SEMI G77-0699 (Reapproved 0706)
SPECIFICATION FOR FRAME CASSETTE FOR 300 mm WAFERS

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1 Purpose

1.1 The purpose of this Document is to specify the mechanical features for a 300 mm wafer frame cassette used between the wafer mounting process and the die-bonding process.

2 Scope

2.1 This Standard is intended to set an appropriate level of specification that places minimal limits on innovation while ensuring modularity and interchangeability at all mechanical interfaces.

2.2 Only the physical interfaces for the frame cassette are specified; no materials requirements or micro-contamination limits are given. However, this Specification was written to allow for both metal and plastic frame cassette designs.

2.3 This Specification defines a 300 mm wafer frame cassette that is intended for both manual and automated transport. The frame cassette has the following components and subcomponents ('◊' indicates an optional component):

2.3.1 Top

◊ robotic handling flange (optional)
- top cover

2.3.2 Interior

- frame supports for 13 or 25 tape frames
- frame restraint

2.3.3 Sides

◊ human handles (optional)

2.3.4 Rear

- rear cover

2.3.5 Bottom

- 2 bottom conveyor rails running along the sides of the frame cassette
◊ 3 features that mate with kinematic coupling pins and provide a 10 mm lead-in (optional)
◊ 4 frame cassette sending pads (optional)

NOTICE: SEMI Standards and Safety Guidelines do not purport to address all safety issues associated with their use. It is the responsibility of the users of the Documents to establish appropriate safety and health practices, and determine the applicability of regulatory or other limitations prior to use.

3 Referenced Standards and Documents

3.1 *SEMI Standards and Safety Guidelines*

SEMI E1.9 — Mechanical Specification for Cassettes Used to Transport and Store 300 mm Wafers

SEMI E15 — Specification for 300 mm Tool Load Port

SEMI E47.1 — Mechanical Specification for FOUPS Used to Transport and Store 300 mm Wafers

SEMI E57 — Mechanical Specification for Kinematic Couplings Used to Align and Support 300 mm Wafer Carriers

SEMI G74 — Specification for Tape Frame for 300 mm Wafers

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NOTICE: Unless otherwise indicated, all documents cited shall be the latest published versions.

4 Terminology

4.1 *bilaterial datum plane* — a vertical plane that bisects the tape frames and that is perpendicular to both the horizontal and facial datum planes. [SEMI E57]

4.2 *conveyor rails* — parallel surfaces on the bottom of the cassette for supporting the cassette on roller conveyors.

4.3 *facial datum plane* — a vertical plane that bisects the tape frames and that is parallel to the front side of the frame cassette (where tape frames are removed or inserted). On tool load ports, it is also parallel to the load face plane specified in SEMI E15 on the side of the tool where the frame cassette is loaded and unloaded. [SEMI E57]

4.4 *frame cassette* — an open structure that holds one or more tape frames.

4.5 *horizontal datum plane* — a horizontal plane from which projects the kinematic coupling pins on which the frame cassette sits. On tool load ports, it is at the load height specified in SEMI E15 and might not be physically realized as a surface. [SEMI E57]

4.6 *robotic handling flange* — horizontal projection on the top of the frame cassette for lifting and rotating the frame cassette.

4.7 *tape frame* — the frame which applies the wafer tape to the wafer and retains the wafer.

4.8 *wafer tape* — an adhesive plastic tape which retains the wafer or diced chip. It is used between the mounting process and die-bonding process.

5 Ordering Information

5.1 *Intended Use* — This Document is intended to specify 300 mm wafer frame cassettes over a reasonable lifetime of use, not just those in new condition. For this reason, the purchaser needs to specify a time period as well as the number and type of uses to which the frame cassettes will be put. It is under these conditions that the frame cassettes must remain in compliance with the requirements listed in § 6.

6 Requirements

6.1 *Dimensions* — The frame cassette dimensions are shown in Figures 1 through 5 and listed in Table 1. In all figures, the heaviest lines are used for surfaces that have tolerances (not surfaces that have only maximum or only minimum dimensions).

6.2 *Tape Frame Orientation* — The tape frames must be horizontal when the frame cassette is placed on the load port.

6.3 *Center of Tape Frames* — When a tape frame is stored in the frame cassette, the center of the tape frame should be within the radius of 2 mm from the center of the junction of the bilateral datum plane and the facial datum plane.

6.4 *Top and Rear Covers* — Both top and rear covers are required. With the covers in place, the frame cassette must conform to all dimensions listed in Table 1.

6.5 *Number of Slots* — The frame cassette has an option of either 13 or 25 slots.

6.6 *Kinematic Couplings (optional)* —The physical alignment mechanism from the frame cassette to the tool load port (or a nest on a vehicle or in a stocker) consists of features (not specified in this document) on the top entity that mate with three or six pins underneath as defined in SEMI E57. Most of the dimensions of the frame cassette are determined with respect to the three orthogonal datum planes defined in that standard: the Horizontal Datum Plane, the facial datum plane, and the bilateral datum plane.

6.6.1 The three features that mate with the pins must provide a lead-in capability that corrects a frame cassette misalignment of up to 10 mm in any horizontal direction, although 15 mm is recommended for ergonomic reasons. However, it is recommended that robotics placing cassettes on kinematic couplings use as little of this lead-in capability as possible to avoid wear.

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6.7 *Human Handles (optional)* — All handles for use by humans must either be contained within the maximum outer dimensions of the frame cassette, be detached when not in use, or be retractable into the maximum outer dimensions when not in use. Handles for use by humans (if present) must follow SEMI S8 and shall require the use of both hands (each using a full wrap-around grip, given the minimum clearance requirement in SEMI E15.1). Automation handling features shall not be considered for dual purpose unless they are designed to meet SEMI S8.

6.8 *Robotic Handling Flange (optional)* — On the top of the frame cassette is an optional robotic handling flange for manipulating the frame cassette.

6.9 *Bottom Rails* — On the bottom of the frame cassette are two rails, one on each side for use with roller conveyors.

6.10 *Frame Restraint* — The frame cassette must provide a feature that prevents tape frames from slipping out of the cassette during transport. The feature must conform to all dimensions listed in Table 1.

6.11 *Frame Cassette Sensing Pads (optional)* — When the cassette is fully down, the frame cassette sensing pads (see Figure 5) must be *z*2 above the horizontal datum plane. It is recommended that the areas surrounding all of the frame cassette sensing pads be designed in conjunction with the features that mate with the kinematic coupling pins so that a mechanical sensor pin cannot interfere with the lead-in function of the kinematic couplings.

6.12 *Cassette Stacking (optional)* — The frame cassette may have optional features to allow two 13 capacity cassettes to be stacked on top of each other. This option is only available for cassettes without a robotic handling flange.

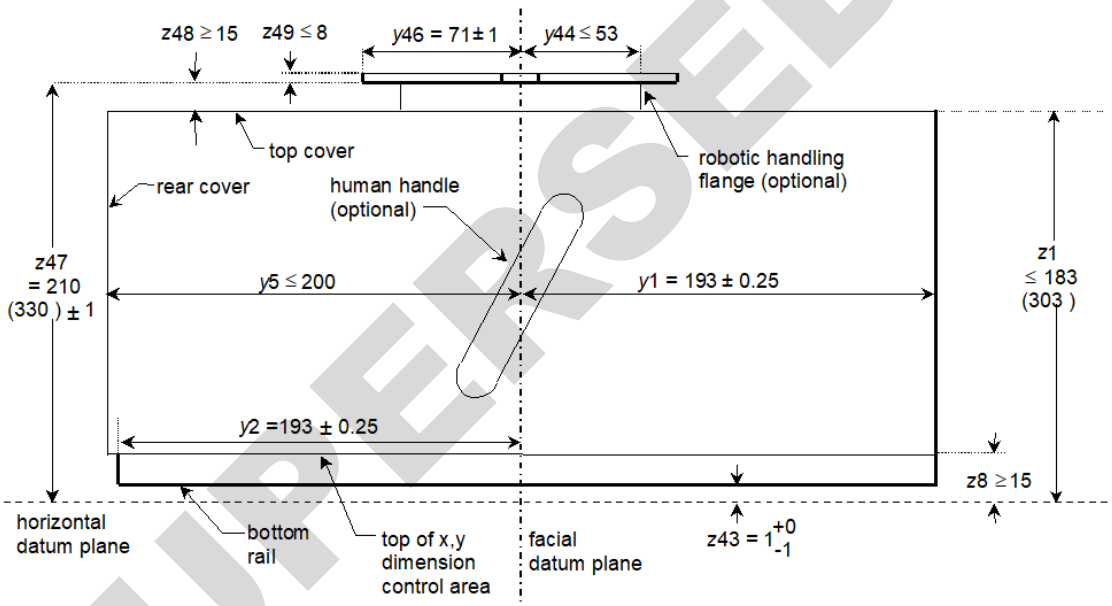

Figure 1
Side View of Frame Cassette

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