

SEMI PV66-0715 (Reapproved 0221) TEST METHOD FOR DETERMINING THE ASPECT RATIO OF SOLAR CELL METAL FINGERS BY CONFOCAL LASER SCANNING MICROSCOPE

This Standard was technically approved by the Photovoltaic Global Technical Committee. This edition was approved for publication by the global Audits and Reviews Subcommittee on December 10, 2020. Available at www.semiviews.org and www.semi.org in February 2021; originally published July 2015.

1 Purpose

1.1 The purpose of this Standard is to standardize a fast and accurate test method for determining the aspect ratio of solar cell metal fingers by confocal laser scanning microscope (CLSM).

2 Scope

2.1 This Standard defines the test method for determining the aspect ratio of solar cell metal finger.

2.2 This Standard applies to test the aspect ratio of solar cell metal finger by CLSM.

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 14644-1:1999 — Cleanrooms and Associated Controlled Environments —Part 1: Classification of Air Cleanliness

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

4 Terminology

4.1 Abbreviations and Acronyms

4.1.1 CLSM — confocal laser scanning microscope

4.2 Symbols

4.2.1 *G* — gram

4.2.2 °C — degrees Celsius

5 Summary of Test Method

5.1 CLSM uses a laser as light source and is configured on the traditional optical microscope using conjugate focus device. The system uses a computer digital image processing to observe and analyze the object of interest. Principle of CLSM is shown in Figure 1.

5.2 The fundamental principle of the CLSM: a specific wavelength light excited by the laser is magnified and passed a lighting pinhole diaphragm in the scanner. Then a dot photosource is formed and focused on the plane by the objective, a fluorescence which is emitted on the irradiated dot on the sample pass the detected diaphragm and reach the detector, and finally imaging in the computer.

¹ International Organization for Standardization, ISO Central Secretariat, 1, ch. de la Voie-Creuse, CP 56, CH-1211 Geneva 20, Switzerland; Telephone: +41.22.749.01.11, Fax: +41.22.733.34.30, <http://www.iso.org>

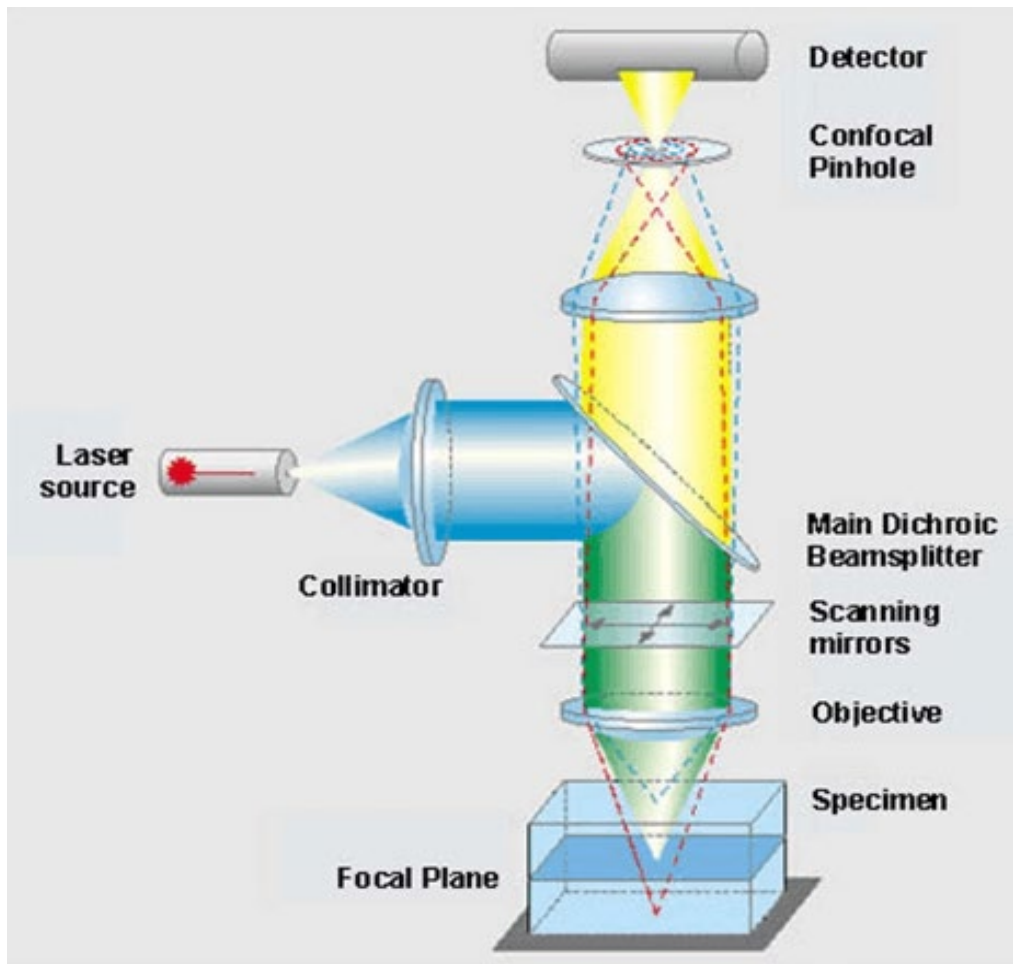


Figure 1
Principle Diagram of CLSM

6 Apparatus

6.1 CLSM

6.2 Computer

6.3 *Electronic Balance* — Tolerance ± 0.002 g.

7 Safety Precautions

7.1 Power switch and the power outlet of the CLSM are checked in security before and after use.

8 Test Specimens

8.1 Weigh cells with electronic balance before and after printing, and make sure the weight of the paste is within the control range.

8.2 Randomly take three cells with the full pattern and no printing interrupt and defect.

9 Preparation of Apparatus

9.1 Because of the high sensitivity of the crystalline silicon wafer surface, the testing environment should meet the following requirements:

9.1.1 Ambient temperature should be $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$, ambient humidity should be $60\% \pm 20\%$.