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

GB/T 13388-2009

Replacing GB/T 13388-1992

**Method for measuring crystallographic orientation of flats on
single-crystal silicon slices and wafers by X-ray techniques**

硅片参考面结晶学取向X射线测试方法

(English Translation)

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Foreword

This revised standard adopts SEMIMF847-0705 "reference surface of silicon crystal to X-ray testing methods." this standard compared with SEMIMF847-0705, with the following exceptions.

--- Part of the international standard SEMI standard referenced by direct reference to corresponding our standards;

--- The main form content according to GB/T 1.1 requirements choreography.

This standard replaces GB/T 13388-1992 "wafer reference surface crystallographic orientation of the X-ray test method." this standard compared with GB/T 13388-1992, the main changes are as follows.

Method 2 --- --- adds Laue back reflection X-ray method;

--- Cancel specific provisions diameter and length of the reference surface of the wafer;

--- GB prior to its amendment states that "the process does not apply to silicon in a predetermined orientation with the reference surface and the silicon surface perpendicular to the plane Between the projection and the wafer surface normal angle of not less than 3 ° measured wafer "; and SEMIMF847-0705, only for corner Degree deviate from -5 ° to + 5 ° silicon;

--- Normative references increased;

--- Modify the precision used SEMIMF847-0705 through a silicon wafer 50 times (25 times per side) measurements obtained this test instrument to a single aspect of the reproduction of a single operator Evaluation. 1-alpha alpha calculated value of distribution of 1.94 ';

--- Increasing the relevant safety provisions.

The standard equipment by the National Standardization Technical Committee and the semiconductor material (SAC/TC203) proposed.

This standard by the National Standardization Technical Committee materials and equipment at the Technical Committee of semiconductor material.

This standard was drafted. Grinn Semiconductor Materials Co., Ltd.

2 Range

2.1

standard specifies the method for measuring the angle α , α angle perpendicular to the reference plane of the crystal surface of silicon wafers circular reference to the reference plane Kakuma.

2.2

standard applies to the reference wafer surface length should be consistent with GB/T 12964 and GB/T 12965 provisions, and the angle of silicon should deviate from -5° to $+5^\circ$ range.

Crystal 2.3 by the standard assay to directly dependent on the accuracy of the reference surface of the reference bezel and bezel with matching accuracy with respect to the X-ray Alignment accuracy.

2.4

Standard consists of the following two methods.

Test Method 1 --- X-ray diffraction edge Test Method 2 --- Laue back reflection X-ray method 2.4.1 a non-destructive testing methods, in order to make the wafer with respect to the unique X-ray goniometer positioning, in addition to the use of special silicon Jig outside, similar to the GB/T 1555 Test Method 1. Compared with the back reflection Laue method, the technique for measuring the reference surface of the crystal to get higher Accuracy.

2.4.2

Method 2 is non-destructive to the reference surface with respect to the X-ray beam positioning, in addition to using "instant" film and special fixtures in addition, with ASTM E82 and DIN 50433 test methods - Part 3 is similar. Although Method 2 is more simple and fast, but does not have fine method 1 Degree, equipment and fixtures because it uses less accurate and low cost. Method 2 provides a measure of the permanent film recording.

NOTE: explanation Laue photograph can get information wafer alignment errors. However, this is beyond the scope of the test method. This interpretation is willing to users, to see ASTM E82 and DIN 50433 test methods Part 3 or standard X-ray textbooks. Because you can use a different fixture methods 2 is also applicable to the determination of the orientation of the wafer surface.

2.5

Standard values \u200b\u200bare in metric units, the value of imperial units in parentheses for information purposes only.

NOTE: This standard does not address safety issues, if any, associated with the use of standards. Standard before use, to establish appropriate safety and security measures and determining

regulation Applications chapter system is the standard user's responsibility.

3 Limitations

3.1

Reference surface flatness can affect the alignment accuracy of the reference plane and the reference baffle. In the section reference plane is raised (less common situation Conditions), the reference surface crystal orientation may not be unique. More commonly, the reference surface along a plane perpendicular to the wafer surface with two straight reference the baffle Intersect at two points. In this case, the crystal orientation is measured perpendicular to the wafer surface by two plane crystal orientation. In the latter case, when the Between the reference plane and the reference bezel aligned to the measured crystal silicon is obtained in a subsequent process of crystal orientation.