



High-Quality Uniform Light Source
& Solar Simulator
TYPE: PEC-L12

Specifications

Peccell Technologies, Inc.

High Quality Uniform Light Source Solar Simulator

Specifications TYPE: PEC-L12

Product summary

PEC-L12 is a high-quality and uniform light source, which can irradiate intense light (100 mW/cm^2) to an area more than $6 \text{ cm} \times 6 \text{ cm}$. *Parallel light of uniform intensity* is generated by combination of a 150-W xenon arc lamp and an optical system including quartz integrator lens, set in a *compact body*.

The spectral profile of the emitted light matches that of the sun under the AM1.5 conditions, which means the profile matches *Class-A quality* (Top quality) certificated by JIS (Japanese Industrial Standards). The AM1.5 standard is typically used at the latitudes of Japan. The maximum irradiance is as high as 150 mW cm^{-2} .

The system can generate white light from a xenon-arc lamp with a spectral profile in the wide wavelength range from ultra-violet to infrared. The introduction of an interference filter or a monochromator makes the system a *monochromic parallel light source* with incident intensity.

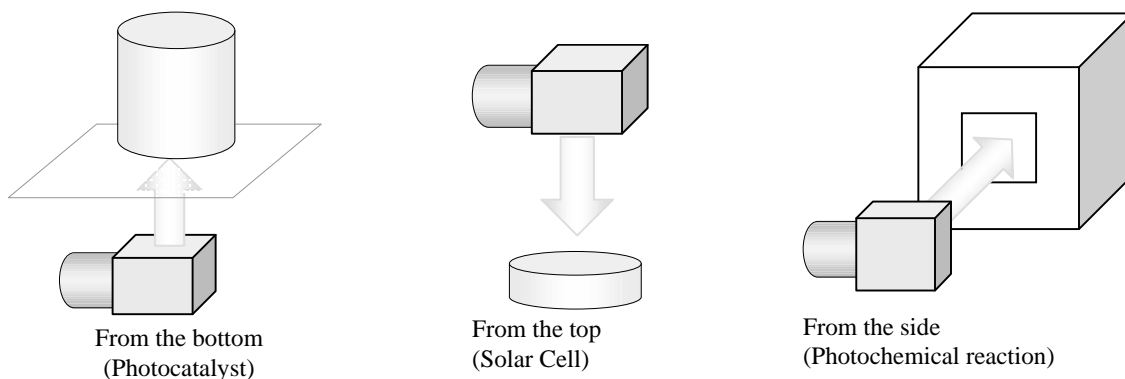
PEC-L12 is designed for a variety of experiments in which you use a light source to obtain *quantitative results such as quantum efficiency*. Thus, the system can apply to extensive purposes such as photochemical experiments, evaluation of solar cells and photocatalysts, and degradation and stability test.

The absolute irradiance of the system is determined by using pseudo-amorphous silicon cell (supplied as accessory equipment).

For usage of a solar cell evaluation system, the combination of PEC-L12 with a temperature-controlled sample stage (PEC-T10), a current-voltage (I-V) detection apparatus, and the analysis software is highly recommended.

Peccell Technologies Inc. will serve best equipment for your advanced experiments.

The System Applies to Sample Irradiation for a Variety of Purposes



Advantages and features of PEC-L12

1. **Applying a 150-W xenon arc lamp with High Intensity** . Improving the collector optics of a 150-W xenon arc lamp provides much higher irradiance by 50% than the former type consisting of a 500-W xenon arc lamp. Applying a 150 W xenon arc lamp contributes not only a power saving but also a cost saving for changing of the lamp. The lifetime of the lamp bulb is over 1500 hours.
2. **Irradiation to a wide area with stable, uniform, and parallel light.** The emitting light is unified by an integrator lens providing high quality parallel light with an intensity distribution within 5%, and the effective illumination area more than 6 cm x 6 cm. The lenses made of BK7 reduce UV-C irradiation, and the switching regulator circuit in the power supply also contributes highly stable irradiation intensity.
3. **Easily changing irradiation direction and position of the lamp.** The direction of the light is freely adjustable at any angle in 360°; Irradiation from the top, the bottom, or the side, can be carried out. The XYZ three-axis adjuster can easily adjust the position of the xenon lamp.
4. **Low-noise cooling system of the lamp.** The lamp bulb is covered with the thermal insulation board to avoid overheating the outer jacket. In addition, the fan with a size of 120 mm cools off the lamp house. The cooling system gives the long lifetime of the Xe lamp, achieving a 5-hours operation in a day without changing the lamp in ca. a 1 year.
5. **Compact size, easily set even on a small desk.** The size of the base is 20 cm x 20 cm. The user can set up the system even in a small space.
6. **Irradiation time reserved by the timer.** The illumination can be turned on or off by the electric shutter. The irradiation time can be controlled by the timer switch.
7. **Reducing Electromagnetic Noise.** The electromagnetic noise, caused by turning on the lamp, is reduced by putting the lamp starter inside the lamp house.

Components

1. **Lamp house:** NDXH-150ESS with a setting base and a stand (Changeable)
2. **Lamp unit:** ITE50-AM1.5G (Removable)
3. **Power supply for lamp** NDXP-150E (Possible to set apart from the lamp house)
4. **Power source for shutter**
5. **Three Power cables** AC input; DC input; output for fun

Accessories sold separately

n Pseudo amorphous silicon cell for light intensity calibration

The equipment applies to determine illumination power and to count a number of photon.

n Filter holder for monochromic light irradiation

PEC-L12 can provide monochromic uniform parallel light (360 nm to 900 nm).

n Temperature-controlled sample stage (PEC-T10)

Temperature of sample is controlled by the equipment instantly.

We recommend the PECCELL Software for the solar cell I-V measurement

n Current-voltage (I-V) detection apparatus with the analysis software

The special equipment for correct evaluation of solar cells (Photocurrent-Voltage characteristics and conversion efficiency) include the *Keithley 2400 Source Meter* and the *I-V analysis software* (PECCELL's original). The latter software is strongly recommended for the user working on dye-sensitized solar cells, which needs special care for obtaining reliable I-V curves. The software has been developed by us specialist of the dye-sensitized solar cell study.

Specifications

1. **Lamp house: LHX-150ESS**

Matched lamp: 150 W Xe arc lamp (USHIO UXL-151D-O)

Back mirror: Al-spattered concave mirror

Lamp bulb retainer: Small size XYZ three axis adjuster

Exhaust fan: AC 100V, f120, box-shaped fan

Shutter: Solenoid, wing type.

Dimension: Lamp house: W 150 × D 150 × H 400mm

Foot of stand: W 200 × D 200 × H 20 mm

Legs of stand: H 200 mm, four hexagonal legs

2. **Uniform-illumination optical system ITE50-AM1.5G**

Mirror: 45° all wavelength reflection aluminum mirror

Integrator lens: Drum lens of BK7

Collimator: φ100 of BK7

Air mass filter: AM1.5G

Distance of illumination: Adjustable

Lens tube: φ70

3. **Power supply for lamp: NDXP-150E**

Control system: High frequency PWM constant current control system (switching regulator)

Electrical input: AC 100V, 50-60Hz, 900VA

Output voltage: DC 20V ± 3V (depending on the property of lamp bulb),

No-load open circuit voltage: Over 120V

Output Current: DC 5 – 8A (variable)

Current ripple: Less than 5%(p-p)

Total fluctuation: Less than 4%

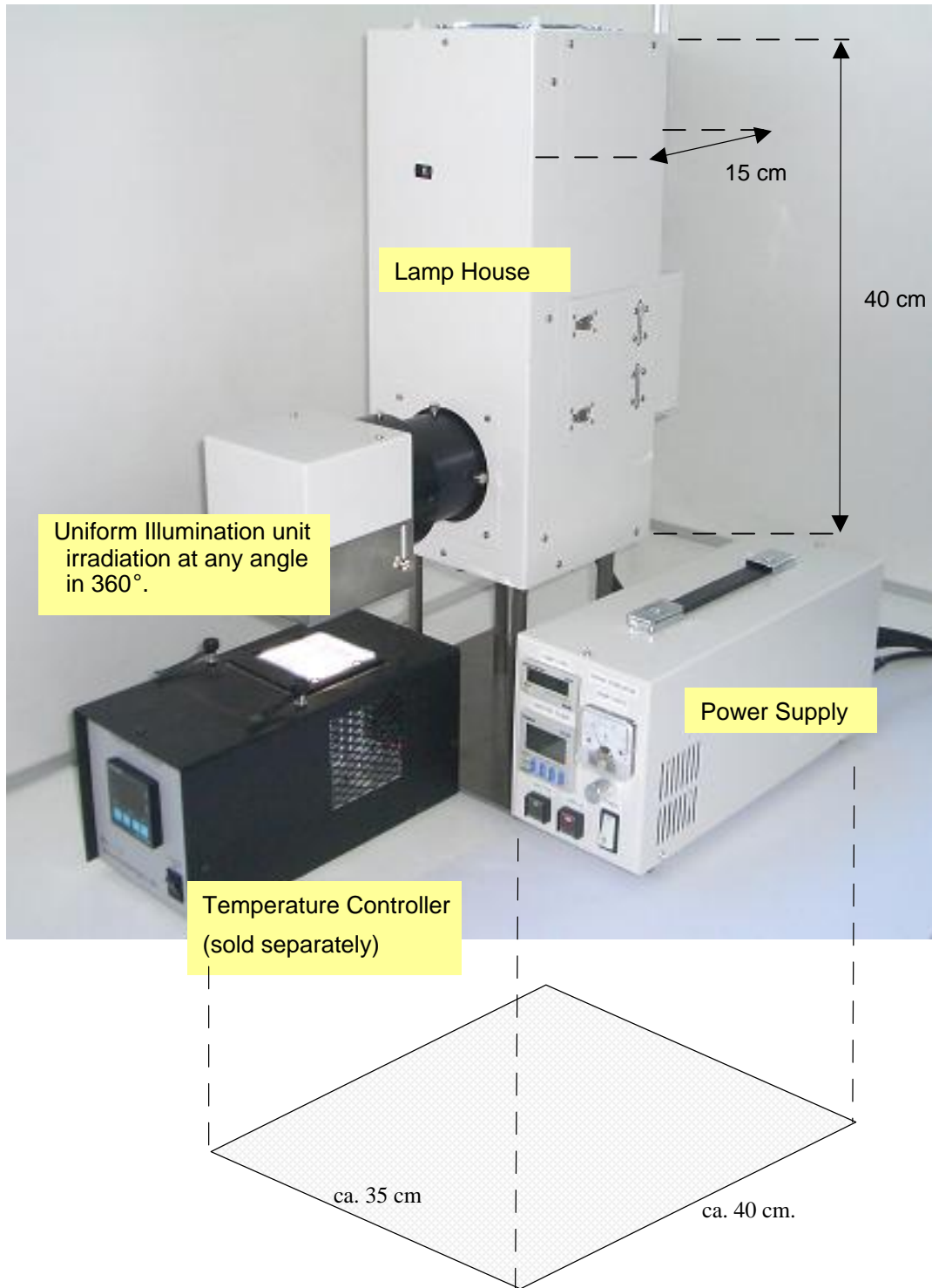
Starter: STX-25 (in lamp house)

Dimensions: Refer to the next sheet.

Function of the System

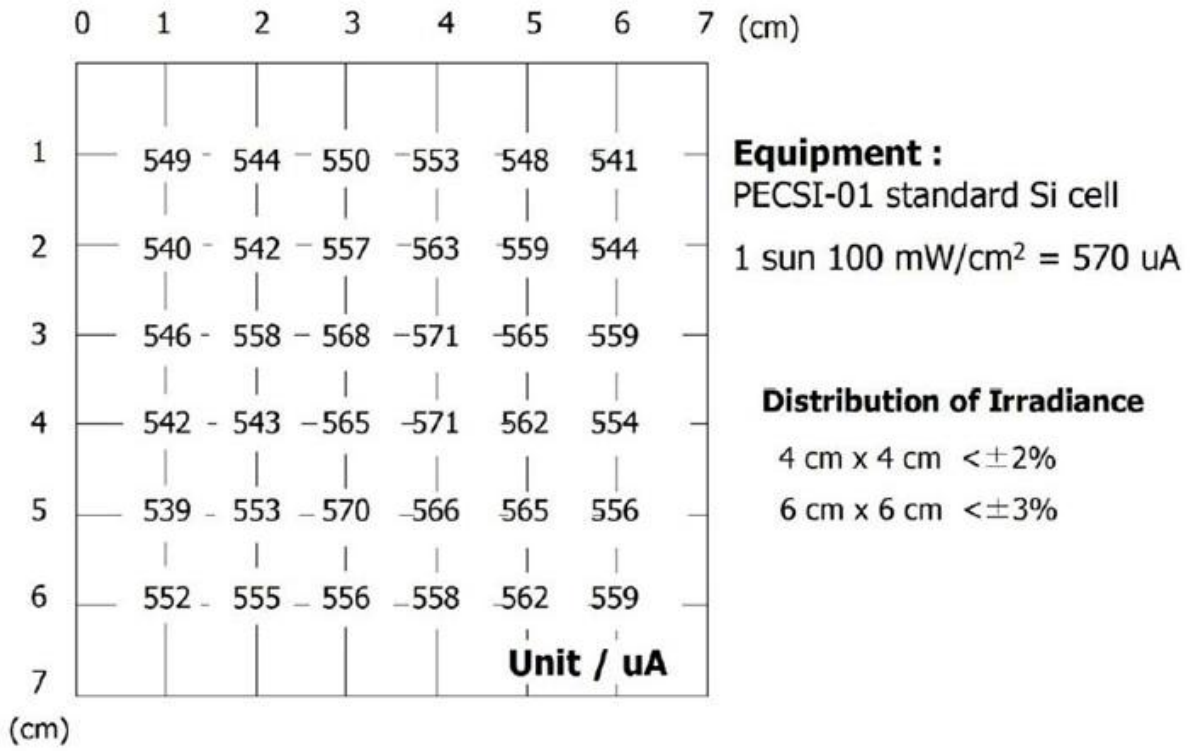
1. **High Intensity of illumination as a solar simulator** : The system provides white light with a spectral profile as matched with AM1.5, the intensity is as much as 150 mW cm⁻² (1.5 sun).
2. **Wide Range of the Effective Illumination Area** : Effective illumination area is as much as 40 cm² (ca. 6 cm x 6 cm) in the case of a parallel light source. The usage as a non-parallel light source achieves the wide area more than 60 cm² (ca. 7.5 cm x 7.5 cm).
3. **Easily Adjustment of Illumination Intensity**: Easy operation of adjustment of a current of the power supply, a distance between the lamp and the sample stage can control the intensity of illumination continuously. In addition, the direction of the light is adjusted at any angle in 360°.
4. **Usage for Monochromatic Light Source**: The combination with the special holder and interference filters (accessories sold separately) makes the system a high quality monochromatic parallel light source. In addition, pseudo-amorphous silicon cell for light intensity calibration (an accessory sold separately) provides you information about a number of photon in your experimental setup, and therefore, the determination of quantum yield of photochemical reactions will be done.

Appearance



The figure shows an area you need when the system is set up on the table. Of course, the power supply is put apart from the lamp house, for example under the table. In this case, the area on the table you need is 25 cm x 40 cm.

Distribution of Irradiance PEC-L11/0690014



Temporal Stability PEC-L11/0690014

