

SEMI MF2074-0912 (Reapproved 0718) GUIDE FOR MEASURING DIAMETER OF SILICON AND OTHER SEMICONDUCTOR WAFERS

This Standard was technically approved by the Silicon Wafer Global Technical Committee. This edition was approved for publication by the global Audits and Reviews Subcommittee on February 1, 2018. Available at www.semiviews.org and www.semi.org in July 2018; originally published by ASTM International as ASTM F2074; previously published September 2012.

1 Purpose

1.1 The diameter of semiconductor wafers is an important parameter in microelectronic fabrication. Wafer diameters must conform to the limits specified in SEMI M1; or other agreed upon limits, or product that is otherwise suitable may not fit correctly in process equipment.

1.2 Cam-follower edge rounding usually results in wafers that are circular. However, wafers ground with edge-follower edge rounding equipment may be elliptically shaped. Measurements made at the three positions specified in this Guide do not provide complete information about the roundness of the wafer.

2 Scope

2.1 This Guide defines standardized positions for measuring diameter of circular wafers of silicon and other semiconducting materials especially those processed with edge-follower edge-rounding equipment that contain flats or notches (fiducials) on the periphery. It was developed for use with silicon wafers of 150 mm diameter or less with standard diameter and fiducial positions as given in SEMI M1.

2.2 It may be applied to other types of semiconductor wafers if the flat locations are properly taken into account or if the fiducial is a notch.

2.3 No recommendations are given regarding the test instrumentation to be used, but either contacting (taking suitable precautions to avoid edge chipping) or noncontacting gauges have been found to be satisfactory. Wafers of any size can be measured provided that suitable test jigs and instruments are available.

2.4 Roundness of wafers cannot be determined from measurements made solely at the positions defined in this Guide. No information is provided concerning the diameter of the wafer at points other than those measured.

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 Limitations

3.1 The presence of an indent or uneven edge on the periphery of the wafer at the measurement position can cause the resulting diameter measurement to be in error.

3.2 If the wafer is not circular, the measured diameter may differ from that found by measuring at different positions or based on a different number of measurements.

4 Referenced Standards and Documents

4.1 SEMI Standards and Safety Guidelines

SEMI M1 — Specification for Polished Single Crystal Silicon Wafers

SEMI M20 — Practice for Establishing a Wafer Coordinate System

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

5 Terminology

5.1 Terms relating to silicon and other semiconductor technology are defined in SEMI M59.

6 Measurement Positions

6.1 Measure the diameter at the three positions listed in Table 1 for the appropriate fiducial position(s) (see Figure 1). The angular positions in Table 1 are given in degrees from the x -axis as defined in SEMI M20.

6.2 Calculate the diameter of the wafer as the average of the diameters measured at the three positions.

6.3 The relationships between wafer configurations and wafer conductivity types and orientations as defined in SEMI M1 are given in Table 2.

7 Keywords

7.1 diameter, semiconductor, silicon, wafer

SUPERSEDED