



North America 3DS-IC (Three-dimensional Stacked Integrated Circuits) Standards Committee Meeting Summary and Minutes



SEMI®
International
Standards

North America Standards Spring 2014 Meetings
1 April 2014, 15:00 – 17:00 Pacific Time
SEMI Headquarters in San Jose, California

Committee Announcements

Next Committee Meeting

North America Standards Meetings at SEMICON West 2014

July 7-10, 2014

San Francisco Marriott Marquis Hotel in San Francisco, California

Table 1 Meeting Attendees

Italics indicate virtual participants

Co-Chairs: Urmi Ray (Qualcomm), Sesh Ramaswami (Applied Materials), Richard Allen (NIST), Chris Moore (---)

SEMI Staff: Paul Trio

<i>Company</i>	<i>Last</i>	<i>First</i>	<i>Company</i>	<i>Last</i>	<i>First</i>
AGC Electronic Materials	Takahashi	Mark	NIST	Allen	Richard
Corning	Schmidt	Ilona	Super Sight	Perroots	Len
EV Group	Oakes	Garrett	Zeta Instruments	Kertayasa	Robert
NCAP China	Zhang	Xia			
NCAP China	Shangguan	Dongkai	SEMI	Trio	Paul

Table 2 Leadership Changes

<i>Group</i>	<i>Previous Leader</i>	<i>New Leader</i>
Inspection & Metrology Task Force	Yi-Shao Lai (ASE) stepped down as TF co-leader.	

Table 3 Ballot Results

Passed ballots and line items will be submitted to the ISC Audit & Review Subcommittee for procedural review.

Failed ballots and line items were returned to the originating task forces for re-work and re-balloting.

<i>Document #</i>	<i>Document Title</i>	<i>Committee Action</i>
5173D	New Standard: Guide for Describing Silicon Wafers for Use in a 300 mm 3DS-IC Wafer Stack	Failed , to be reballoted
5447	New Standard: Terminology for Through Glass Via and Blind Via in Glass Geometrical Metrology	Failed , to be reballoted
5693	New Standard: Guide for Describing Silicon Wafers for Use as 300 mm Carrier Wafers in a 3DS-IC Temporary Bond-Debond (TBDB) Process	Passed as balloted
5694	New Standard: Guide for Describing Materials Properties for a 300 mm 3DS-IC Wafer Stacks	Passed with editorial changes



Table 3 Ballot Results

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<i>Document #</i>	<i>Document Title</i>	<i>Committee Action</i>
5695	New Standard: Guide to Describing Materials Properties for Intermediate Wafers for Use in a 300 mm 3DS-IC Wafer Stack	Passed with editorial changes

Table 4 Authorized Activities

<i>#</i>	<i>Type</i>	<i>SC/TF/WG</i>	<i>Details</i>
5713	SNARF	Bonded Wafer Stack TF	New Standard: Specification of Glass Interposers

Note: SNARFs and TFOFs are available for review on the SEMI Web site at:

<http://downloads.semi.org/web/wstdsbal.nsf/TFOFSNARF>

Table 5 Authorized Ballots

<i>#</i>	<i>When</i>	<i>SC/TF/WG</i>	<i>Details</i>
5173E	Cycle 3, 2014 (or C4-14)	Bonded Wafer Stack TF	New Standard: Guide for Describing Silicon Wafers for Use in a 300 mm 3DS-IC Wafer Stack
5447A	Cycle 3, 2014 (or C4-14)	Inspection & Metrology TF	New Standard: Terminology for Measured Geometrical Parameters of Through-Glass Vias (TGVs) in 3DS-IC Structures
5506	Cycle 3, 2014 (or C4-14)	Inspection & Metrology TF	New Standard: Guide for Measuring Warp, Bow and TTV on Silicon and Glass Wafers Mounted on Wire Grids by Automated Non-Contact Scanning using Laser Scanning Interferometry

Table 6 New Action Items

<i>Item #</i>	<i>Assigned to</i>	<i>Details</i>
2014Apr #01	Len Perroots	Contact Japan committee members to better understand their issues surrounding 5173.
2014Apr #02	Rich Allen, Paul Trio	Submit a Publication Improvement Proposal (PIP) Form to provide a better R1-1 figure in Document 5694 for co-chair approval.

Table 7 Previous Meeting Actions Items

<i>Item #</i>	<i>Assigned to</i>	<i>Details</i>
2013Oct #02	Paul Trio	Work with SEMI Taiwan staff in identifying and reaching out to industry stakeholders in Taiwan. Paul to also consult with Bevan Wu (ITRI/BW & Associates) for additional support and guidance.
2013Jul #02	Paul Trio	Remind Rich Allen to look into renaming the Thin Wafer Handling Task Force to Thin Wafer Task Force then form appropriate working groups focusing on various areas (e.g., Handling WG, Shipping WG).

1 Welcome, Reminders, and Introductions

Rich Allen, committee co-chair, called the meeting to order at 3:10 PM. After welcoming all attendees, the SEMI meeting reminders on membership requirements, antitrust, patentable technology, and meeting guidelines were presented and explained. Finally, the agenda was reviewed.

Attachment: 01, SEMI Standards Required Meeting Elements



2 Review of Previous Meeting Minutes

The committee reviewed the minutes of the previous meeting held October 29 in conjunction with the NA Standards Fall 2013 meetings.

Motion: Accept the minutes of the previous meeting as written.

By / 2nd: Robert Kertayasa (Zeta Instruments) / Len Perroots (Super Sight)

Discussion: None

Vote: 7-0 in favor. Motion passed.

Attachment: 02, NA 3DS-IC SEMICON Fall 2013 meeting (October 29) minutes

3 SEMI Staff Report

Paul Trio (SEMI) gave the SEMI Staff Report. The key items were as follows:

- 2014 Global Calendar of Events
 - European 3D TSV Summit (January 21-22, Grenoble, France)
 - SEMICON Korea / LED Korea (February 12-14, Seoul)
 - SEMICON China (March 18-20, Shanghai)
 - SEMICON Singapore (April 23-25, Marina Bay Sands)
 - SEMICON Russia (May 14-15, Moscow)
 - SEMI Advanced Semiconductor Manufacturing Conference [ASMC] (May 19-21, Saratoga Springs, New York)
 - SEMICON West (July 8-10, San Francisco, California)
 - SEMICON Taiwan (September 3-5, Taipei)
 - SEMICON Europa / Plastic Electronics (October 7-9, Grenoble, France)
 - SEMICON Japan (December 3-5, Tokyo)
- NA Standards Spring 2014 Meetings (March 31 – April 3)
 - Committees meeting at SEMI Headquarters (San Jose)
 - 3DS-IC | EHS | Facilities & Gases | Information & Control | Metrics | PV Materials
 - SEMI thanks Intel (Santa Clara) for hosting the PIC and Silicon Wafer meetings
- Upcoming North America Meetings (2014)
 - NA Compound Semiconductor Materials in conjunction with CS MANTECH 2014 (May 21, Denver, Colorado)
 - NA Standards Meetings at SEMICON West 2014 (July 7-10, San Francisco, California)
 - NA Standards Fall 2014 Meetings (November 3-6, San Jose, California)
- Standards Publications Report
 - November 2013 Cycle
 - New Standards – 1, Revised Standards – 6, Reapproved Standards – 3, Withdrawn Standards – 0



- December 2013 Cycle
 - New Standards – 2, Revised Standards – 11, Reapproved Standards – 4, Withdrawn Standards – 0
- January 2014 Cycle
 - New Standards – 3, Revised Standards – 3, Reapproved Standards – 0, Withdrawn Standards – 1
- February 2014 Cycle
 - New Standards – 4, Revised Standards – 5, Reapproved Standards – 0, Withdrawn Standards – 1, Total in portfolio – 901 (includes 99 Inactive Standards)
- Official SEMI Standards Groups
 - LinkedIn
 - <http://www.linkedin.com/groups/Official-SEMI-Standards-Group-1774298/about>
 - Twitter
 - @SEMI_standard

Attachment: 03, SEMI Standards Staff Report

4 Taiwan 3DS-IC Committee

Paul Trio (SEMI) provided an update on Taiwan 3DS-IC activities.

- Leadership Change
 - Testing Task Force
 - Ming-Chin Tsai (KYECC) has been appointed as new TF co-leader.
 - Sam Ko (KYECC) stepped down as TF co-leader.
- Published Standards
 - SEMI 3D6, Guide for CMP and Micro-Bump Processes for Frontside Through Silicon Via (TSV) Integration (formerly SEMI Draft Document # 5474)
 - SEMI 3D7, Guide for Alignment Mark for 3DS-IC Process (formerly SEMI Draft Document # 5473)
- Current Activities
 - Testing TF
 - New Standard: Guide for Incoming/Outgoing Quality Control and Testing Flow for 3DS-IC Products (#5485)
 - Middle-End Process TF
 - New Standard: Guide for Overlay Performance Assessment for 3DS-IC Process (#5688)
- SEMI Staff:
 - Cher Wu | cwu@semi.org

Attachment: 04, Taiwan 3DS-IC Report

5 Japan 3D-IC Study Group

Paul Trio provided the Japan 3D-IC liaison report. The key items were as follows:

- Formed under the Japan Packaging Committee
- Next meeting: May 8 during the Japan Spring 2014 Meetings (SEMI Japan office, Tokyo)



- Thin Die Bending Strength Measurement Method Task Force
 - Doc. 5691 – New Standard: Test Method for Measurement of Chip (Die) Strength by Mean of Cantilever Bending. Submitted for Cycle 2, 2014 voting period.
- Thin Chip Handling Task Force
 - Approved by the Japan Packaging Committee on March 20, 2014
 - Charter: The Thin Chip Handling TF aims to develop standards for carriers such as chip trays for reliable handling and shipping of thin chips and dies used in high-volume 3D IC manufacturing.
 - Scope: The TF will define requirements for carriers to handle thin chips including physical interfaces used in 3D IC manufacturing, as well as shipping requirements, including packaging, reliability, and other relevant criteria for thin chips.
 - The TF will develop a specification and the test methods for the carriers to meet the requirements.
 - The TF will develop standards to handle thin chips and die by adhesive tray and others.
 - The TF will define dimensions, the test method for adhesive strength of adhesive tray.
- 3D-IC Study Group
 - Study Group meeting is being held actively
 - Aug. 29, 2012: Workshop with 20 attendees
 - Oct. 5, 2012: Kick Off Meeting with 20 attendees
 - Nov. 7, 2012: 2nd Meeting with 14 attendees
 - Dec. 6, 2012: 3rd Meeting with 31 attendees
 - Feb. 1, 2013: 4th Meeting with 17 attendees
 - Mar. 7, 2013: 5th Meeting with 28 attendees
 - Mar. 26, 2013: 6th Meeting with 21 attendees
 - Apr. 26, 2013: 7th Meeting with 16 attendees
 - May. 17, 2013: 8th Meeting with 18 attendees
 - Jun. 27, 2013: 9th Meeting with 17 attendees
 - Sep. 19, 2013: 10th Meeting with 13 attendees
 - Oct. 22, 2013: 11th Meeting with 24 attendees
 - Nov. 28, 2013: 13rd Meeting with 22 attendees
 - Dec. 5, 2013: 14th Meeting with 22 attendees
 - Dec. 19, 2013: 15th Meeting with 15 attendees
 - Jan. 13, 2014: 16th Meeting with 18 attendees
 - Mar. 11, 2014: 17th Meeting with 21 attendees
 - May. 8, 2014: 18th Meeting
 - Achievement
 - Held the joint meeting with N.A. and TWN 3DS-IC technical committee to exchange information on Dec 5, 2013.
 - Organized the 3D-IC technology seminar during the SEMICON Japan 2013 with very good reputations.
 - Exhibited the 3D-IC standards activities and several displays at the SEMICON Japan 2013.
 - Conducted the surveys to solicit the inputs from the industries on the potential areas of needs for SEMI Standardization. The summary was shared with the SG team at Jan 23, 2014 meeting.
 - Agreed on the formation of Thin Chip Handling TF. Kick-off the TF from April after TC approval on 3/20-2014.

- SEMI Staff:
 - Naoko Tejima | ntejima@semi.org

Attachment: 05, Japan 3D-IC Report

6 Ballot Review

Passed ballots and line items will be submitted to the ISC Audit & Review Subcommittee for procedural review.

Failed ballots and line items were returned to the originating task forces for re-work and re-balloting.

NOTE 1: Committee adjudication on Cycle 2 ballots are detailed in the Audits & Reviews (A&R) Subcommittee Forms for procedural review. These A&R forms are available as attachments to these minutes. The attachment number for each document is provided below the summary tables.

6.1 Cycle 2 Ballots

Document #	Document Title	Committee Action
5173D	New Standard: Guide for Describing Silicon Wafers for Use in a 300 mm 3DS-IC Wafer Stack	Failed , to be reballoted
5447	New Standard: Terminology for Through Glass Via and Blind Via in Glass Geometrical Metrology	Failed , to be reballoted
5693	New Standard: Guide for Describing Silicon Wafers for Use as 300 mm Carrier Wafers in a 3DS-IC Temporary Bond-Debond (TBDB) Process	Passed as balloted
5694	New Standard: Guide for Describing Materials Properties for a 300 mm 3DS-IC Wafer Stacks	Passed with editorial changes
5695	New Standard: Guide to Describing Materials Properties for Intermediate Wafers for Use in a 300 mm 3DS-IC Wafer Stack	Passed with editorial changes

Action Item: 2014Apr #01, Len Perroots to contact Japan committee members to better understand their issues surrounding 5173D.

Action Item: 2014Apr #02, Rich Allen and Paul Trio to submit a Publication Improvement Proposal (PIP) Form to provide a better R1-1 figure in Document 5694 for co-chair approval.

- Attachment:**
- 06, Ballot Review for Doc. 5173D
 - 07, Ballot Review for Doc. 5447
 - 08, Ballot Review for Doc. 5696
 - 09, Ballot Review for Doc. 5694
 - 10, Ballot Review for Doc. 5695

7 Task Force Reports

7.1 Bonded Wafer Stacks Task Force

Rich Allen reported that the task force is still working on the following Documents:

- Doc. 5174 – New Standard: Specification for Identification and Marking for Bonded Wafer Stacks
- Doc. 5692 – New Standard: Guide for Describing Glass Wafers for Use as 300 mm Carrier Wafers in a 3DS-IC Temporary Bond-Debond (TBDB) Process

The task force also submitted a new SNARF (New Standard: Specification of Glass Interposers) for committee approval [see section 9.1 of these minutes].

7.2 Inspection & Metrology Task Force

Rich Allen reported that the task force plans to submit the following Documents for balloting:

- Doc. 5447A – Terminology for Measured Geometrical Parameters of Through-Glass Vias (TGVs) in 3DS-IC Structures
- Doc. 5506 – New Standard: Guide for Measuring Warp, Bow and TTV on Silicon and Glass Wafers Mounted on Wire Grids by Automated Non-Contact Scanning using Laser Scanning Interferometry

The task force is still working on the following Documents:

- Doc. 5270 – New Standard: Guide for Measuring Voids in Bonded Wafer Stacks
- Doc. 5616 – Revision to SEMI 3D4, Guide for Metrology for Measuring Thickness, Total Thickness Variation (TTV), Bow, Warp/Sori, and Flatness of Bonded Wafer Stacks

7.3 Thin Wafer Handling Task Force

Rich Allen reported that the TF plans to meet at SEMICON West 2014 to continue ongoing discussions related to thin wafer handling.

8 Old Business

8.1 Action Items from previous meeting:

<i>Item #</i>	<i>Assigned to</i>	<i>Action Item</i>	<i>Status</i>
2013Jul #02	Paul Trio	Remind Rich Allen to look into renaming the Thin Wafer Handling Task Force to Thin Wafer Task Force then form appropriate working groups focusing on various areas (e.g., Handling WG, Shipping WG).	Open
2013Oct #01	Paul Trio	Contact NA 3DS-IC chairs and TF leaders and ask whether they plan to attend SEMICON Japan for the joint 3DS-IC meeting (see § 5 of these minutes)	Completed. Closed.
2013Oct #02	Paul Trio	Work with SEMI Taiwan staff in identifying and reaching out to industry stakeholders in Taiwan. Paul to also consult with Bevan Wu (ITRI/BW & Associates) for additional support and guidance.	Open
2013Oct #03	Paul Trio, Rich Allen	Finalize the NA 3DS-IC Spring 2014 meeting schedule by the end of February.	Completed. Closed.

9 New Business

9.1 New Standards Activity on Glass Interposers

Rich Allen and Ilona Schmidt presented a new SNARF, prepared by the Bonded Wafer Stacks TF, on glass interposer specification:

New Standard: Specification of Glass Interposers

- **Rationale:** In the past, interposers were made from silicon. Glass can be used as an alternative material with its specific physical and thermal properties. However, no specification or description of requirements for such glass interposers exists. This planned work aims to close the gap. Some of the work may replicate work done for silicon interposers, but some of it will be specific for glass.
- **Scope:** Establish a specification for interposers made from glass; these interposers would be expected to enable fabrication of glass vias or blind vias.



Motion: Approve new SNARF for: *New Standard: Specification of Glass Interposers*
By / 2nd: Robert Kertayasa (Zeta Instruments) / Ilona Schmidt (Corning)
Discussion: None
Vote: 7-0 in favor. Motion passed.

9.2 Upcoming Ballots

#	Type	SC/TF/WG	Details
5173E	Cycle 3, 2014 (or C4-14)	Bonded Wafer Stack TF	New Standard: Guide for Describing Silicon Wafers for Use in a 300 mm 3DS-IC Wafer Stack
5447A	Cycle 3, 2014 (or C4-14)	Inspection & Metrology TF	New Standard: Terminology for Measured Geometrical Parameters of Through-Glass Vias (TGVs) in 3DS-IC Structures
5506	Cycle 3, 2014 (or C4-14)	Inspection & Metrology TF	New Standard: Guide for Measuring Warp, Bow and TTV on Silicon and Glass Wafers Mounted on Wire Grids by Automated Non-Contact Scanning using Laser Scanning Interferometry

Motion: Approve letter ballot distribution of Documents 5173E, 5447A, and 5506 for Cycle 3 or 4, 2014 voting period.
By / 2nd: Ilona Schmidt (Corning) / Len Perroots (Super Sight)
Discussion: None
Vote: 6-0 in favor. Motion passed.

10 Action Item Review

10.1 Open Action Items

Paul Trio (SEMI) reviewed the open action items. These can be found in the Open Action Items table at the beginning of these minutes.

10.2 New Action Items

Paul Trio (SEMI) reviewed the new action items. These can be found in the New Action Items table at the beginning of these minutes.

11 Next Meeting and Adjournment

The next meeting of the North America 3DS-IC committee is scheduled for Tuesday, July 8 in conjunction with SEMICON West 2014. The tentative schedule is provided below:

North America Standards Meetings at SEMICON West 2014
 July 7-10, 2014
 San Francisco Marriott Marquis Hotel
 780 Mission Street
 San Francisco, California 94103
 U.S.A.



Tuesday, July 8

- Inspection & Metrology Task Force (8:00 AM to 10:00 AM)
- Bonded Wafer Stacks Task Force (10:00 AM to 12:00 Noon)
- Thin Wafer Handling Task Force (1:00 PM to 3:00 PM)
- NA 3DS-IC Committee (3:00 PM to 5:00 PM)

Having no further business, a motion was made to adjourn the NA 3DS-IC Spring 2014 Committee meeting at SEMI Headquarters in San Jose, California. Adjournment was at 4:35 PM.

Respectfully submitted by:

Paul Trio
Senior Manager, Standards Operations
SEMI North America
Phone: +1.408.943.7041
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Minutes approved by:

Sesh Ramaswami (Applied Materials), Co-chair	Not present
Urmi Ray (Qualcomm), Co-chair	Not present
Richard Allen (NIST), Co-chair	May 2, 2014
Chris Moore (BayTech-Resor), Co-chair	Not present

Table 8 Index of Available Attachments #1

#	Title	#	Title
1	SEMI Standards Required Meeting Elements	6	Ballot Review for Doc. 5173D
2	NA 3DS-IC Fall 2013 Meeting (October 29) Minutes	7	Ballot Review for Doc. 5447
3	SEMI Standards Staff Report	8	Ballot Review for Doc. 5693
4	Taiwan 3DS-IC Report	9	Ballot Review for Doc. 5694
5	Japan 3D-IC Report	10	Ballot Review for Doc. 5695

#1 Due to file size and delivery issues, attachments must be downloaded separately. A .zip file containing all attachments for these minutes is available at www.semi.org. For additional information or to obtain individual attachments, please contact Paul Trio at the contact information above.