CEP-25RR Spectral response/IQE measurement system



The CEP-25RR 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.CEP-25RR . The system can measure the spectral response and spectral reflectivity with a single system to determine the internal quantum efficiency(IQE) Spectral response and reflectance measurement can be performed on the same surface of the sample with the same light. Equipped with white bias light source as standard, spectral response under pseudo sunlight and I-V characteristics as a solar simulator with the AM-1.5G can be easily measured.

Spectral response measurement by constant energy irradiation

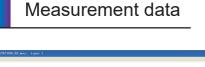
The light intensity is adjusted with a continuous density variable ND filter, and constant energy light without wavelength characteristics is irradiated. The spectral response of the sample can be calculated from the irradiation light intensity and the measured photocurrent. The same measurement can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

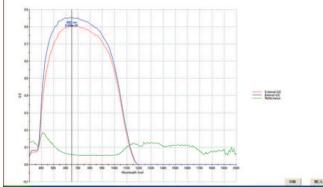
Measurement of quantum efficiency by constant photon irradiation

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.

Diffuse reflection measurement and internal quantum efficiency

The light intensity is adjusted and constant photon light is irradiated to the sample. After setting a solar cell on the integrating sphere, the diffuse reflectivity can be measured with the double beam optical system. Also, the internal quantum efficiency is calculated from the quantum efficiency and diffuse reflectivity measurement.





This is an example of internal quantum efficiency (IQE) measurement data of a crystalline Si solar cell.

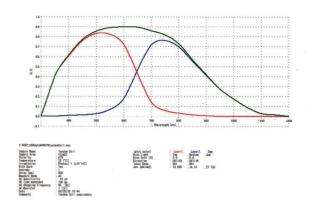
Red: EQE data, Green: Reflectance data, Blue: IQE

For example, for a crystalline Si solar cell,

Long-wavelength sensitivity is reduced. $\Rightarrow The crystal itself degraded.$

Short-wavelength sensitivity is reduced ⇒There is a problem with the surface diffusion layer.

Those can be determined from internal quantum efficiency measurement data.



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



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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
Reflectivity measurement range/items	0~100% Dark/Baseline/Reflectivity measurement
Measurement method	Double beam optical system: Sample and reference beam are switched by the sector mirror

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
- •Grating 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 and white light)
- TP unit
- Si detector holder
- Reflectivity measurement optical system (including a standard diffusion plate)
- Cable for solar cell (XRY- Alligator clip)
- Interface unit
- Note PC
- Instruction Manual

Dimensions are approximate. Appearance and dimensions may vary depending on options.

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

< CEP-25RR-1806012E >

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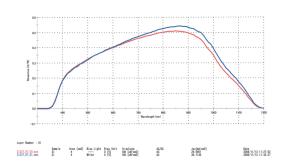


Various sample holders

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



Spectral response data of polycrystalline Si



The spectral response in the long wavelengths range differs with (blue graph) and without (red graph) white bias. Under pseudo 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

Contact