue with regard to daisy chained components

Comments:

LFS.04.01.07

Date Due: 2/5/2004

Responsibility: Brian Greene

Required Action: Contact CALCE for support

Comments:

LFS.04.01.06

Date Due: 1/23/2004

Responsibility: Brian Greene

Required Action: Distribute mechanical shock testing procedures once Lee Whiteman has provided them to Brian.

Comments: Lee Whiteman is working this item

LFS.04.01.04

Date Due: 1/23/2004

Responsibility: Lety Campuzano-Contreras

Required Action: Determine the manufacturing lead time for the SnAgCuBi wire.

Comments: Awaiting response from Doug McBright before finalization.

LFS.04.01.03

Date Due: 1/23/2004

Responsibility: Dave Hillman

Required Action: Provide Lety Campuzano-Contreras, Lee Whiteman, and Tom Woodrow with boards. Lety, Lee and Tom will provide a FedEx-able address to David Hillman for shipping purposes.

Comments: Addresses have been received. Waiting for the delivery of the boards.

LFS.04.01.02

Date Due: 1/23/2004

Responsibility: Dave Hillman

Required Action: Determine additional cost associated with two tinning assemblies.

Comments:

LFS.04.01.01

Date Due: 1/23/2004

Responsibility: Dave Hillman

Required Action: Order the BGA Rework stencils for the test boards, electro-migration boards, and SIR boards.

Comments: In work

LFS.03.10.07

Date Due: 2/05/2004

Responsibility: ITB

Required Action: Solicit stakeholder interest in attending a tour of Boeing-Irving's assembly of the test vehicles, approximately 40 persons, March/April timeframe.

Comments: Inputs received by B.Greene

LFS.03.10.05

Date Due: 01/23/2004

Responsibility: Lety Campuzano-Contreras

Required Action: Report of results of Kaizen no-clean flux cleaning study

Comments: 01/14/04 – All solder pastes have been received. Paperwork has been initiated to ship 200 grams of solder paste to Kaizen