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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 14140.1-1993

Replacing GB/T 14140-2009, GB/T 30866-2014

**Test method for measuring diameter of semiconductor wafer
(English Translation)**

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part 1: Structure and drafting rules for standardization documents" Drafting.

This document replaces GB/T 14140-2009 "Measurement method for diameter of silicon wafers" and GB/T 30866-2014 "Measurement method for diameter of silicon carbide single crystal wafers".

This document is based on GB/T 14140-2009 and integrates the contents of GB/T 30866-2014.

Compared with 2009, in addition to structural adjustments and editorial changes, the main technical changes are as follows.

- a) The optical projection method (see Method 1 of GB/T 14140-2009) has been deleted;
- b) The scope has been changed (see Chapter 1, Chapter 1 and Chapter 13 of GB/T 14140-2009);
- c) The terms and definitions have been changed (see Chapter 3 and Chapter 15 of GB/T 14140-2009);
- d) Added the profilometer method (see Chapter 4);
- e) The principle of the micrometer method has been changed (see 5.1, Chapter 16 of GB/T 14140-2009);
- f) Added the interference factor of micrometer screw deformation during micrometer testing

(see 5.2.5);

g) The diameter test position of the micrometer method has been changed (see 5.6.1, 20.2 of GB/T 14140-2009);

h) The precision of the micrometer method has been changed (see 5.8, Chapter 23 of GB/T 14140-2009);

i) The test report for the micrometer method has been modified (see 5.9, Chapter 24 of GB/T 14140-2009);

j) Added the vernier caliper method (see Chapter 6).

1 Scope

This document describes methods for measuring the diameter of semiconductor wafers using the profilometer, micrometer, and vernier caliper methods.

This document is applicable to the test of the diameter of circular semiconductor wafers, and the test range is the nominal diameter not exceeding 300mm.

Used to test the out-of-roundness of the wafer.

2 Normative references

The contents of the following documents constitute the essential clauses of this document through normative references in this document.

For referenced documents without a date, only the version corresponding to that date applies to this document; for referenced documents without a date, the latest version (including all amendments) applies to this document.

GB/T 14264 Terminology of Semiconductor Materials

3 Terms and Definitions

The terms and definitions defined in GB/T 14264 apply to this document.

4.1 Principles of the Method

Place the wafer to be measured on a flat, clean suction cup or wafer edge clamping device and move it between two opposite probes along the specified pattern.

The probe scans the surface of the wafer and shines on the test points and the incision position on the edge of the wafer to obtain the data of each point on the edge of the straight line passing through the center point.

The diameter of the wafer is obtained by calculating the distances between a series of

paired edge points.

4.2 Interference Factors

4.2.1

Wafer cleanliness may interfere with the scanning results and affect the test results.

4.2.2

Wafer edge ripples or unevenness may affect the test results.

4.2.3

Inaccurate equipment calibration will introduce deviations in test results.

4.2.4

The positioning accuracy of the equipment will affect the test location, thereby affecting the location of the sampling point, which may lead to erroneous test results.

4.2.5

Different parameter settings of the test equipment will affect the test results.

4.3 Test conditions

The test should be carried out in the following environment.

- a) Temperature. $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$.
- b) Relative humidity. $(50 \pm 20)\%$.

4.4 Instruments and Equipment

4.4.1

The edge profile tester shall include the following components.