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

SEMICON West 2013 Meetings
9 July 2013, 15:00 – 17:00 Pacific Time
San Francisco Marriott Marquis Hotel in San Francisco, California

Committee Announcements
Next Committee Meeting
North America Standards Fall 2013 Meetings
October 28-31, 2013
SEMI Headquarters in San Jose, California

Table 1 Meeting Attendees

Italics indicate virtual participants
Co-Chairs: Urmi Ray (Qualcomm), Sesh Ramaswami (Applied Materials), Chris Moore (Semilab), Richard Allen (NIST)
SEMI Staff: Paul Trio

Company	*Last*	*First*	*Company*	*Last*	*First*
Applied Materials	Ramaswami	Sesh	SEMATECH	Vartanian	Victor
BayTech Group	Baylies	Win	Sonoscan	Martell	Steve
BW & Associates; ITRI	Wu	Bevan			
NIST	Allen	Richard	SEMI	Trio	Paul

Table 2 Leadership Changes

Group	*Previous Leader*	*New Leader*
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.

Document #	*Document Title*	*Committee Action*
5588	Line Item Revisions to SEMI 3D2-0113, Specification for Glass Carrier Wafers for 3DS-IC Applications	
Line Item 1	Unit Correction in Scope	**Passed** as balloted.
Line Item 2	Correction of "Diameter" Cell in Table 1, Part 2	**Passed** as balloted.
Line Item 3	Correction of "Scratch/Dig" Cell in Table 1, Part 2	**Passed** as balloted. Superclean
Line Item 4	Clarification of hazardous substances restrictions in Table 1, Part 2	**Passed** as balloted.
Line Item 5	Clarification of shipping box types in Table 1, Part 2	**Passed** as balloted.

Table 4 Authorized Activities

#	*Type*	*SC/TF/WG*	*Details*
5616	SNARF	Inspection & Metrology TF	Revision to SEMI 3D4, Guide for Metrology for Measuring Thickness, Total Thickness Variation (TTV), Bow, Warp/Sori, and Flatness of Bonded Wafer Stacks
5617	SNARF	Inspection & Metrology TF	Revision to SEMI 3D5, Guide for Metrology Techniques to be used in Measurement of Geometrical Parameters of Through-Silicon Vias (TSVs) in 3DS-IC Structures

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

#	*When*	*SC/TF/WG*	*Details*
5616	Cycle 6, 2013 (or C1-14)	Inspection & Metrology TF	Revision to SEMI 3D4, Guide for Metrology for Measuring Thickness, Total Thickness Variation (TTV), Bow, Warp/Sori, and Flatness of Bonded Wafer Stacks
5617	Cycle 6, 2013 (or C1-14)	Inspection & Metrology TF	Revision to SEMI 3D5, Guide for Metrology Techniques to be used in Measurement of Geometrical Parameters of Through-Silicon Vias (TSVs) in 3DS-IC Structures

Table 6 New Action Items

Item #	*Assigned to*	*Details*
2013Jul #01	Paul Trio	Request more information on the Japan Thin Chip (Die) Bending Strength Measurement TF activity
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).
2013Jul #03	Sesh Ramaswami	Provide Paul Trio a list of key stakeholder contacts so that Paul Trio can inform them of current activities and invite them to participate. Paul Trio will also arrange for access to the published 3DS-IC Standards for their review and input.
2013Jul #04	Paul Trio, Rich Allen	Finalize the NA 3DS-IC Fall 2013 meeting schedule by the end of September.

Table 7 Previous Meeting Actions Items

Item #	*Assigned to*	*Details*
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 April 2 in conjunction with the NA Standards Spring 2013 meetings.

Motion:	Accept the minutes of the previous meeting as written.
By / 2nd:	Steve Martell (Sonoscan) / Bevan Wu (BW & Associates)
Discussion:	None
Vote:	3-0 in favor. Motion passed.

Attachment: 02, NA 3DS-IC Spring 2013 meeting (April 2) minutes

3 SEMI Staff Report

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

- 2013 Global Calendar of Events
    - SOLARCON India (August 1-3, Bangalore)
    - SEMICON Taiwan / LED Taiwan (September 4-6, Taipei)
    - SEMICON Europa (October 8-10; Dresden, Germany)
    - PE2013 – Plastic Electronics Exhibition and Conference (October 8-10; Dresden, Germany)
    - PV Taiwan (October 30 – November 1, Taipei)
    - SEMICON Japan (December 4-6, Chiba)
- [early] 2014 Global Calendar of Events
    - SEMICON Korea / LED Korea (February 12-14, Seoul)
- Committees meeting at SEMICON West 2013
    - 3DS-IC | EHS | Facilities & Gases | HB-LED | Information & Control | Liquid Chemicals | MEMS/NEMS | Metrics | Microlithography | PIC | PV/PV Materials | Silicon Wafer | Traceability
- Standards Program at SEMICON West 2013
    - *Silicon Wafers – Future Standardization to Enable the Transition* (Wednesday, July 10)
        - Agenda:
            - Towards 450 mm Silicon Wafers, *Mike Goldstein* (Intel)
            - Notchless Wafer, *Pinyen Lin* (G450C)
            - New Edge Exclusion Proposal, *Kwangwook Lee* (G450C)
            - Wafer Geometry for Advanced Nodes, *Gerd Pfeiffer* (IBM)
            - Challenges during 450 mm Silicon Processing, *Hisashi Furuya* (SUMCO)
            - 450 mm Facilities Planning, *Allen Ware* (F450C)
            - G450C Component Lift Program Update, *Les Marshall* (G450C)
- Standards Publications Report
    - April 2013 Cycle
        - New Standards – 1, Revised Standards – 6, Reapproved Standards – 8, Withdrawn Standards – 0

- May 2013 Cycle
  - New Standards – 5, Revised Standards – 3, Reapproved Standards – 3, Withdrawn Standards – 0
- June 2013 Cycle
  - New Standards – 10, Revised Standards – 2, Reapproved Standards – 4, Withdrawn Standards – 0, Total in portfolio – 887 (includes 94 Inactive Standards)

- NA Standards Fall 2013 Meetings
  - October 28-31
  - SEMI Headquarters in San Jose, California
  - Inviting local companies willing and able to host some of the meetings to maintain one-week format.
- Technical Ballot Critical Dates for NA Standards Fall 2013 Meetings
  - Cycle 5: due July 18 / July 29 – August 28
  - Cycle 6: due August 15 / August 29 – September 30

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:

- Next meeting: July 30, 2013 at ITRI in Hsinchu
- 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

Middle-End Process TF	
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
Testing TF	
Doc. 5485	New Standard: Guide for Incoming/Outgoing Quality Control and Testing Flow for 3DS-IC Products

- Recently Approved Document for Publication

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

- Recent Taiwan 3DS-IC Ballot

* Voting Period – Cycle 2, 2013 *		
Doc #	*Document Title*	*Task Force*
5473	New Standard: Guide for Alignment Mark for 3DS-IC Process	Middle-End Process TF

- 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: July 19 during the Japan Summer Meetings 2013 (SEMI Japan office, Tokyo)
- Study Group leaders
  - Kazunori Kato (AiT) | Yutaka Koma (Koma Consulting) | Masahiro Tsuriya (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
  - May. 17, 2013: 8th Meeting with 18 attendees
  - Jun. 27, 2013: 9th Meeting with 17 attendees
- Discussing about the possibility of the standardization of:
  - Bonded Wafer Handling
  - Stacked Wafer Handling
  - Diced Stacked Dies Handling
- 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
- Currently preparing the test samples with various wafer thickness down to 10um for the experiment of bending strength measurement.

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

Additional Discussion:

- Some committee members requested additional information on the Thin Chip (Die) Bending Strength Measurement TF, particularly the method(s) being used.

Action Item: 2013Jul #01, Paul Trio to request more information on the Japan Thin Chip (Die) Bending Strength Measurement TF activity.

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 4 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 *Cycle4 Ballots*

Document #	*Document Title*	*Committee Action*
5588	Line Item Revisions to SEMI 3D2-0113, Specification for Glass Carrier Wafers for 3DS-IC Applications	
Line Item 1	Unit Correction in Scope	**Passed** as balloted.
Line Item 2	Correction of “Diameter” Cell in Table 1, Part 2	**Passed** as balloted.
Line Item 3	Correction of “Scratch/Dig” Cell in Table 1, Part 2	**Passed** as balloted. Superclean
Line Item 4	Clarification of hazardous substances restrictions in Table 1, Part 2	**Passed** as balloted.
Line Item 5	Clarification of shipping box types in Table 1, Part 2	**Passed** as balloted.

Attachment: 06, Ballot Review for Doc. 5588

7 Task Force Reports

7.1 *Bonded Wafer Stacks Task Force*

Rich Allen reported that the task force reviewed the responses received on ballot 5588 (see section 6 of these minutes for additional information). The task force has also reviewed the responses received on ballot 5173C (*New Standard: Guide for Describing Materials Properties for a 300 mm 3DS-IC Wafer Stack*) and is working on draft 5173D. Finally, Rich reported that the task force is still working on Document 5174, *New Standard: Specification for Identification and Marking for Bonded Wafer Stacks*. There are no major updates on Document 5174 at this time.

7.2 *Inspection & Metrology Task Force*

Victor Vartanian provided the following summary of the items discussed during the TF meeting held earlier in the day:

- Corning presented a report on the status of Document 5506, *New Standard: Test Method for Measuring Warp, Bow and TTV on Silicon and Glass Wafers Mounted on Wire Grids by Automated Non-Contact Scanning using Laser Scanning Interferometry*
- There are no major updates on the development of Document 5447, *Terminology for Measured Geometrical Parameters of Through-Glass Vias (TGVs) in 3DS-IC Structures*
- The task force also reviewed the status of Document 5270, *New Standard: Guide for Measuring Voids in Bonded Wafer Stacks*. Sergei Ostapenko from Ultrasonic Technologies provided a presentation on resonance ultrasonic vibration (RUV) technique used to identify voids in bonded wafers.

Finally, Victor reported that the TF plans to submit two SNARFs for revisions to SEMI 3D4 [*Guide for Metrology for Measuring Thickness, Total Thickness Variation (TTV), Bow, Warp/Sori, and Flatness of Bonded Wafer Stacks*] and 3D5 [*Guide for Metrology Techniques to be used in Measurement of Geometrical Parameters of Through-Silicon Vias (TSVs) in 3DS-IC Structures*].

7.3 *Thin Wafer Handling Task Force*

Rich Allen reported that the TF is completing the remaining experiments that would introduce more revisions to SEMI 3D3, *Guide for Multi-Wafer Transport and Storage Containers for 300 mm, Thin Silicon Wafers on Tape Frames*. Rich also mentioned that the name of this TF may need to be clarified since this group actually focuses on shipping and transport, and not on the handling, of thin wafers. One approach that the committee discussed is to rename this group as the “Thin Wafer Task Force” then form various working groups focusing on various topics/areas (e.g., Handling WG, Shipping WG). Sesh Ramaswami supported the idea of renaming the TF and stated that several people have asked him for clarification on the actual scope of this TF. Furthermore, he pointed out that several 3D industry stakeholders are still not aware of this committee’s standardization efforts, including the five 3DS-IC standards published thus far. He stated that such companies should be informed of such efforts and invited to participate. Sesh also recommended that SEMI arrange for access to these published standards and ask for inputs. These inputs can then be used for future development of these Documents.

Action Item: 2013Jul #02, Paul Trio to 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).

Action Item: 2013Jul #03, Sesh Ramaswami to provide Paul Trio a list of key stakeholder contacts so that Paul Trio can inform them of current activities and invite them to participate. Paul Trio will also arrange for access to the published 3DS-IC Standards for their review and input.

8 Old Business

8.1 Completed action Items from previous meeting:

Item #	*Assigned to*	*Action Item*	*Status*
None			

9 New Business

9.1 *New TFOFs & SNARFs*

Victor Vartanian presented two new SNARFs to revise SEMI 3D4 and 3D5:

Revision to SEMI 3D4, Guide for Metrology for Measuring Thickness, Total Thickness Variation (TTV), Bow, Warp/Sori, and Flatness of Bonded Wafer Stacks

- Rationale:
  - Comments in balloting suggested some edits need to be made so we propose to ballot several line item changes.
- Scope:
  - We propose the following changes:

    1) Section 2.4:

    Proposal to change text to: “The Guide focuses on general measurement techniques including IR laser profiling, white light confocal microscopy, visible and IR interferometry, capacitance, back-pressure and acoustic microscopy. Each technology has unique strengths and weaknesses—some rely on front-side illumination, others on back-side illumination. Some techniques can measure the thicknesses of individual layers in the bonded wafer stack, and some are additionally capable of measuring surface nanotopography.”

    2) Section 2.6:

    Proposal to change text to: “The measurements described in this Guide are on bonded wafer stacks with thickness in the range of 50 to 1550 μm. The Taskforce will identify a thickness range appropriate for 3DS-ICs.”

    3) Section 5.2, proposal to fix typographical error:

    Proposal to remove the “2” after the word “depictions” in Figure 3 Figure Caption.

    4) Section 5, Terminology, proposal to add the following:

    5.1.5 CSI — coherence scanning interferometry

    5) Proposal to make Figure 44 less pixelated (need to obtain better copy of figure).

    Other line item changes as identified by the Taskforce.

Revision to SEMI 3D5, Guide for Metrology Techniques to be used in Measurement of Geometrical Parameters of Through-Silicon Vias (TSVs) in 3DS-IC Structures

- Rationale:
  - Comments in balloting suggested some edits need to be made so we propose to ballot several line item changes.
- Scope:
  - We propose the following changes:

    1) Section 2.5, proposal to alter text as follows:

    The examples given have been provided by qualified industry [delete: colleagues] experts, and are believed to be representative of instrument performance that can be routinely achieved. Substantial efforts have been made to obtain performance data that are representative of the marketplace in 2012. However, this guide is not an exhaustive survey of the state of the art of TSV geometrical metrology.

    2) Section 6.1, proposal to alter text as follows:

    Image-based dimensional measurements — A typical route to performing image-based dimensional measurements of TSVs consists of two steps: a) Acquire a digital image of the TSV; and b) Analyze the image. [delete: It hardly needs to be stated that in the 21st century both of these steps are carried out with the aid of digital computers of some sort.] The capability of acquiring [delete: digital] images is offered by multiple vendors [delete: for all of the measurement tools listed above]. Basic interactive tools for the analysis of digital images are widely available, in some cases free, for example ImageJ. Several images of TSVs have been published in the open technical literature; SEM images are particularly popular. Examples are shown below [add: in §8.2].

    3) Section 6.2, proposal to alter text as follows:

    Challenges to accurate and consistent extraction of dimensional parameters — The metrology issues in SEM imaging and image analysis have been discussed at length in a technical article on SEM as a technique for dimensional metrology. These usually come down to identifying the exact pixel or fraction of a pixel that corresponds to the edge of a feature to be measured. Best practices in image analysis are beyond the scope of this guide; [delete: however, proper reporting of TSV dimensions would clearly appear to be incomplete, and hence of limited use, without documentation of the methodologies used for both imaging and image analysis.]

    4) Section 7.1, proposal to alter text as follows:

    Despite these limitations, cross-section SEM is the [delete: tool] technique usually used in verification of other, less direct methods of obtaining TSV dimensions.

    5) Section 7.4, proposal to alter text as follows:

    Interferometry — Some of the measurement techniques to be introduced below utilize interferometry. Interferometry refers to measurements that rely on the interference of light; optical interference occurs for light of all wavelengths, including, in the present context, [delete: optical] visible and IR.

    6) Section 7.4, proposal to alter text as follows:

    Note 1: The X-ray microscope works by detecting transmitted X-rays after they pass through a material. The x-ray microscopy technique as practically applied to date is image-based and destructive, [add: because of the specimen preparation needed as explained below.]

7) Section 8.2, proposal to alter text as follows:

Examples of measurements of TSV dimensions on SEM images — Example images from contributing organizations and the technical literature, demonstrating measurements of dimensions of TSVs and similar structures in cross-sectional SEM images, are shown in Figures 3-5. Figure 3, [delete: from a contributing organization], illustrates research-style manual annotation of the image to obtain dimensions by use of an image analysis software package. Note the dimension on the figure. The TSV depth is approximately 50 µm. Figure 4, [delete: from a contributing organization,]

8) Page 6, proposal to fix footnote 10:

The reference needs to add the DOI information, e.g., everything highlighted in the text below, copied from the Journal Web site [add: (http://iopscience.iop.org/0960-1317/22/4/045019):]

9) Page 7, proposal to fix Figure 5 caption:

The "10" should be a superscript to refer to Footnote 10 (which is a reference to the source of the image and first appears on the previous page). So the superscript should read "10, 11."

Other line item changes as identified by the Taskforce.

Motion: Approve SNARFs for SEMI 3D4 and SEMI 3D5 revisions.
By / 2nd: Sesh Ramaswami (Applied Materials) / Win Baylies (BayTech Group)
Discussion: None
Vote: 4-0 in favor. Motion passed.

9.2 *Upcoming Ballots*

#	*Type*	*SC/TF/WG*	*Details*
5616	Cycle 6, 2013 (or C1-14)	Inspection & Metrology TF	Revision to SEMI 3D4, Guide for Metrology for Measuring Thickness, Total Thickness Variation (TTV), Bow, Warp/Sori, and Flatness of Bonded Wafer Stacks
5617	Cycle 6, 2013 (or C1-14)	Inspection & Metrology TF	Revision to SEMI 3D5, Guide for Metrology Techniques to be used in Measurement of Geometrical Parameters of Through-Silicon Vias (TSVs) in 3DS-IC Structures

Motion: Approve letter ballot distribution of Documents 5616 (3D4 revision) and 5617 (3D5 revision) for Cycle 6, 2013 (or Cycle 1, 2014) voting period.
By / 2nd: Sesh Ramaswami (Applied Materials) / Win Baylies (BayTech Group)
Discussion: None
Vote: 4-0 in favor. Motion passed.

9.3 *Outstanding Contributor Awards*

SEMI recognizes a number of Standards members who have made significant contributions to the program in the past year. SEMI Standards sincerely thanks them for their efforts. The NA 3DS-IC 2013 Outstanding Contributor Award recipients are:

- Chris Moore – Semilab
- David Read – NIST
- Ilona Schmidt – Corning
- Raghunandan Chaware – Xilinx
- Richard Allen – NIST
- Sesh Ramaswami – Applied Materials
- Urmi Ray – Qualcomm
- Victor Vartanian – SEMATECH

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, October 29 in conjunction with the NA Standards Fall 2013 meetings. The tentative schedule is provided below:

North America Standards Fall 2013 Meetings
October 28-31, 2013
SEMI Headquarters
3081 Zanker Road
San Jose, California 94103
U.S.A.

Tuesday, October 29

- 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)

Action Item: 2013Jul #04, Paul Trio and Rich Allen to finalize the NA 3DS-IC Fall 2013 meeting schedule by the end of September.

Having no further business, a motion was made to adjourn the NA 3DS-IC Committee meeting in conjunction with SEMICON West 2013 in San Francisco, California. Adjournment was at 5:00 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	
Urmi Ray (Qualcomm), Co-chair	Not present
Richard Allen (NIST), Co-chair	September 13, 2013
Chris Moore (Semilab), Co-chair	Not present

Table 8 Index of Available Attachments #1

#	*Title*	#	*Title*
1	SEMI Standards Required Meeting Elements	4	Taiwan 3DS-IC Report
2	NA 3DS-IC Spring 2013 Meeting (April 2) Minutes	5	Japan 3D-IC Report
3	SEMI Standards Staff Report	6	Ballot Review for Doc. 5588

#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.