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

GB/T 14141-2009

Replacing GB/T 14141-1993

**Test method for sheet resistance of silicon epitaxial, diffused
and ion-implanted layers using a collinear four-probe array**

硅外延层、扩散层和离子注入层薄层电阻的测定 直排四探针法

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Foreword

This standard replaces GB/T 14141-1993 "Determination of silicon epitaxial layer, the diffusion layer and the ion implantation layer sheet resistance of row four-probe Needle. " This standard compared with GB/T 14141-1993, the main changes are as follows:

- Modify the minimum diameter measured sheet resistance (by the 10.0mm to 15.9mm), sheet resistance and resistance measurement range Accuracy;
- Increasing the normative references;
- Increased with the introduction of specimen geometry correction factor related to the calculation sheet resistance;
- Increased disturbances;
- Remove trichlorethylene reagent;
- Modify the sheet resistance range, increasing the "DC input impedance less than 109Ω";
- Remove trichlorethylene rinsing;
- Modify arbitration measuring probe spacing from 1mm to 1.59mm;
- Increasing the correction factor and temperature correction coefficient table. 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. Ningbo, Li Li Electronics Co., Ltd., Nanjing Guosheng Electronics Co., Ltd., the Ministry of Information Industry, the quality of special materials Supervision and Inspection Center. The main drafters of this standard. Li careful, Xu Feng, Liupei Dong, Chen Pan, Marin treasure, He Xiukun. This standard

replaces the standards previously issued as follows:

--- GB/T 14141-1993. Silicon epitaxial layer, the diffusion layer and the ion implantation layer Measured sheet resistance of four - probe

1 Scope

GB/T 14141-2009 is the Chinese national standard on test method for sheet resistance of silicon epitaxial, diffused and ion-implanted layers using a collinear four-probe array, in the field of electrical engineering. The /T suffix marks it as a recommended standard: it is not compulsory by itself, but it becomes binding as soon as a contract, a tender or a customer specification calls it up - which in practice is how most foreign buyers meet it. It was issued on 30 October 2009 by the General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China; Standardization Administration of China, and has been in force since 1 June 2010. Classification: ICS 29.045, CCS H80. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

This standard specifies the vertical four-probe measurement silicon epitaxial layer, the diffusion layer and the ion implantation layer sheet resistance method. This standard applies to measuring a diameter greater than 15.9mm by epitaxy, diffusion, ion implantation into the silicon thin or lower surface formed The average sheet resistance of the layer. Silicon substrate and the measured conductivity type opposite thin. Suitable for measuring the thickness of not less than 0.2 μ m thin, square Block resistance measurement range of 10 Ω ~ 5000 Ω . This method can also be applied to higher or lower resistance sheet resistance measurements, but its measurement accuracy Accuracy has not been evaluated.

2 Normative references

The following documents contain provisions which, through reference in this standard and become the standard terms. For dated references, subsequent Amendments (not including errata content) or revisions do not apply to this standard, however, encourage the parties to the agreement are based on research Whether the latest versions of these documents. For undated reference documents, the latest versions apply to this standard.

GB/T 1552 silicon germanium crystal measuring resistivity inline four-probe method
Methods of measurement

GB/T 11073 radial resistivity variation on silicon

3 Method summary

Use inline four-probe measurement device, the DC current through the sample two external probes, measuring the potential difference between the two in the probe, and the introduction of Correction factor related to the geometry of the specimen, the sheet resistance was calculated.

4 Confounding factors

4.1 Probe material and its shape and surface of silicon contact is a point power source to meet the injection conditions will affect test accuracy.

4.2 voltmeter input impedance will introduce measurement errors.

4.3 silicon geometry, surface contamination, etc. affect the test results.

4.4 light, high-frequency vibration, strong electromagnetic fields and temperature and humidity testing environment may affect the test results.

5 Reagents

5.1 hydrofluoric acid, pure class distinctions.

5.2 water, 25 °C when the resistivity of greater than 2MΩ · cm.

5.3 methanol, 99.5%.

5.4 dry nitrogen.

6.1 Probe System

6.1.1 probe having a conical carbide probe angle of 45 ° ~ 150 °, the tip radius respectively 35μm ~ 100μm, 100μm ~ Hemispherical radius of 250μm or 50μm ~ 125μm circular cross-section of the flat.

6.1.2 pressure probe and the sample is divided into less than 0.3N and 0.3N ~ 0.8N two kinds.