TSV and Advanced Packaging

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Background

We would like to have discussions on reliability issues that need to be addressed in advanced packages, with focus on TSV and 2.5/3D. Main questions we want to answer: What are the reliability issues we need to look into? How about testability? Do we need to come up with new tests or do the standard tests apply? How about failure localization/detection? Is the development of new FA-methods needed?

Discussion Topics

To make sure we have enough time to have in-depth discussions, we propose to focus on the following topics (the first two are related to a specific technology, the last two are more general and applicable to different applications)

- TSV
- Wafer-to-wafer bonding
- Fine pitch multi-layer Cu RDL
- Thermal and thermos-mechanical issues in large packages

Summary

After the introduction of the TSV and advanced packaging trends and main their challenges by the moderators, discussions were mainly centered around “High Reliability” of TSV integration, wafer bonding and fan-out packages.

Reliability concerns of TSV integration were discussed for both for via-last and via-middle TSVs. Major reliability concerns are metal migration and thermo-mechanical issues by the Cu TSV with the via middle approach and plasma damage during M1 exposure with the last approach. One attendee questioned TSV design rule (KOZ) to avoid the impact of TSV. It was agreed TSV-EM, at current dimensions, is not the biggest concern. Revision of current JEDEC-standards might be appropriate as well.

Main reliability concerns for W2W stacking were Cu migration (if pitch becomes too small), EM issues due to dielectric layer-Cu electrode contact and delamination issues between dielectric layer and Cu electrode, including particle problems.

One attendee raised a question about impact of contact open size on Cu bump reliability.

Package thermals are raised as a general concern to manage advanced 2.5D/3D packaging solutions.

As suggestions for next year:

1. Maybe making an attendance-list would be good?

2. Maybe doing a 10-15’ briefing before the workshop would be good to get all moderators in the same room and on the same pitch.