



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



SEMI®
International
Standards

NA Standards Spring 2013 Meetings
2 April 2013, 15:00 – 17:00 Pacific Time
SEMI Headquarters in San Jose, California

Committee Announcements

Next Committee Meeting

SEMICON West 2013 Meetings

July 8-11, 2013

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), Chris Moore (Semilab), Richard Allen (SEMATECH)

SEMI Staff: Paul Trio

<i>Company</i>	<i>Last</i>	<i>First</i>	<i>Company</i>	<i>Last</i>	<i>First</i>
Balluff	Todd	Brad	SEMATECH	Allen	Richard
BayTech Group	Baylies	Win	SEMATECH	Vartanian	Victor
Corning	Schmidt	Ilona	Sonoscan	Martell	Steve
<i>NIST</i>	<i>Read</i>	<i>David</i>	Yield Engineering	Das	John
<i>Qualcomm</i>	<i>Ray</i>	<i>Urmi</i>			
Quartet Mechanics	Jan	Feisa	SEMI	Trio	Paul

Table 2 Leadership Changes

<i>Group</i>	<i>Previous Leader</i>	<i>New Leader</i>
None		



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>
5173C	New Standard: Guide for Describing Materials Properties and Test Methods for a 300 mm 3DS-IC Wafer Stack	Failed and will be reballoted
5175	New Standard: Guide for Multi-Wafer Transport and Storage Containers for 300 mm, Thin Silicon Wafers on Tape Frames	Passed as balloted
5409	New Standard: Guide for Metrology for Measuring Thickness, Total Thickness Variation (TTV), Bow, Warp/Sori, and Flatness of Bonded Wafer Stacks	Passed as balloted
5410	New Standard: Guide for Metrology Techniques to be used in Measurement of Geometrical Parameters of Through-Silicon Vias (TSVs) in 3DS-IC Structures	Passed as with editorial changes

Table 4 Authorized Activities

<i>#</i>	<i>Type</i>	<i>SC/TF/WG</i>	<i>Details</i>
5588	SNARF	Bonded Wafer Stack TF	Line Item Revision to SEMI 3D2-0113, Specification for Glass Carrier Wafers for 3DS-IC Applications

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>
5173D	Cycle 3, 2013 (or C4-13)	Bonded Wafer Stacks TF	New Standard: Guide for Describing Materials Properties for a 300 mm 3DS-IC Wafer Stack
5588	Cycle 3, 2013	Bonded Wafer Stack TF	Line Item Revision to SEMI 3D2-0113, Specification for Glass Carrier Wafers for 3DS-IC Applications

Table 6 New Action Items

<i>Item #</i>	<i>Assigned to</i>	<i>Details</i>
None		

Table 7 Previous Meeting Actions Items

<i>Item #</i>	<i>Assigned to</i>	<i>Details</i>
None		

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 30 in conjunction with the NA Standards Fall 2012 meetings.

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

By / 2nd: Steve Martell (Sonoscan) / Win Baylies (BayTech Group)

Discussion: None

Vote: 6-0 in favor. Motion passed.

Attachment: 02, NA 3DS-IC Fall 2012 meeting (October 30) minutes

3 SEMI Staff Report

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

- 2013 Global Calendar of Events
 - SEMICON Singapore (May 7-9, Marina Bay Sands)
 - SEMICON Russia (June 5-6, Moscow)
 - Intersolar Europe (June 19-21; Munich, Germany)
 - Intersolar NA (July 8-11; San Francisco, California)
 - SEMICON West (July 9-11, San Francisco, California)
 - SEMICON Taiwan (September 4-6, Taipei)
 - SEMICON Europa (October 8-10; Dresden, Germany)
 - PE2013 – Plastic Electronics Exhibition and Conference (October 8-10; Dresden, Germany)
- NA Standards Spring 2013 Meetings
 - Committees meeting at SEMI Headquarters (San Jose)
 - 3DS-IC | EHS | Facilities & Gases | HB-LED | Information & Control | Liquid Chemicals | MEMS/NEMS | Metrics | PIC (TC only) | PV/PV Materials | Traceability
 - SEMI thanks Intel (Santa Clara) for hosting the PIC (TFs only) and Silicon Wafer meetings
- Upcoming NA Meetings
 - NA Compound Semiconductor Materials Committee (May 15 in conjunction with CS MANTECH; New Orleans, Louisiana)
 - NA Standards Meetings at SEMICON West (July 8-11; San Francisco Marriott Marquis Hotel in San Francisco, California)
- Technical Ballot Critical Dates for SEMICON West 2013 Meetings
 - Cycle 3: due April 17 / May 1 – May 31
 - Cycle 4: due May 20 / June 1 – July 1
- Revised SEMI Standards Regulations (March 2013 Revision)
 - Major Items Included in this Revision:
 - Addition of a new category called Complementary File.
 - Its relationship to other types of material explicitly related to a Standard or Safety Guideline is presented in the following table.

TYPES OF OTHER PUBLISHED INFORMATION WITH AN EXPLICIT RELATIONSHIP TO A STANDARD OR SAFETY GUIDELINE		Relationship to Standard or Safety Guideline	
		Official Part	Not Official Part
How Published	Conjoined to S or SG	Appendix	Related Information
	Not conjoined to S or SG and not in .pdf	Complementary File	Various Materials

Required Actions by TC Chapters

- TC Chapters must take action on Standards that reference files in formats other than pdf (e.g., XML schema, WDSL, xls)
- All non-pdf files published prior to March 2013 Regulations are Various Materials.
- TC Chapters must decide if non-pdf files are required for implementation of the Standard, and if so, TC Chapter must issue a ballot to make the non-pdf files “Complementary Files”.

SEMI Staff Note: Recommended wording for Complementary Files and Various Materials provided in the report. See attachment information at the end of this section.

Minor Items in Regulations revision:

- Some editorial changes have been made for improved clarity and better consistency with the Procedure Guide and Style Manual
 - Clarifying the voting/nonvoting designations for members of committees
 - Defining MR as the acronym for Minority Report
 - Defining Program as shorthand for SEMI Standards Program
- Procedure Guide Revision (March 2013)
 - Revision for consistency with the revised Regulations changes.
 - The PG revision also included:
 - Definition of Complementary Files
 - Addition of TFOF as Appendix 2
 - Addition of recommendation for author and/or the TF leader to distribute draft ballot to all TF members 7 days prior to Letter Ballot submission.
 - Goal is to establish TF consensus. Can also be done via TF meeting that all members were notified of.
- Revised SEMI Standards Regulations (November 2012 Revision)

Major Items Included in this Revision:

- Global TC Structure (RTC/LTC to TC Chapters under a Global Technical Committee)
 - All regional and local technical committees become chapters of a global technical committee and have equal standing and responsibilities with regard to their functions in it, regardless of their administrative tie with a RSC
- Formation and Disbandment of Global Technical Committee
- Formation and Disbandment of TC Chapter under existing Global Technical Committee
- Elimination of Regional Standards
- IP Section (§ 15)
 - Exit mechanism from LOA in limbo
 - Clarification and additional guidance on Letter of Intent (LOI)

- Restructuring the section in chronological order
 - From approval of activity to discovery after publication
 - Redefine Supplementary Materials
 - Remove Appendices from “Supplementary Materials”
 - Redefine “Other Supplementary Materials” as “Various Materials”
 - Not official content of the Standard or Safety Guideline
 - Part of a standard but is published separately
 - Miscellaneous Items
 - Response to NARSC re: clarification of “published”
 - (§ 8.3.2.2) and voting by interest (§ 7.2.3)

Minor Items:

- Add definitions to the Regs from PG (or create definition in the Regs)
 - Consistent use of terms such as SEMI Standards Program, Standards Document
 - Updated section and paragraph references
 - Numerous editorial changes
- Future Tasks for the ISC Regulations Subcommittee
 - Virtual Meetings
 - Identify key concerns/issues
 - infrastructure, language, approval process.
 - Benchmark other SDOs
 - Official Liaisons with other SDOs
 - Liaisons for IEC and ISO
 - Redefine Interest Categories of TC Members
 - Currently based on IC, include PV/FPD/MEMS
 - Inclusion of regulatory requirement in SEMI Standards / Safety Guidelines
- Standards Publications Report
 - January 2013 Cycle
 - New Standards – 9, Revised Standards – 3, Reapproved Standards – 0, Withdrawn Standards – 0
 - February 2013 Cycle
 - New Standards – 0, Revised Standards – 8, Reapproved Standards – 0, Withdrawn Standards – 0
 - March 2013 Cycle
 - New Standards – 0, Revised Standards – 3, Reapproved Standards – 2, Withdrawn Standards – 0, Total in portfolio – 871 (includes 93 Inactive Standards)
- Global Activity Report (*details provided in the report*):
 - Current task forces
 - Active SNARFs
 - By Region
 - By Region, SNARF type (e.g., New Standard, Revision, Reapproval)
 - Ballots
 - By Region, year (2011, 2012, 2013 [YTD])
 - By Region, ballot type (e.g., New Standard, Revision, Reapproval)
 - By Committee



- Standards Usage Interview
 - Looking for details on how standards are actually used:
 - Development/Engineering
 - Procurement
 - Manufacturing
 - Interview should take less than 30 minutes – contact James or any Standards staff
- The Official SEMI Standards LinkedIn Group
 - <http://www.linkedin.com/groups/Official-SEMI-Standards-Group-1774298/about>

Attachment: 03, SEMI Standards Staff Report

4 Taiwan 3DS-IC Committee

Paul Trio (SEMI) provided the Taiwan 3DS-IC update. The key items were as follows:

- Leadership
 - TK Ku (ITRI) | Wendy Chen (KYEC) | Yi-Shao Lai (ASE)
- Task Force Overviews
 - 3DS-IC Testing
 - Develop standards, guidelines, and/or specifications for electrical testing of prebond and bonded wafers/devices for the ultimate goal of yield enhancement.
 - Design for Test (DfT) (e.g., test structures)
 - Test methodologies (e.g., contact method and test procedures)
 - Test fixtures (e.g., probe card and probe interfaces); and
 - Data mining test results.
 - Middle-End Process
 - Develop the standards and define the specifications for middle-end process (MEOL) related manufacturing flow.
 - Current Focus: Wafers with or without TSVs, including:
post final metal temporary bonding | wafer thinning | micro-bumping |
TSV formation and reveal | redistributed line (RDL) formation | carrier de-bond
- SNARFs

<i>Middle-End Process TF</i>	
Doc. 5473	New Standard: Guide for Alignment Mark for 3DS-IC Process
Doc. 5474	New Standard: Guide for CMP and Micro-bump Processes for Frontside TSV Integration

<i>Testing TF</i>	
Doc. 5485	New Standard: Guide for Incoming/Outgoing Quality Control and Testing Flow for 3DS-IC Products

- Recent Taiwan 3DS-IC Ballots

<i>* Voting Period – Cycle 2, 2013 *</i>		
<i>Doc #</i>	<i>Document Title</i>	<i>Task Force</i>
5474	New Standard: Guide for CMP and Micro-bump Processes for Frontside Through Silicon Via (TSV) Integration	Middle-End Process TF

- SEMI Staff:
 - Catherine Chang | cchang@semi.org

Attachment: 04, Taiwan 3DS-IC Report

5 Japan 3D-IC Study Group

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

- Formed under the Japan Packaging Committee
- Next meeting: July 19 during the Japan Summer Meetings 2013 (SEMI Japan office, Tokyo)
- Study Group leaders
 - Kazunori Kato (AiT) | Yutaka Koma (Koma Consulting) | Masahiro Tsuruya (iNEMI)
- 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. 25, 2013: 6th Meeting with 21 attendees
 - Apr. 26, 2013: 7th Meeting
- Discussing about the possibility of the standardization of Bonded Wafer Handling and Grip Ring.
- Thin Chip (Die) Bending Strength Measurement Task Force
 - Approved by the Japan Packaging Committee on March 25.
 - Kick-off meeting was held on March 26.
 - Charter:
 - Spreading out of 3D Packaging, wafer/chip thickness becomes thinner and thinner. Chip strength measurement has already been standardized, but it needs special tool for less than 50um thickness and is not a convenient method. To solve this problem, a new bending strength measurement method called “Cantilever Bending Method” for ultra-thin dice is proposed. It will make it easy to prescribe in requirements and specifications among several suppliers and achieve smooth handling through the supply-chain.
 - Scope:
 - Method of Chip Strength Measurement for Ultra Thin Thickness (<50um)
 - Clarified by Chip Thickness
- SEMI Staff:
 - Naoko Tejima | ntejima@semi.org

Attachment: 05, Japan 3D-IC Study Group Presentation

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 1 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 Cycle1 Ballots

Document #	Document Title	Committee Action
5173C	New Standard: Guide for Describing Materials Properties for a 300 mm 3DS-IC Wafer Stack	Failed and will be reballoted
5175	New Standard: Guide for Multi-Wafer Transport and Storage Containers for 300 mm, Thin Silicon Wafers on Tape Frames	Passed as balloted
5409	New Standard: Guide for Metrology for Measuring Thickness, Total Thickness Variation (TTV), Bow, Warp/Sori, and Flatness of Bonded Wafer Stacks	Passed as balloted
5410	New Standard: Guide for Metrology Techniques to be used in Measurement of Geometrical Parameters of Through-Silicon Vias (TSVs) in 3DS-IC Structures	Passed with editorial changes

Attachment: 06, Ballot Review for Doc. 5173C
 07, Ballot Review for Doc. 5175
 08, Ballot Review for Doc. 5409
 09, Ballot Review for Doc. 5410

7 Task Force Reports

7.1 Bonded Wafer Stacks Task Force

Rich Allen (SEMATECH) reported that the task force will review feedback received on ballot 5173C and will begin working on draft 5173D. Rich also reported that an error in SEMI 3D2 (*Specification for Glass Carrier Wafers for 3DS-IC Applications*) was identified. A SNARF was presented to the committee for approval (see section 9.1 of these minutes). Finally, the task force is still working on Document 5174, *New Standard: Specification for Identification and Marking for Bonded Wafer Stacks*.

7.2 Inspection & Metrology Task Force

Rich Allen reported that the task force reviewed votes received on Documents 5409 [*New Standard: Guide for Metrology for Measuring Thickness, Total Thickness Variation (TTV), Bow, Warp/Sori, and Flatness of Bonded Wafer Stacks*] and 5410 [*New Standard: Guide for Metrology Techniques to be used in Measurement of Geometrical Parameters of Through-Silicon Vias (TSVs) in 3DS-IC Structures*]. Rich also reported that round robin for Document 5270 (*New Standard: Guide for Measuring Voids in Bonded Wafer Stacks*) had already started. Bonded wafer sets have been sent to the pilot laboratory.

7.3 Thin Wafer Handling Task Force

Rich Allen reported that the TF reviewed votes received on Document 5175 (*New Standard: Guide for Multi-Wafer Transport and Storage Containers for 300 mm, Thin Silicon Wafers on Tape Frames*). The task force also discussed possible areas for new activities. Meetings will be scheduled to determine next steps.



8 Old Business

8.1 Completed action Items from previous meeting:

<i>Item #</i>	<i>Assigned to</i>	<i>Action Item</i>	<i>Status</i>
None			

9 New Business

9.1 *New TFOFs & SNARFs*

Ilona Schmidt (Corning) presented a new SNARF to revise SEMI 3D2:

Line Item Revision to SEMI 3D2-0113, Specification for Glass Carrier Wafers for 3DS-IC Applications

- Rationale:
 - Current standard 3D2-0113 contains an error (typo) in table 1 part 2, section 2-6.3 Scratch/dig.
- Scope:
 - Line item revision of table 1, part 2, 2-6.3 Scratch/dig, the first numbers (grade A wafers) are supposed to read 20/10 and not 60/40.

Motion: Approve SNARF: *Line Item Revision to SEMI 3D2-0113, Specification for Glass Carrier Wafers for 3DS-IC Applications*

By / 2nd: Ilona Schmidt (Corning) / Steve Martell (Sonoscan)

Discussion: None

Vote: 5-0 in favor. Motion passed.

9.2 *Upcoming Ballots*

<i>#</i>	<i>Type</i>	<i>SC/TF/WG</i>	<i>Details</i>
5173D	Cycle 3, 2013 (or C4-13)	Bonded Wafer Stacks TF	New Standard: Guide for Describing Materials Properties for a 300 mm 3DS-IC Wafer Stack
5588	Cycle 3, 2013	Bonded Wafer Stack TF	Line Item Revision to SEMI 3D2-0113, Specification for Glass Carrier Wafers for 3DS-IC Applications

Motion: Approve letter ballot distribution of document 5173D for the Cycle 3 or 4, 2013 voting period.

By / 2nd: Steve Martell (Sonoscan) / Win Baylies (BayTech Group)

Discussion: None

Vote: 5-0 in favor. Motion passed.

Motion: Approve letter ballot distribution of document 5588 for the Cycle 3, 2013 voting period.

By / 2nd: Ilona Schmidt (Corning) / Steve Martell (Sonoscan)

Discussion: None

Vote: 5-0 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 9 in conjunction with SEMICON West 2013. The tentative schedule is provided below:

North America Standards Meetings at SEMICON West 2013
July 8-11, 2013
San Francisco Marriott Marquis Hotel
55 Fourth Street
San Francisco, California 94103
U.S.A.

Tuesday, July 9

- Inspection & Metrology Task Force (8:00 AM to 10:00 AM)
- Wafer Bonded 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 Committee meeting in conjunction with the NA Standards Spring 2013 meetings in San Jose, California. Adjournment was at 5:30 PM.

Respectfully submitted by:

Paul Trio
Senior Manager, Standards Operations
SEMI North America
Phone: +1.408.943.7041
Email: ptrio@semi.org

Minutes approved by:

Sesh Ramaswami (Applied Materials), Co-chair	Not present
Urmi Ray (Qualcomm), Co-chair	
Richard Allen (SEMATECH), Co-chair	June 10, 2013
Chris Moore (Semilab), Co-chair	Not present



Table 8 Index of Available Attachments #1

<i>#</i>	<i>Title</i>	<i>#</i>	<i>Title</i>
1	SEMI Standards Required Meeting Elements	6	Ballot Review for Doc. 5173C
2	NA 3DS-IC Fall 2012 Meeting (October 30) Minutes	7	Ballot Review for Doc. 5175
3	SEMI Standards Staff Report	8	Ballot Review for Doc. 5409
4	Taiwan 3DS-IC Report	9	Ballot Review for Doc. 5410
5	Japan 3D-IC Study Group Report		

#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.