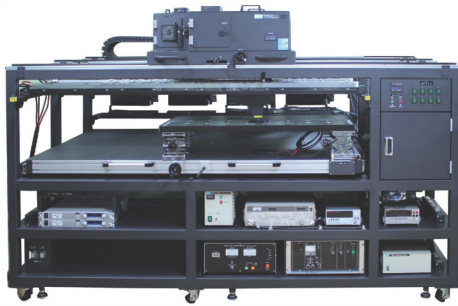


## CEP-M1000 Solar Cell Module Spectral Response Measurement System



The CEP-M1000 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 CEP-M1000 was developed under the technical guidance of the National Institute of Advanced Industrial Science and Technology for the purpose of evaluating the spectral response of solar cell modules. It targets crystalline and thin-film single-junction solar cells and multi-junction solar cells. It is possible to measure the spectral sensitivity of a solar cell module with a maximum size of 1.7 x 1.2 x 0.1M.

- **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**

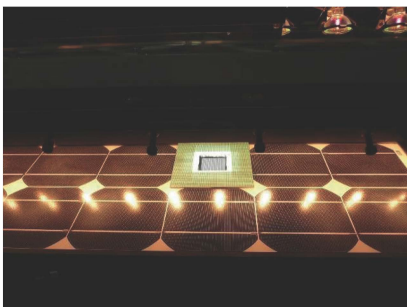
Measure the cell characteristics with white bias light.

- **Solar spectrum calculation (IEC 60904-3)**

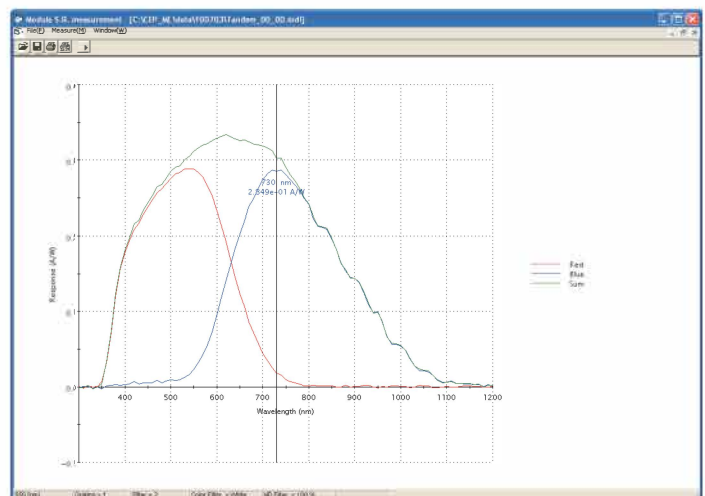
The short-circuit current density can be calculated from the integration of the solar spectrum and quantum efficiency.



The photo shows the CEP-M1000 perform the spectral response measurement.



The photo shows the cell under measurement.



The above is External quantum efficiency (EQE) measurement data of multi-junction solar cells measured with the model CEP-M1000.



## Specifications

Measurement	Spectral response, quantum efficiency, I-V curve
Wavelength range	300 ~ 1200nm
Light source for monochromatic light	Xe lamp
Irradiation area for monochromatic light	20×20mm
Wavelength purity	Variable, Max. 20nm
Irradiation intensity	5 ~ 50μW/cm <sup>2</sup> or more ( Wavelength 350 ~ 1200nm)
Positional non-uniformity	Within ±2.5%
Constancy of wavelength intensity	Within ±2%
Irradiation Mode	Constant energy and constant photon
Measurement mode	DC and AC (13 ~ 100Hz)
Light source for White light	Xe lamp
Irradiation area or White light	20×20mm
Spectral match	JIS C8912 · C8933 Class A
Supported size of module	Max. size : 1.7 x 1.2 x 0.1M 30kg Structure: Aluminum frame Stainless steel plate
Auxiliary bias light	Halogen lamp



## Standard Configuration

- Xe lamp 150W ( for monochromatic light )
- Xe lamp 150W Power supply ( for monochromatic light )
- Light condensing optical system
- Monochromator
- Grating 600 line/mm brazed at 300nm
- Grating 600 line/mm brazed at 500nm
- Grating 600 line/mm brazed at 800nm
- 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 )
- Bias light for non measurement cells ( halogen lamp )
- 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

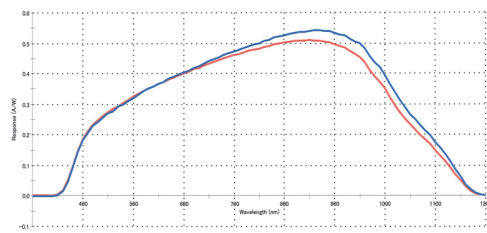


## Option

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



## Spectral response data of polycrystalline Si



Layer Number : 01  
 1127.07 20.00  
 1127.07 20.00

Sample	Area (cm <sup>2</sup> )	Bias Light	Bias Volt	Scan Rate	Scan Area	AC/DC	Auto (cm <sup>2</sup> )	Date
4	White	0 (V)	100 (cm <sup>2</sup> /sec)	100 (cm <sup>2</sup> /sec)	AC	0.0000	2008/11/13 11:53:53	

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 30A ( for other operations, the dedicated transformer can be offered)
- Main unit : Approx. W3100×D2000×H1800mm
- Weight : Approx. 1000Kg

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

< CEP-M1000-1709015N >

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