



Standard Test Method for Spectral Responsivity Measurements of Photovoltaic Devices¹

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1. Scope

1.1 This test method is to be used to determine either the absolute or relative spectral responsivity response of a single-junction photovoltaic device.

1.2 Because quantum efficiency is directly related to spectral responsivity, this test method may be used to determine the quantum efficiency of a single-junction photovoltaic device (see 10.10).

1.3 This test method requires the use of a bias light.

1.4 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

- E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method
- E772 Terminology of Solar Energy Conversion
- E927 Specification for Solar Simulation for Photovoltaic Testing
- E948 Test Method for Electrical Performance of Photovoltaic Cells Using Reference Cells Under Simulated Sunlight
- E973 Test Method for Determination of the Spectral Mismatch Parameter Between a Photovoltaic Device and a Photovoltaic Reference Cell

¹ This test method is under the jurisdiction of ASTM Committee E44 on Solar, Geothermal and Other Alternative Energy Sources and is the direct responsibility of Subcommittee E44.09 on Photovoltaic Electric Power Conversion.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

E1036 Test Methods for Electrical Performance of Nonconcentrator Terrestrial Photovoltaic Modules and Arrays Using Reference Cells

E1125 Test Method for Calibration of Primary Non-Concentrator Terrestrial Photovoltaic Reference Cells Using a Tabular Spectrum

E1362 Test Method for Calibration of Non-Concentrator Photovoltaic Secondary Reference Cells

E2236 Test Methods for Measurement of Electrical Performance and Spectral Response of Nonconcentrator Multi-junction Photovoltaic Cells and Modules

G173 Tables for Reference Solar Spectral Irradiances: Direct Normal and Hemispherical on 37° Tilted Surface

3. Terminology

3.1 *Definitions*—Definitions of terms used in this test method may be found in Terminology E772.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *chopper, n*—a rotating blade or other device used to modulate a light source.

3.2.2 *device under test (DUT), n*—a photovoltaic device that is subjected to a spectral responsivity measurement.

3.2.3 *irradiance mode calibration, n*—a calibration method in which the reference photodetector measures the irradiance produced by the monochromatic beam.

3.2.4 *monitor photodetector, n*—a photodetector incorporated into the optical system to monitor the amount of light reaching the device under test, enabling adjustments to be made to accommodate varying light intensity.

3.2.5 *monochromatic beam, n*—chopped light from a monochromatic source reaching the reference photodetector or device under test.

3.2.6 *monochromator, n*—an optical device that allows a selected wavelength of light to pass while blocking other wavelengths.

3.2.7 *power mode calibration, n*—a calibration method in which the reference photodetector measures the power in the monochromatic beam.