

SEMI HB2-0613 (Reapproved 1218) SPECIFICATION FOR 150 mm OPEN PLASTIC AND METAL WAFER CASSETTES INTENDED FOR USE FOR MANUFACTURING HB-LED DEVICES

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1 Purpose

1.1 This Specification provides the dimensional requirements for plastic and metal wafer cassettes used for the processing and handling of 150 mm diameter HB-LED sapphire wafers conforming to the SEMI Standard.

2 Scope

2.1 This Specification is for general usage and outlines the basic requirements for open cassettes for 150 mm sapphire wafer sizes.

2.2 This Document provides basic interface requirements for automated substrate handling.

2.3 To meet these specifications, cassettes must be manufactured within the dimensional limits and be dimensionally stable within the specification when used in accordance with manufacturers' recommendations.

NOTE 1: Recommended usage should be agreed to between user and supplier, since wafer cassettes are manufactured from a number of different materials by several manufacturing methods.

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 HB1 — Specification for Sapphire Wafers Intended for Use for Manufacturing High Brightness-Light Emitting Diode Devices

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

4 Terminology

4.1 Definitions

4.1.1 *bar* — see 'crossbar.'

4.1.2 *bar end* — the end surface of the cassette that has only one crossbar.

4.1.3 *bar radius* — the radius nearest the bar end of the cassette on the crossbar. (See Figure 1, D5b.)

4.1.4 *bar web* — the mass of material for structural support which may or may not be present on the crossbar. (See Figure 1, D5a, Type II.)

4.1.5 *bar width* — the distance or thickness of the bar when measured perpendicular to the top face. (See Figure 1, D5b.)

4.1.6 *cassette* — open wafer carrier which stores multiple substrates in a vertical stack for transport between process equipment.

4.1.7 *crossbar* — the mass of material connecting the two sides of the cassette at the bar end of the cassette.

4.1.8 *end wall* — the wall of the cassette opposite the bar end of the cassette.

4.1.9 *hole* — the area for the pin on another cassette to enter for transferring wafers. (See Figure 1, C8.)

- 4.1.10 *parallelism tolerance* — the minimum and maximum dimension allowance for the opposite pockets to vary in relation to their distance from the crossbar end of the cassette. (See Figure 1, D1.)
- 4.1.11 *pin* — the mass of material which enters the hole or slot of another cassette for transferring wafer. (See Figure 1, C7.)
- 4.1.12 *pin and hole center distance from pocket centerline* — the distance from centerline of either the pin or hole to the closest pocket centerline. (See Figure 1, C9.)
- 4.1.13 *pocket* — the area in which the wafer is located in the cassette.
- 4.1.14 *pocket centerline* — the imaginary line which bisects each pocket.
- 4.1.15 *pocket depth* — the distance from the pocket flat to its own pocket nose, not to the opposite pocket. (See Figure 1, C2.)
- 4.1.16 *pocket flat* — the width of the pocket along the vertical walls at its narrowest distance. (See Figure 1, C3.)
- 4.1.17 *pocket nose* — the top of the mass of material between adjacent pockets.
- 4.1.18 *pocket size* — the distance between opposite pocket flats. (See Figure 1, C4.)
- 4.1.19 *pocket spacing* — the distance between pocket centerlines. (See Figure 1, B2.)
- 4.1.20 *pocket width* — the width of the pocket at its widest distance. (See Figure 1, C1.)
- 4.1.21 *slot* — see ‘hole.’
- 4.1.22 *top face* — the plane or surface of the cassette from which side wafers enter into or exit out of the cassette.
- 4.1.23 *track clearance* — the unobstructed area between the two cassette sides on the bar end. (See Figure 1, D6a.)
- 4.1.24 *wafer carrier* — any cassette, box, pod, or boat that contains wafers.
- 4.1.25 *wafer tilt* — the possible unparallel position of the wafer, when the cassette is resting on the bar end, in relation to a nominal horizontal wafer plane that is parallel to the plane at the bar end of the cassette. (See Figure 1.)
- 4.1.26 *wafer transfer* — the act of relocating wafers from one cassette into another. This can be accomplished by several methods.

5 Requirements

5.1 *Wafer Compatibility* — Due to the tolerances present in the cassette dimensions, as well in a standardized sapphire wafer, not every possible SEMI Standards wafer cassette may be compatible with every possible SEMI Standard wafer. Please verify the compatibility of your specific wafer and cassette with the respective vendors.

5.2 *Cassette Identification* — Barcode and RFID locations are defined in this Document to show the locations that cassette ID's will be placed. The use of RFID and/or barcode on the cassettes are optional.

5.3 Cassette Dimensions

5.3.1 Table 1 contains a list of the cassette dimensions used in the following tables and figures.

5.3.2 Table 2 contains values for the specific wafer cassettes according to wafer dimension and cassette type.

5.3.3 Dimension Notations

5.3.3.1 Overall dimensions are indicated as *Ax*.

5.3.3.2 Capacity dimensions are indicated as *Bx*.

5.3.3.3 Detail dimensions are indicated as *Cx*.

5.3.3.4 Machine fit specifications are indicated as *Dx*.

5.3.3.5 ID location specifications are indicated as *Ex*.

6 Dimensions

Table 1 Reference Symbols and Descriptions

Reference	Description	Reference	Description
A1	Length	D5b	Bar width measured perpendicular to the top surface.
A2	Width (with/without flange)	D5c	From the outside of the bar end to the bar web.
A3	Height (excluding pin)	D6a	Track clearance
B1	Pockets per cassette	D6b	On the bar end surface, the distance between the two struts perpendicular to the crossbar.
B2	Pocket spacing	D6c	On the bar end surface, the thickness of each of the two struts perpendicular to the crossbar.
B3	Center distance from the 1st to last pocket	D6d	On the bar end surface, the length of each of the two struts perpendicular to the crossbar.
C1	Pocket width	D8e	Pickup flange – Refer to the appropriate Figure for details.
C2	Pocket depth	E1a ^{#1}	Track barcode tag area height
C3	Pocket flat	E1b ^{#1}	End wall barcode tag area height
C4	Pocket size	E1c ^{#1}	Barcode tag area width
C5	Pin and hole location (width)	E2a ^{#1}	From the bottom of the cassette to the bottom of the barcode tag area.
C6	Pin and hole location (length)	E2b ^{#1}	Center point of the barcode tag area relative to the center of the cassette.
C7	Pin diameter and height	E3a ^{#1}	From the bottom of the cassette to the bottom of the barcode tag area.
C8	Hole or slot	E3b ^{#1}	From the outside of the bar end of the cassette to the start of the barcode tag area.
C9	Pin and hole center distance from pocket centerline.	E4a ^{#1}	RFID tag area height
D1	From the outside of the bar end of the cassette to the centerline of the 1st pocket.	E4b ^{#1}	RFID tag area width
D2	From the centerline of the 1st pocket to the closest point on the crossbar or web.	E4c ^{#1}	From the bottom of the cassette to the bottom of the RFID tag area.
D3a	The step from the bar end of the carrier to the crossbar (the tolerance indicates allowable bow).	E4d ^{#1}	From the center of the cassette to the start of the RFID tag area (RFID tag to be located on left side of cassettes as shown in Figure 2).
D3b	Sensor Pad Location – The step from the bar end of the carrier to the crossbar (the tolerance indicates the allowable deviation measured at a maximum distance of ½ in. from the crossbar/sidewall junction).		
D4a	From the bottom of the cassette to the center of the crossbar, measured at the bar end of the cassette. Applicable only to full-depth wafer cassettes; i.e., the wafer sits below the top of the cassette.		
D4b	Center point of a nominal size wafer relative to a cassette reference.		
D5a	Bar web width which is the mass of material which may be present on the crossbar and is measured perpendicular to the top surface. Bar web width on type II crossbar.		

#1 These references define optional features.