

SEMI P27-96 (Reapproved 0703) PARAMETER CHECKLIST FOR RESIST THICKNESS MEASUREMENT ON A SUBSTRATE

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1 Purpose

1.1 This checklist identifies the parameters for the thickness measurement of single layer resist on a substrate. Several methods are known for the thickness measurement of thin films, among them two methods are widely used for the thickness measurement of resist films.

1.2 They are the surface profilometers which use mechanical contact method to detect the topology of a surface, and the light interference method which can be used only for transparent films.

1.3 The contacting method has more accuracy than light interference method, but the precision of the measurement is limited. The light interference method shows much more precision than the other but the results depend on measuring conditions.

2 Scope

2.1 This guideline describes on the parameters for the thickness measurement of single layer resist in lithography process.

2.2 For example, pre-expose resist thickness measurement on a bare silicon wafer for the QC of an optical resist, or the resist thickness measurement of partially exposed and fully exposed films after development for the determination of a characteristic curve of a resist.

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3 Referenced Standards

3.1 ASTM Standard¹

ASTM F804 — Standard Practice for Producing Spin Coating Resist Curves, 7.4 Thickness Measuring Instrument

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

4 Parameters for Contact Type Measuring Instruments (Surface Profilometer)

1. Name of the instrument used for the measurement
2. Pressure of the stylus
3. Radius of curvature of the stylus tip
4. Type of substrate
5. The method of making a scratch on the surface of the resist
6. Temperature and relative humidity of the room

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NOTE 1: The stylus pressure should be so adjusted that it does not leave a visible indented track mark on the resist surface at $\times 50$ optical microscope magnification.

5 Parameters for Light Interference Thickness Measurement Apparatus

1. Name of the apparatus used for the measurement
2. Refractive index or Cauchy indexes of the resist used as the parameter of the measurement

$$n = A + \frac{B}{Y^2} + \frac{C}{Y^4}$$

where

A, B, C = Cauchy indexes

n = refractive index

Y = wave length

3. The range of wave length used for the measurement should be specified. Type of the substrate. Surface condition, cleaning method and the refractive index of the substrate if available.
4. Magnification setting
5. Type of optical filter
6. Temperature and relative humidity of the room

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