

SEMI D7-94 (Reapproved 0703) FPD GLASS SUBSTRATE SURFACE ROUGHNESS MEASUREMENT METHOD

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NOTICE: This Standard or Safety Guideline has an Inactive Status because the conditions to maintain Current Status have not been met. Inactive Standards or Safety Guidelines are available from SEMI and continue to be valid for use.

1 Purpose

1.1 This Document defines the method of FPD glass substrate surface roughness measurement by stylus method surface roughness measurement instrument.

2 Scope

2.1 This Specification shall be used by vendors and/or buyers of glass substrates for flat panel display and is effective for all glass substrates used.

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 Referenced Standards and Documents

3.1 ISO Standards¹

ISO 486 — Surface Roughness – Parameters, Their Values and General Rules for Specifying Requirements

ISO 3274 — Instruments for the Measurement of Surface Roughness by the Profile Method – Contact (Stylus) Instruments of Consecutive Profile Transformation

ISO 4287-1 — Surface Roughness – Terminology – Part 1: Surface and its Parameters

3.2 JIS Standard²

JIS B0601-1982 — Definitions and Designation of Surface Roughness

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

4 Terminology

4.1 Definitions

4.1.1 *long wavelength cutoff* — wavelength that the attenuation ratio of its amplitude becomes 75% when the traced profile is passed through the high-pass wavelength filter which eliminates waviness element.

4.1.2 *short wavelength cutoff* — wavelength that the attenuation ratio of its amplitude becomes 75% when the traced profile is passed through the low-pass wavelength filter which eliminates noise element.

4.1.3 *stylus method surface roughness measuring instrument* — instrument that traces on a section of a surface by a stylus, records irregularity on the surface in an enlarged form, and indicates its amplitude as roughness parameters.

4.1.3.1 The type of instrument in this Standard is specified to an instrument which is sometimes called as a profiler for very thin films and steps.

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² Japanese Standards Association, 4-1-24 Akasaka, Minato-ku, Tokyo 107-8440, Japan; Telephone: +81.3.3583.8005, Fax: +81.3.3586.2014, <http://www.jsa.or.jp>

5 Measurement Instrument

5.1 *Method* — Stylus method surface roughness measuring instrument defined in Sections 3.1 or 3.2, or an instrument which meets those conditions.

5.2 *Stylus*

Material — Diamond.

Shape — Circular cone or rectangular cone.

Tip Radius — 2 μm or less.

5.3 *Measuring Force* — 0.1 mN (0.01 gf) or above, 0.7 mN (0.07 gf) or less.

5.4 *Sampling Interval* — 1 μm or less.

5.5 Vertical noise amplitude *p-p* value: 3 nm (= 30 Å) or less.

6 Measurement Conditions

6.1 *Long Wavelength Cutoff, λ_c* — 0.08 mm or close.

6.1.1 *Short Wavelength Cutoff, λ_s* — 0.0025 mm or less.

6.1.2 *Evaluation length, L_e* — 0.4 mm.

6.1.3 *Surface Roughness Parameter* — Maximum height of the profile $Ry5$ (ISO 4287-1:1984) (= Rz (DIN 4768-1990)) or 10 point height of irregularities which is close to $Ry5$, Rz (JIS B0601-1982).

7 Test Specimen

7.1 A clean FPD glass substrate. No stains or oils should be seen by the naked eye.

8 Measurement Procedure

8.1 Contact the specimen on the stage of the instrument and leave for five minutes to condition the specimen to room temperature.

8.2 Put the stylus on the specimen, measure roughness by tracing the surface, and calculate the defined roughness parameter.

8.3 Change the measurement location to the location near the previous location and measure again.

8.4 Change the measurement location to the location defined in Section 9 and repeat the above measurement.

9 Measurement Location

9.1 Describe the measurement location on the report, for example, measure the following two locations:

- The center of the specimen.
- The point which is 20 mm inside from both edges of the orientation corner.

10 Calculations or Interpretation of Results

10.1 Show the measurement results in nm (nanometers) and round fractions of 0.5 and over to the next highest whole numbers.

Table 1 Example: Measurement Results

Maximum Height: $Ry5$	n1	n2
The Center	**nm	**nm
The Corner	**nm	**nm