semi | Standards

3D Packaging and Integration Steering WG Meeting Minutes

Rev.1

Date :September 9, 2019

Venue: SEMI Japan Office

Agenda

- Agenda Review
- Welcome and Self Introduction
- SEMI Standards Legal Reminders
- Review of the Previous Meeting Minutes/ Action Items
- Discussion:
  - Key Task Forces Status:
    - PLP Panel Size TF
    - PLP Glass Carrier Characterization TF
  - TF Opportunities Discussion
    - Encapsulant Materials for PLP (Tsuriya)
    - Inspection/Measurement (Shimamoto/AIST)
  - PLP Workshop Planning
  - Technical Sharing
    - Traceability TC introduction – Tsunobuchi/キーエンス
- Summary & Action Items
- Next Meeting

SEMI Standards Legal Reminders

Note from Oct 4 Meeting:

- Yanagisawa-san/SEM-J mentioned that trademarks is included in Legal requirement (IP section).
- Team asked the background of this newly added item for Legal Reminders
- Yanagisawa-san will share information about this at next week TC meeting. (Action).

Highlight from the Meeting (2019/9/9)

- Two TF activities are updated as below:
  - PLP Size TF owned by NA:
    - TF team will start working on 2nd revision of 3D20-0719 document, by adding several panel characteristic. See the attached SNARF.
    - Conference call is scheduled on Sept 12 from 8:00AM japan time
  - PLP Glass Carrier TF:
    - TF team met several times and discussed the items for characteristics. Newly 3 companies joined the TF members who are from Hitachi Chemical, Shimadzu and Kuramoto.
    - Next meeting is Oct 31, 13:00 – 15:00.
- 2 potential TF opportunities were discussed as below.
  - PLP Encapsulant Characteristics Prep:
    - 3rd Prep meeting was held on Sept 9, and team discussed the TFOF. Team will complete the TFOF and will submit TC on Oct 11 for approval.
    - Kick-off meeting is scheduled on Oct 11, followed by TC meeting.
  - 3DS IC bonded layer inspection metrology Prep:
    - 1st prep team meeting was held on Sept 9.
    - Team discussed TFOF and SNARF, and will submit TFOF to TC at Oct 11 TC meeting.
    - 2nd meeting is scheduled on Sept 17.
- Technical Sharing:
  - Tsunobuchi-san/Keyence from Traceability TF introduced the traceability activities.
  - Location of ID marking for PLP panel or PLP Glass Carrier are specified in the document. Tsunobuchi-san mentioned that Panel ID T17 which is now referred by 3D20-0719 is not adequate in defining the PLP Panel ID.
  - Team is asked to work on Traceability TF team to provide the necessary information to define the PLP panel ID. Continue to work on this through Steering WG.
- Panel Discussion at SEMICON Japan 2019:
  - The date: Dec 11 (Wed) 10:20 – 12:00am
  - Venue: Room# 607 at Conference Tower at Big Site
  - Panelist: Screen, Tokyo Seimitsu, Panasonic (moderator: Shimamoto)

Previous Actions

#	Description	Responsibility	Due	Remark

Note: Item# 0 means the open AI from the previous meetings

Task Force Activities Update

PLP Panel Characteristics TF Status (as of 2019/9/9)

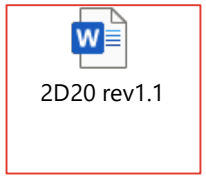
- R6332A was approved at SEMICON West. PLP panel size is specified as below (Doc name: 3D20-0719)
  - 510 ±1.0 mm × 515 ±1.0 mm;

  OR
  - 600 ±1.0 mm × 600 ±1.0 mm;
- Now team moves to work on 2nd version of this document by adding:
  - These are focused on four criteria.

    1) Minimum panel thickness of 200 um
    2) Maximum panel thickness of 3 mm
    3) Maximum panel mass of 4 kg
    4) Maximum flat stone warpage of

    a. 6 mm for a 510 x 515 mm panel, OR

    b. 7.2 mm for a 600 x 600 mm panel



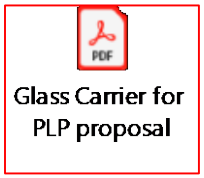
Note from Sept 9 Meeting:

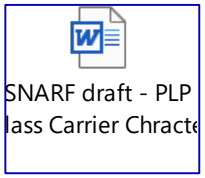
- TF team will start working on 2nd revision of 3D20-0719 document, by adding several panel characteristic. See the attached SNARF.
- Conference call is scheduled on Sept 12 from 8:00AM japan time.

PLP Glass Carrier

Proposal for Characteristics to be specified:

- Length range (L1 mm –L2 mm) tolerance (+/-dL mm)
- Width range (W2 mm –W2 mm) tolerance (+/-d W mm)
- Thickness range tolerance (+/-d mm)
- Exclusion range
- Surface roughness
- Squareness tolerance (+/-f degree)
- Straightness
- Oriental Corner location shape (C1x X C1y)
- Rest of 3 corners Shape (C2x X C2y)
- Edge treatment R or C? Size
- TTV
- Warp
- Alignment mark





Note from July 1, 2019 Meeting:

- **TFOF was approved at June 7 TC meeting.**
- **Kick-off meeting is held on July 1. Takahashi-san is appointed as TF leader. Call for more participants.**
  - Team to invite Screen as a member.
- **Team discussed the SNARF as attached. TF team will submit SNARF for approval at 10/11TC meeting.**

Note from Sept 9, 2019 Meeting:

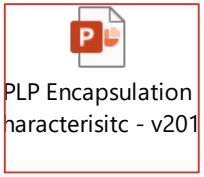
- **TF team met several times and discussed the items for characteristics. Newly 3 companies joined the TF members who are from Hitachi Chemical, Shimadzu and Kuramoto.**
- **Next meeting is Oct 31, 13:00 – 15:00.**

Taskforce Opportunities

PLP Encapsulant Characteristics

Proposed content:

- Material Types used for PLP encapsulation
- Key characteristics name and these measurement methods
- Measurement/ Testing Method for each characteristics and equipment.
- Measurement/ Testing Procedure (including preparation of measurement/ test for sample, sample size and so on?)



Note from July24 Meeting:

- Ikeda-san/Hitachi Chemical mentioned that there are different requirement of characteristics for PLP, rather than legacy packages.
- So, he is asked to prepare his thoughts at the next SG meeting, which might includes:
  - Whether SEMI Standard is needed for PLP mold resin
  - If yes, what contents (parameters and measurement metrology?) are needed for SEMI STD.
  - Suggestion for TF team formation

Note from Oct 4 Meeting:

- Makita-san mentioned the difference among the needs for legacy packages vs. PLP. Examples of specific warpage requirement and RDL compatibility, so on.
- Misawa-san commented the needs to define the requirement for PLP encapsulant.
- Tsuriya will draft the preliminary outline of the standard documents as a initial trial for discussion. (Action)

Note from Jan-24, 2019 Meeting:

- Tsuriya proposed this initiative and explained the content.
- Tsuriya will invite mold resin manufacturers, equipment and testing companies to form the prep team.
- Tsuriya will invite Yokoe-san to this team

Note from April 8, 2019 Meeting:

- Tsuriya sent out the invitation to the prep team. Still waiting for the confirmation from them.
- Yanagisawa-san to contact Apic Yamada to this Steering WG participation.
- Schedule to organize the prep meeting on ~~Jun7~~ 13:00 – 15:00 at SEMI Office. (date changed to July 1)

Note from July 1, 2019 Meeting:

- First prep meeting is held on July 1 with encapsulant manufacturers and had brainstorming about the needs for SEMI document.
- Team decided to have another call in August 5 with molding equipment maker.
- Team plan to have a meeting on Sept 9 and will discuss TFOF and SNARF. Will invite OSATs and other related members from overseas to this meeting.

Note from Sept 9, 2019 Meeting:

- **3rd Prep meeting was held on Sept 9, and team discussed the TFOF. Team will complete the TFOF and will submit TC on Oct 11 for approval.**
- **Kick-off meeting is scheduled on Oct 11, followed by TC meeting.**

3DS IC bonded layer inspection metrology

【目的】
- SEMI 3D17-1217 Specification for Reference Material for Bonded Wafer Stack Void Metrology については、2枚積層の場合のみの記載となっている。従い、多段積層品の観測手法に展開する
- IPC/JEDECJoint-Standard-035の記載に含まれない測定法が必要となる

【アプローチ】
- 多層品のサンプルの界面を分離するための手法の検討
  - Ex.反射法と透過法の併用、波形から特定位置波形の抽出
- 各層を分離するための特徴あるパターン案の作成
  - Ex.レーザ等による位置情報提供、検出可能サイズの決定
- 各層の厚みと必要な装置性能の明確化
  - Ex.周波数や時間分解能のガイドライン、その他機能
- 参画してもらう他社候補と体制
  - Ex.超音波探傷メーカ、S、R、U、Tか？
- 測定対象とするサンプルの準備
  - Ex. ①AISTで現有する多段積層チップでの界面位置分離評価 ②断面観察結果との相関

規格化までのラフなタイムスケジュール
- TF体制化3か月
- 具体的活動6か月
- 規格化文書化3か月
- Ballot～成文化4か月

【懸念】
- 1. 情報の開示範囲
- 2. 被測定対象物の範囲
- 3. 賛同半導体メーカの協力が得られるか？
- 4. JEDECJ-Std-035との棲み分

Inspection Prep v190701

Note from July24 Meeting:
- Iimura-san/Hitachi Power was asked to consider the inspection guideline at the last meeting. Ohno-san/Hitachi Power attended the meeting and expressed as below:
  - He agrees to form the team and develop the inspection/ measurement guideline.
  - Purpose and Scope will be drafted per SNARF. Tsuriya will work with Ohno-san to draft the SNARF and will present the draft at the next SG meeting.

Note from Oct 4 Meeting:
- Ohno-san was absent the meeting. So, we will discuss this opportunity at the next meeting. Tsuriya will communicate with Ohno-san and get the proposed objective and work area.

Note from Jan-24, 2019 Meeting:
- Ohno-san joined the meeting from Taiwan during his biz trip.
- He suggested the inspection guide for the items which are not covered by IPC/JEDEC J-STD-035.
- Shimamoto-san suggest measuring the samples and these data should be included in the Guide. TV for measurement samples are available at AIST.
- Ohno-san and Shimamoto-san will form a team for TF prep. Other members are welcome to join this team.

Note from April 8, 2019 Meeting:
- Shimamoto-san and Ohno-san discussed the outline of this potential TF, and their work area was presented at the meeting.
  - Shimamoto-san plans to invite Sonoscan Japan office to this TF.
  - AIST has 6L samples, and plan to use this sample for measurement study. This study plans to be in April between Shimamoto-san and Ohno-san.
  - Some concerns about technical confidential information, so these will be also discussed by TF prep team.
- TFOF will be submitted at 6/7 3D P&I TC meeting. (did not submit TFOF at this mtg

Note from July 1, 2019 Meeting:
- Shimamoto-san updated the scope of this TF opportunity. Currently test running is made by Hitachi Power and will define the scope for the project based on the first observation for this study.
- TFOF will be submitted at Oct 11 TC meeting.

Note from Sept 9, 2019 Meeting:
- **1st prep team meeting was held on Sept 9.**
- **Team discussed TFOF and SNARF, and will submit TFOF to TC at Oct 11 TC meeting.**
- **2nd meeting is scheduled on Sept 17.**

Workshop

PLP Workshop During SEMICON Japan 2019

- The date: Dec 11 (Wed) 10:20 – 12:00am
- Venue: Room# 607 at Conference Tower at Big Site
- Theme:

  PLP技術の普及を推進するうえで技術課題の一つであるRDL技術について現状と今後取り組むべき内容について議論する。また、SEMIにて国際規格として取り組む項目についても意見交換を行う。
- Session Style: Panel discussion. .
- Panelist :
  - Screenへの発表準備内容:

    露光装置の技術能力について下記内容を網羅した内容の発表依頼。

    PLPの大判600x600までのサイズで今後要求が出てくるであろう1um Line Spaceが対応できる装置能力を有しているか。PLPパネルへの露光を行う上で留意する点は何か。SEMIにて取り組むべき課題はなにか。
  - TSKへの発表準備内容:

    PLPパネルの薄化プロセスと技術課題についての発表依頼。

    PLPの大判600x600までのサイズが対応できる装置能力を有しているか。大きな課題である反りへの対応と、その技術解決策は何か。特にモールド樹脂表面上にRDL層を形成するにあたっての研磨工程で留意すべきことは何か。SEMIにて取り組むべき課題はなにか。
  - パナソニックへの発表準備内容:

    PLP用RDL材料技術について下記内容を網羅した内容の発表依頼。

    ベースがモールド樹脂上やシリコン・ガラスである場合での1um Line Spaceに対応できる材料技術について重要となる特性はなにか。PLPパネルへのRDL材を塗布(?)する上で留意する点は何か。SEMIにて取り組むべき課題はなにか。

Technical Sharing

Traceabilityについて

FOPLP(Fan Out Panel Level Packaging)

FOPLP生産ラインのトレサビリテ目的のため、使用が検討されている2D CODEの動向
〔用途〕
① パネルID:SEMI T7準拠？・・・Symbol size=8×32dots / Dot size=100μm程度
マーキング方法:レーザマーカ
＊SEMI T7のScopeはシリコンウエハーと書かれているため、FOPLPのガラス基板IDにT7を使用することはミスマッチと思われる

② Die ID:対象SEMI規格無し・・・Symbol size=未定 / Dot size=数μ～数10μm
マーキング方法:レーザマーカ

③ Substrate 基板ID:対象SEMI規格無し(E142?)・・・Symbol size=未定 / Dot size=数10μm？
マーキング方法:レーザマーカ

④ Package ID:SEMI T19・・・Symbol size=22×22または20×20 / Dot size=50～150μm
マーキング方法:レーザマーカ
Chipサイズが小型化する動きに合わせて、上記以外の仕様を追加する要望が出始めている

まだ上記については、現在標準化の動きは進めていません。
その他にも要望があれば、トレサビリティ委員会で標準化を検討します。

FOPLP 20190909 TSUNOBUCHI 1

Note from Sept 9, 2019 Meeting:

- Tsunobuchi-san/Keyence from Traceability TF introduced the traceability activities.
- Location of ID marking for PLP panel or PLP Glass Carrier are specified in the document.
- Tsunobuchi-san mentioned that Panel ID T17 which is now referred by 3D20-0719 is not adequate in defining the PLP Panel ID.
- Team is asked to work on Traceability TF team to provide the necessary information to define the PLP panel ID. Continue to work on this through Steering WG.

Summary

Actions

#	Description	Responsibility	Due	Remark
1	Technical Sharing: Tsuriya to invite Mario IBRAHIM to the next meeting via tele-conferencing, and ask him to share Advanced Packaging Technology Overview.	Tsuriya	11/18	

Note: Item# 0 means the open AI from the previous meetings

Next Meeting

- Nov 18, 2019 15:00 – 17:00
  - Venue: SEMI Japan Office
  - Meeting Agenda:
    - PLP Panel Discussion Prep Update at SEMICON Japan
    - Project Opportunity Discussion
    - Technical Sharing
    - Others

Participants

Name	Company
Masahiro Tsuriya	iNEMI
Haruo Shimamoto	AIST
Takahiro Naemura	Hitachi High Technologies
Eiji Yoshino	Hitachi High Technologies
Shigeru Ono	Hitachi Power Solutions
Hirokazu Tsunobuchi	Keyence
Naoki Kanagawa	Panasonic
Hiroyuki Shida	Shin-Etsu Polymer
Yoshikazu Hirabayashi	Shinko
Tutomu Okabe	TDK
Yoshiyuki Yokoe	Toray Engineering
Tetsuya Yamada	Towa
Yu Takada	Ushio
Chie Yanagisawa	SEMI Japan

3DS-IC Steering Study Group

SG Leaders:

Masahiro Tsuriya/ iNEMI

Haruo Shimamoto/ AIST