CEP-25ML Spectral Response Measurement System

(Evaluation for Multi-junction solar cells and compound semiconductor solar cells)



The CEP-25ML has been designed to irradiate solar cells with monochromatic light of constant energy and constant photons without wavelength dependence, and measures the spectral response and quantum efficiency of various solar cells. The system is equipped with a color bias light source for multi-junction solar cells.Equipped with white bias light source as standard, spectral response measurement under simulated sunlight and I-V measurement as a solar simulator using AM-1.5G can be easily performed.

Spectral response measurement by constant energy irradiation

The light intensity is adjusted with a continuous density variable ND filter, and constant energy light without wavelength characteristics is irradiated. The spectral response of the sample can be calculated from the irradiation light intensity and the measured photocurrent. The same measurement can be performed under white light or color bias light. Bias voltage can be set.

Measurement of quantum efficiency by constant photon irradiation

The light intensity is adjusted with a continuous density variable ND filter, and constant photon light is irradiated. The quantum efficiency of the sample can be calculated from the irradiation light intensity and the measured photocurrent. The same measurement can be performed under white light or color bias light. The bias voltage can be set.

Solar cell characteristics and I-V characteristics measurement

The cell characteristics can be measured with white bias light.

Solar spectrum calculation (IEC 60904-3)

Measurement data

The short-circuit current density can be calculated from the integration of the solar spectrum and quantum efficiency.



The data shows external quantum efficiency (EQE) measurement data of a Ge photo diode detector. With a constant photon of 1×10^{14} Photon/cm², the measurement can be performed with excellent SN in the wavelength range of 300 to 1700 nm.



The data shows EQE measurement of two-junction solar cells consisting of crystalline silicon and amorphous silicon. By using color filters, it is possible to measure EQE of each of the top and bottom cells.



Specifications

Measurement	Spectral response, quantum efficiency,I-V curve		
Wavelength range	300 ~ 1700nm (~2000nm can be expanded as an option)		
Light source for monochromatic light	Xe lamp + Halogen lamp		
Irradiation area for monochromatic light	20×20mm (can be expanded to 50×50mm as an option)		
Wavelength purity	Variable, Max. 20nm		
Irradiation intensity	$5 \sim 50 \mu$ W/cm ² or more (Wavelength 350 ~ 1200nm)		
Positional non-uniformity	Within ±2.5%		
Constancy of wavelength intensity	Within ±3%		
Irradiation mode	Constant energy and constant photon		
Measurement mode	DC and AC (13 ~ 100Hz)		
Light source for White light	Xe lamp (Auto color bias)		
Irradiation area or White light	20×20mm		
Spectral match	JIS C8912 • C8933 Class A		

Standard Configuration



•Xe lamp 500W (for monochromatic light)

- •Xe lamp 500W Power supply (for monochromatic light)
- Halogen lamp 400W (for monochromatic light)
- Halogen lamp 400W Power supply (for monochromatic light)
- •Light condensing optical system (for 2 light sources type)

Monochromator

- Grating 600 line/mm brazed at 300nm
- Grating 600 line/mm brazed at 500nm
- Orating 600 line/mm brazed at 1600nm
- Light emitting optical system (auto continuous density variable ND filter)

●Variable frequency chopper DC/13 ~100Hz

- High order light cut filters
- •Xe lamp 150W (for White light)
- •Xe lamp 150W Power supply (for White light)
- Optical system for white light (Built-in AM1.5G filter)
- Color filter holder
- Sample compartment
- Source meter
- Lock-in amplifier
- SI Photo diode detector (for monochromatic light)
- TP unit
- Si detector holder
- Si Photo diode detector (for white light)
- Cable for solar cell (XRY- Alligator clip)
- Interface unit
- Note PC
- Instruction Manual

Various sample holders Automatic filter switching mechanism for white bias (ND filter / color filter)



The spectral response in the long wavelengths range differs with (blue graph) and without (red graph) white bias. Under simulated sunlight irradiation, you can see that the spectral response characteristics are different.



Dimensions

- Power : AC100V ±10V 50/60Hz 20A
- Main unit : Approx. W1750×D950×H1460mm
- Weight : Approx. 400Kg

The specifications, configuration and appearance are subject to change without prior notice.

< CEP-25ML-1708013E >

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