Physical Interfaces & Carriers North America TC Chapter

Meeting Summary and Minutes

NA Standards Spring Meetings 2024
Wednesday, March 27, 10:00 – 12:00 Noon Pacific
SEMI Global Headquarters, Milpitas, California, and via Official Virtual TC Chapter Meeting (OVTCCM)

TC Chapter Announcements

Next TC Chapter Meeting

SEMICON West 2024

Wednesday, July 10, 09:30 – 12:30 Pacific

Moscone Center, San Francisco, California/USA

Table 1 Meeting Attendees

Italics indicate virtual participants

Co-Chairs: Melvin Jung (Intel), Matt Fuller (Entegris)
SEMI Staff: Laura Nguyen

Company	*Last*	*First*	*Company*	*Last*	*First*
Acteon NEXT LLC	*Komatsu*	*Shoji*	JEOL Ltd.	Asayama	Kyoichiro
Brooks Automation	*Babbs*	*Daniel*	*Lam Research*	*Wong*	*Scott*
Entegris	*Strickhouser*	*Chris*	*LK Semiconductor Consulting Services*	*Kwakman*	*Laurens*
Hitachi-High Tech	Onishi	Tsuyoshi	Tokyo Electron Limited	Mashiro	Supika
Intel	*Jung*	*Melvin*	Tokyo Electron Limited	Tomita	Yugo
Intel	*Radloff*	*Stefan*	SEMI	Nguyen	Laura

Table 2 Leadership Changes

None

Table 3 Committee Structure Changes

None

Table 4 Ballot Results

None

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

#2 **Failed** ballots and line items were returned to the originating task forces for re-work and re-balloting or abandoning.

Table 5 Activities Approved by the GCS between meetings of the TC Chapter

None

Table 6 Authorized Activities

Listing of all revised or new SNARF(s) and TFOF(s) approved by the Originating TC Chapter.

None

#1 SNARFs and TFOFs are available for review on the SEMI Web site at: http://downloads.semi.org/web/wstdsbal.nsf/TFOFSNARF

Table 7 Authorized Ballots

Listing of documents authorized by the Originating TC Chapter for Letter Ballot.

#	*When*	*TF*	*Details*
7195	Cycle 4, 2024	SEMI E72 Revision TF	Revision to SEMI E72-1016, Specification and Guide for Equipment Footprint, Height, and Weight

Table 8 SNARF(s) Granted a One-Year Extension#1

#	*TF*	*Title*	*Expiration Date*
6592	Electron Microscopy Workflow TF	New Standard, Specification for Container for Transport and Storage of Transmission Electron Microscope (TEM) Lamella Carriers within Electron Microscopy Workflows	Spring 2025

#1: If the Standards Document Development Project is found to be continuing, but cannot be completed within the current project period, the TC Chapter may grant a one-year extension at a time, as many times as necessary. [*Regulations* § 8.3]

Table 9 SNARF(s) Cancelled

None

Table 10 Standard(s) to receive Inactive Status

None

Table 11 New Action Items

Item #	*Assigned to*	*Details*
2024March#01	SEMI Staff	Create connect@SEMI communities for PIC TFs. Completed.

Table 12 Previous Meeting Action Items

Item #	*Assigned to*	*Details*
2017April#04	Laura Nguyen	To identify which documents under the global task force, belong to which committees. Ongoing. Unsure how this should be done.
2022Mar#01	Larry Hartsough	Larry to check Five-Year docs for “must”, “shall”, and other PM related items. Ongoing.
2022Mar#02	Laura Nguyen	Laura to check internally to share top formatting examples to TF leaders. Ongoing.
2022July#01	Larry Hartsough	Provide tutorial for Inactive Standards. Ongoing.
2022Nov#01	Larry Hartsough	Put together a slide on how to add other things to consider in the future (such as, how to resolve different types of conflict; ex: SEMI E131 and E15.1 conflict) Ongoing.
2023Nov#01	Laura Nguyen	Laura to connect Loek with Christian to revise SNARF. Ongoing.

1 Welcome, Reminders, and Introductions

Matt Fuller (Entegris) called the meeting to order at 10:00. The meeting reminders on antitrust issues, intellectual property issues and holding meetings with international attendance were reviewed. Attendees introduced themselves.

Attachment: SEMI Standards Required Meetings Elements

2 Review of Previous Meeting Minutes

The TC Chapter reviewed the minutes of the previous meeting.

Motion:	To accept the previous meeting minutes as written.
By / 2nd:	By: Shoji Komatsu / Acteon NEXT LLC Second: Supika Mashiro / Tokyo Electron Ltd.
Discussion:	None.
Vote:	7-0 in favor. Motion passed.

Attachment: [2024Spring] PIC NA TC Chapter Meeting Minutes draft

3 Liaison Reports

3.1 *Physical Interfaces & Carriers Japan TC Chapter*

Laura Nguyen (SEMI HQ) reported for the Physical Interfaces & Carriers Japan TC Chapter. Of note:

Meeting Information

- Last meeting
    - Thursday, December 14, 2023, in conjunction with SEMICON Japan 2022, Tokyo Big Sight, Tokyo, Japan + OVTCCM (Hybrid)
- Next Meeting:
    - Friday April 12, 13:00-16:00, OVTCCM

Committee Structure Changes: Next Gen Assembly / Test Material HandlingTF

Organization Chart (*See attachment)*

Ballot Results:

Doc#	Document Title	TC Chapter Action
7112	Line Item Revision to SEMI E181-0423 SPECIFICATION FOR PANEL FOUP FOR PANEL LEVEL PACKAGING, SEMI E181.1-0423 - SPECIFICATION FOR PANEL FOUP FOR 510 mm – 515 mm PANEL SIZE and 12 SLOTS, SEMI E181.2-0423 - SPECIFICATION FOR PANEL FOUP FOR 510 mm – 515 mm PANEL SIZE and 6 SLOTS, SEMI E181.3-0423 - SPECIFICATION FOR PANEL FOUP FOR 600 mm – 600 mm PANEL SIZE and 12 SLOTS, SEMI E181.4-0423 - SPECIFICATION FOR PANEL FOUP FOR 600 mm – 600 mm PANEL SIZE and 6 SLOTS	
LI-1	Clarify the area to prevent Panel FOUP from falling from AMHS in E181	Passed as balloted
LI-2	Modify the panel FOUP internal area considering mass production and that includes changing the definition of first slot height in E181, E181.1, E181.2, E181.3 and E181.4	Passed as balloted
LI-3	Delete the number of slots information in Figure 24 of E181	Passed as balloted
7113	Line Item Revision to Line Item Revision to SEMI E182-0621 - SPECIFICATION FOR PANEL FOUP LOADPORT FOR PANEL LEVEL PACKAGING	
LI-1	Change the y140 value	Passed as balloted
LI-2	Add the “APPLICATION NOTES” to the Related Information	Passed as balloted

Authorized Activities

#	*Type#1*	*SC/TF/WG*	*Details*
7170	SNARF	Panel Level Packaging (PLP) Panel FOUP Task Force	Line Item Revision to SEMI E185-1222: Specification for 300 mm Tape Frame FOUP

#	*Type*[#1]	*SC/TF/WG*	*Details*
7171	SNARF	Panel Level Packaging (PLP) Panel FOUP Task Force	Line Item Revision to SEMI E184-1221E: Specification for 300 mm Tape Frame FOUP Load Port
7172	SNARF	Next Gen Assembly / Test Material Handling Task Force	New Standard: Specification for Next Gen Assembly / Test Carrier

Authorized Ballots:

#	*Type*[#1]	*SC/TF/WG*	*Details*
7170	Cycle 2, 2024	Panel Level Packaging (PLP) Panel FOUP Task Force	Line Item Revision to SEMI E185-1222: Specification for 300 mm Tape Frame FOUP
7171	Cycle 2, 2024	Panel Level Packaging (PLP) Panel FOUP Task Force	Line Item Revision to SEMI E184-1221E: Specification for 300 mm Tape Frame FOUP Load Port

Task Force Highlights

Global PIC Standards Maintenance Task Force

- Two ballots are voting in Cycle 2. The ballot adjudication will be at the next committee meeting in April.
- 7170 - Line-Item Revision to SEMI E184 -1221E Specification for 300 mm Tape Frame FOUP Load Port
  - Since the “E185 Tape Frame FOUP” standard has been published, add it to the reference section and correct “Bias term" to the appropriate wording.
    - Line Item 1: Addition of E185 Tape Frame FOUP to reference section
    - Line Item 2: Bias term correction and editorial correction
- 7171 - Line-Item Revision to SEMI E185 -1222 Specification for 300 mm Tape Frame FOUP
  - Since the "E184 Tape Frame FOUP Loadport" standard has been published, add it to the reference section and correct "Bias term" to the appropriate wording. Also, update incorrect dimensions and missing specifications.
    - Line Item 1: Addition of E184 Loadport standard to reference section
    - Line Item 2: Correction of z0 calculation mistake
    - Line Item 3: Correction of EE Exclusion volume
    - Line Item 4: Bias term correction

Japan Electron Microscopy Workflow liaison TF

- Planning 2023-2024 activities - Aiming at a LCC Standards document ready for Ballot before end Q1 2024
  - Migrate from Doc. 6592 V.03 to a newer, more complete version Q1- Q3, 2023
    - Integrate specs for the listed additional LCC features in Doc 6592
- Review and approve new version(s), identify remaining updates Q4, 2023 - Q1, 2024
  - Refine specifications
  - Create final draft for Ballot, review draft at Taskforce level
- Issue first final version of Doc.6592 for a ballot cycle in Q4 end Q1, 2024
  - In parallel: restart the activities for Doc 6832 (shipping container)

Panel Level Packaging(PLP) Panel FOUP TF

- TF is discussing amendments to the following three items:
  - SEMI E181.2 (6 panel) FOUP First Panel Height

        - TF is considering adding the First panel height option to effectively utilize the internal space of the Panel FOUP.
    - E182 drawing update error
        - Correct the incorrect values of x236,y237, r236 and r243 in Figure 14 and y374 in Figure 15 by Ballot 6963 change.
    - Panel FOUP / LP KC Pin Height
        - There is something that needs to be corrected in the definition of r3/z3 of the KC pin of E182, and TF is reviewing the related E181:z11 and E182:z160.

Five-Year Review: None

Staff Contact: Hirofumi Kanno; hkanno@semi.org

Attachment: JA_PIC_Liaison_20240307_R1.0

3.2 *SEMI Staff Report*

Laura Nguyen (SEMI) gave the SEMI Staff Report. Of note:

Laura Nguyen (SEMI) gave the SEMI Staff Report. Of note:

SEMI Global 2024 Calendar of Events

- SEMICON SEA (May 28-30; Kuala Lumpur, Malaysia)
- SEMCON West (July 9-11; San Francisco, CA)
- SEMICON Taiwan (Sept 4-6; Taipei, Taiwan)
- SEMICON Europa (Nov 12-15; Munich, Germany)
- SEMICON Japan (December 11-13; Tokyo, Japan)

SEMICON West 2025 (October 7-9, 2025, Phoenix Convention Center, Phoenix, AZ) ← **NEW!**

Upcoming NA Meetings

- SEMICON West Standards Meetings
    - July 8-11, 2024, at Moscone Center, San Francisco, CA/USA
- NA Standards Fall Meetings
    - November 4-7, 2024 (*tentative*), at SEMI HQ, Milpitas, California/USA

Standards Online Voting System Updated

- New system went live for Cycle 3, 2024
    - https://www.semi.org/standards/ballots or https://portal.semi.org
- The new voting system:
    - Integrates and streamlines sign-in process with various SEMI/Standards member services
    - Aims to bring updated user interface while maintaining functionality that’s familiar to voters
    - Improves data management for SEMI internal database

Critical Dates for SEMI Standards Ballots

- Cycle 3-2024: Ballot Submission Due: Mar 6/Voting Period: Mar 20 – Apr 19
- Cycle 4-2024: Ballot Submission Due: Apr 24/Voting Period: May 8 – June 7
- Cycle 5-2024: Ballot Submission Due: May 7/Voting Period: May 21 – June 20

https://www.semi.org/en/collaborate/standards/ballots

Regulations & Procedure Manual Updates

- Available at www.semi.org/standards (under Tools for Developing Standards) or direct link below
- Regulations (Feb 20, 2024)
    - New definition of "Standards Document"
    - Clarification of confidential presentation materials
    - https://www.semi.org/sites/semi.org/files/2024-02/Standards%20Regulations%20February%2020%202024.pdf
- Procedure Manual (Feb 20, 2024)
    - The use of Connect@SEMI for TF management and document development depository
    - Clarification on meeting quorum
    - TC Chapter Committee Express Report (CER) timing
    - Deletion of Appendix 4 - Nonconforming Standards Titles
    - https://www.semi.org/sites/semi.org/files/2024-02/Procedure%20Manual%20February%2020%2C%202024.pdf

The Use of Connect@SEMI for TF Management and Document Development Depository

- Refer to PM § 6.4.5 Operation of TFs
    - Task Forces have one year from 02/20/24 to implement use of Connect@SEMI. (https://connect.semi.org)
- Once TFs have implemented use of Connect@SEMI, they shall use it to:
    - Maintain the TF member roster up to date.
    - Share the working drafts.
    - The default format for working Draft Document sharing shall be Adobe Acrobat PDF.
    - Distribute the Draft Document at least one week before ballot submission to SEMI.

New Meeting Required Elements

- The update is on slide 6.
    - New 3rd bullet below.
    - *Confidential information, whether marked or unmarked, shall not be presented and/or discussed in any Standards meetings.*
- Download the latest version at
    - www.semi.org/standards (under Tools for Developing Standards) or direct link below
        - https://www.semi.org/sites/semi.org/files/2024-03/Required%20Meeting%20Elements%20March%202024.pptx
    - Or, contact your Standards staff

Standards Publications Report

Cycle	*New*	*Revised*	*Reapproved*	*Withdrawn*
November 2023	0	4	6	0
December 2023	0	6	0	0
January 2024	0	1	14	0
February 2024	1	12	9	0

Total in portfolio – 1,086 (includes 335 Inactive Standards)

New Standards

Cycle	*Designation*	*Title*	*Committee*	*Region*
February 2024	SEMI FH3	Guide for Salt Mist and Washability Test Flow for Control Module Connector of Wearables	Flexible Hybrid Electronics	TW

Five-Year Review: None

Attachment: Staff Report March 2024 v4_PIC

4 Ballot Review

Listing of documents authorized by the Originating TC Chapter for Letter Ballot.
None

5 Subcommittee and Task Force Reports

5.1 *SEMI E72 Revision Task Force*

Supika Mashiro (TEL) reported for this Task Force. Of note:

Agenda

- TF roster and meeting attendance
- Activities from NA Fall meeting 23' and today
- Request to NA Chapter of PIC GTC

Activities from Fall meeting and today

- Disposition of each negative/comment received on the Reapproval ballot (Doc.#6834) has been discussed and reflected to the CoC Table.
- The draft was updated in accordance with agreed resolutions.

TF request to the TC Chapter

- Request for new Letter Ballot submission approval

On behalf of Supika Mashiro (TEL):

Motion:	Authorize the Document 7195 for Letter Ballot in Cycle 4-2024
By / 2nd:	By: Supika Mashiro / Tokyo Electron Ltd. Second: Stefan Radloff / Intel
Discussion:	None.
Vote:	7-0 in favor. Motion passed.

Next Actions

- Next TF meeting
- 6/24 to prepare for adjudication at SEMICON WEST

Attachment: E72Revision TF Report to NAPIC TC_20240327

5.2 *Film Frame FOUP Task Force (did not meet – will meet April 1, 17:00 Pacific)*

Stefan Radloff (Intel) reported for the FFF Task Force. Of note:

FFF TF Status Update

- Rev 0 full draft of ballot complete –TF review ongoing
    - Document includes 2 different FWH options –we are ~3-4 years too late and constrained by non-standard products in use
- Goal = ready for ballot @ SemiconWest
- Future: FFF Loadport/ BOLTS –very minor adjustments to existing standards

Attachment: FFF update spring 24 update

5.3 *JA Next Gen Assembly / Test Material Handling Task Force*

Stefan Radloff (Intel) reported for the FFF Task Force. Of note:

Background *{refer to TFOF and Scope slides in attachment)*

- Create standards to enable automation in assembly test factories, where really today, nothing exists except outside a couple standards on JEDEC strays
- Goal to develop physical interfaces that will help enable fab like automation
- Scope of the Task Force, initially to develop a carrier that is based on part of E181 (panel FOUP standards) that contains stack of JEDEC trays, and a Load port tweaked to accommodate that carrier
- Long term vision: to develop more formal process equipment modules, assembly version of cluster tool
- First time a scenario where on the SEMI Standards side a carrier standard is created for something that is for a different organization (JEDEC trays)

Standards Structure and Plans *{refer to attachment for images}*

Carrier Design – Intel Proposal *{refer to attachment for images}*

Attachment: NGAT kick off update

5.4 *Electron Microscopy Workflow Task Force*

Laurens Kwakman (LN Semiconductor Consulting) reported for this Task Force. Of note *{See attachment for images}*:

Agenda

- Activity update since November 2023
- Outcome Focus Team Meetings
- Planning 2024

Activity Update

- Since November 2023, the Taskforce has continued to advance the LCC specifications through focus team and taskforce meetings
    - Six focus team meetings and four Taskforce meetings were organized in these last four months. The latest version of Doc6592 V.09 has been reviewed in details and its content has been approved at Taskforce level. But critical specs are still missing: LCC lid design, LC containment features have been the focus point in this period under review.
    - As we are not only defining a Standard for existing technology or products but also do ground-up design based on various concepts, the planning, unfortunately, continues to slip but there is light at the end of the tunnel : we do have a first spec set defined for the LCC lid and LC containment in the pockets, but other elements (magnetic lid locking, open/close sensor features and robot connecting interfaces still need to be detailed which will take at least until end Q3 2024…
- Progress made in November 2023 – March 2024 period
    - All current specs in Doc 6592 V9. have been reviewed and ‘approved’ by TF members
    - LCC material choice concerns have been properly adressed: plastic and metal LCCs can be realised with current (tolerance) specifications in the Standard.
    - Hitachi and the focus team members have come to a coherent set of dimension and tolerance specs based on specifically selected and agreed-upon design choices.

- Critical aspects of LC containment designs have been reviewed; new design proposals have allowed to define a coherent set specs for dimensions and associated tolerances. *{See attachment for images}*
    - Definition of exact ridge topography dimensions
    - Parameter space analysis has allowed to identify the specs that yield a functional LCC
- A detailed analysis and subsequent 3D CAD verification has resulted in a full set of specifications for the lid and base features that ensures LC containment in the pockets *{See attachment for images}*
    - Requires a major update of Doc 6592: planned in Q2 2024
- Summary and Planning 2024 activities (Aiming at a LCC Standards document ready for Ballot before end Q4 2024)
    - Doc 6592 has been updated to V09 and approved by TF members
    - We have found solutions for a plastic compatible LCC Standard
    - The LCC Standard will be defined in material neutral terms
    - Progress is slow, however Thermofisher continues its involvement in the taskforce with critical reviews and specific (industry relevant) design change requests and Hitachi's engineering and design teams are seriously engaged now and provide valuable support.
    - Update Doc 6592 with a full set of LCC lid and LC containment specs: Q2, 2024
    - Redefine the side connector specifications and update Doc 6592 accordingly: Q2, 2024
    - Define missing LCC elements (Lid lock, lid connector, sensor features,..) Q3, 2024
    - Create final draft for Ballot, review draft at Taskforce level Q3, 2024
    - Issue first final version of Doc.6592 for a ballot cycle in Q1 2025 Q4, 2024
- Extension of SNARF 6592 (Validity of SNARF 6592 ends April 1 2024)
    - The SNARF for the development of a LCC Standard was defined end 2019 and its validity was extended until April 1 2024.
    - The planning has seen additional slip due to factors explained before.
    - Hence, the EM Workflow Taskforce requests an extension of SNARF 6592 to complete the work needed to arrive at a new LCC Standard:

On behalf of Laurens Kwakman (LN Semiconductor Consulting):

Motion: Approve a 1 year extension of the project period for SNARF 6592.
By / 2nd: By: laurens kwakman / LK Semiconductors Consulting Services
Second: Kyoichiro Asayama / JEOL
Discussion: None
Vote: 6-0 in favor. Motion passed.

- Next Meetings
    - Next TF meeting: Date: Tuesday, May 7, 2024, Time: 03.00 – 04.00 pm (PDT, pacific daylight time USA)
        - Agenda: Update on latest LCC lid design agreements, (focus team activity update), Updates made in Doc 6592 , new LCC connector design proposal
    - Next Focus team meeting: Date: Tuesday, April 16, 2024, Time: 02.30 – 04.00 pm (PDT USA)
        - Agenda: discuss new specifications generated and proposed by HTT

Attachment: SEMI EM TF -PIC Update 27 March 2024

5.5 *Integrated Workflows in Failure Analysis TF (have not met)*

- Update: currently aligning JSON activity with Information & Control NA Chapter before kickoff meeting is planned.

5.6 *Global PIC Maintenance Task Force (did not meet)*

- Update: Since there are no standards upcoming for Five-Year Review in the NA Chapter, the Global PIC Maintenance TF did not meet at NA Spring meeting.
- Will plan to meet at SEMICON West 2024

6 Old Business

None

7 New Business

7.1 *6x12 Reticle Standards Discussion*

Daniel Babbs (Brooks Automation) brought this to the Committee. Of note:

- New reticle sizes proposed for standardization
- Last October at a SPIE conference, a workshop had a topic on 6x12 request to the industry to collaborate with stakeholders in bringing it to market
    - Additional informal meetings following this topic has been brought up
    - Curious if this has come up anywhere else, and if there is a plan for it? How do we bring major players into this discussion.
- Will this come into SEMI Standards?
    - PIC side has physical interfaces standards, reticle pods, load port, etc.
    - Lithography has reticle standards, but on substrate, and various test methods that may refer to the reticle
- Reticle standards were attempted during the 300 mm standards and was abandoned.
- Has anyone brought this in the SEMI domain?
    - Intel side will bring this up on their end.

8 Action Item Review

8.1 New Action Items are noted in Table 11. Previous action items are noted in Table 12 in ‘red’ and for recent updates in ‘blue’. There is no further business.

9 Next Meeting and Adjournment

9.1 The next meeting is tentatively scheduled for the week of July 8-11, in conjunction with SEMICON West 2024 in San Francisco, California. Schedule details TBD. Please check www.semi.org/standards for updates.

Tentative Schedule:

- Integrated Workflows in Failure Analysis TF ?

Monday, July 8

- 16:00-17:30, SEMI E72 Revision TF

Tuesday, July 9

- 15:00-16:00, Electron Microscopy Workflow TF
- 16:00-18:00, Film Frame FOUP TF (*tentative*)

Wednesday, July 10

- 09:00-09:30, Global PIC Maintenance TF *?? depends on Five-Year Reviews*
- 09:30-12:30, PIC NA TC Chapter Meeting

Adjournment: 11:33.

Respectfully submitted by:

Laura Nguyen
Sr. Coordinator, International Standards
SEMI Global Headquarters
Phone: +1.408.943.7019
Email: lnguyen@semi.org

Minutes tentatively approved by:

Matthew Fuller (Entegris), Co-chair	<Date approved>
Melvin Jung (Intel), Co-chair	<Date approved>

Minutes officially approved by: **PIC NA OVTCCM on XXX.**

Table 13 Index of Available Attachments[#1]

Title	*Title*
Required Meeting Elements March 2024	E72Revision TF Report to NAPIC TC_20240327
[2024Spring] PIC NA TC Chapter Meeting Minutes FINAL	FFF update spring 24 update
JA_PIC_Liaison_20240307_R1.0	NGAT kick off update
Staff Report March 2024 v4_PIC	SEMI EM TF -PIC Update 27 March 2024

#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 Laura Nguyen at the contact information above.