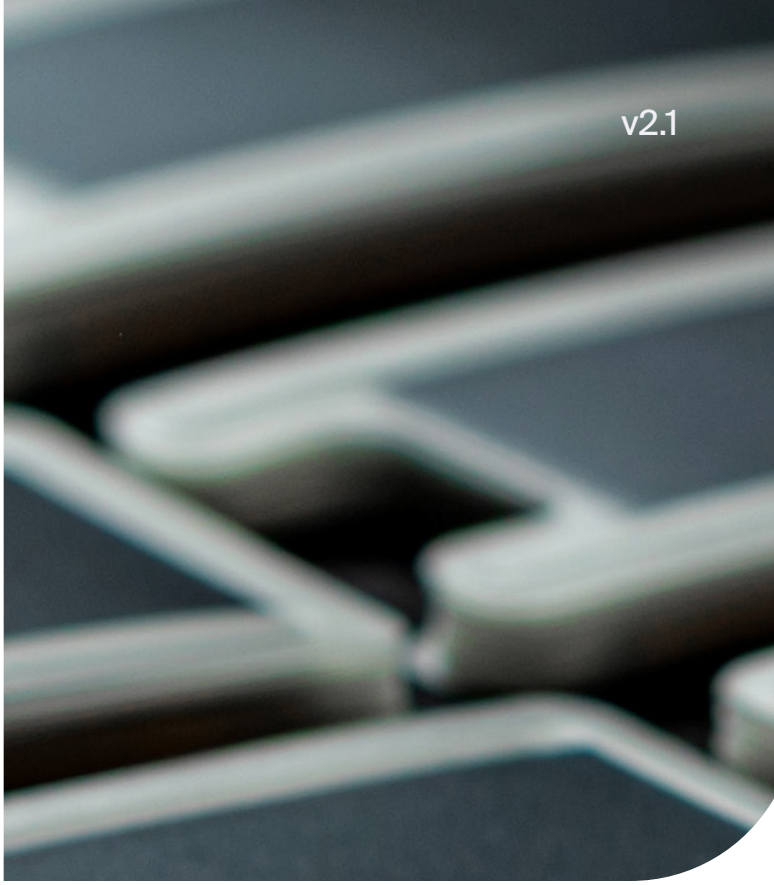


v2.1

*Epishine OneCell*

# Data sheet

Epishine

Epishine

*Printing power*

# Table of Contents

# Epishine's Indoor Solar Cell

Power your electronics with Epishine's indoor solar cells.

For simple integration, unparalleled flexibility and market-leading performance, choose Epishine.

## Key Features:

- Low climate footprint
- Flexible and lightweight
- Output power of up to 8.4 μW/cm$^2$ at 200 lux[1]
- Crafted from organic materials
- Made in Sweden
- Our product range allows you to pick an output voltage best suited for your electronics design

[1]See section 6 for standard measurement conditions

## About Epishine

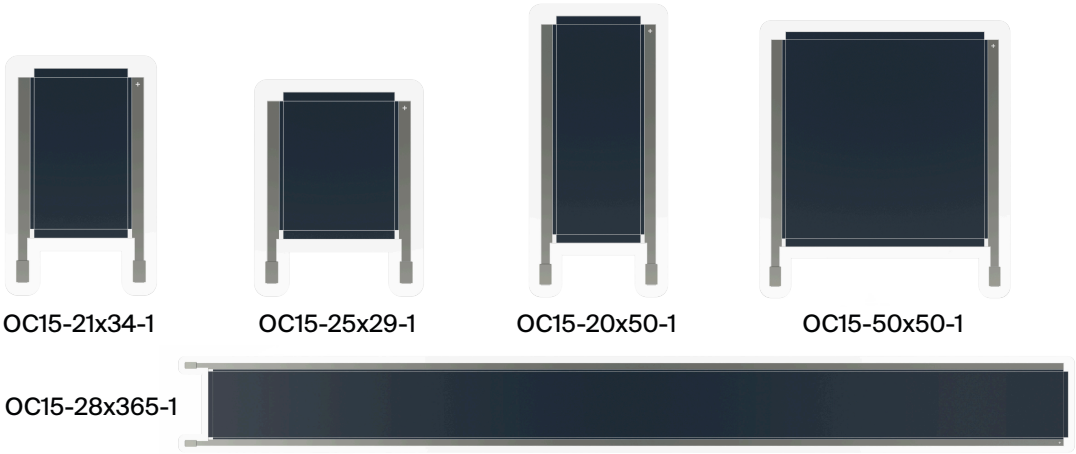
We are a Swedish manufacturing company specialized in the production of printed organic solar cells for light energy harvesting. Our core innovations enable smart electronics to meet the growing demand for sustainable energy solutions. The product line presented within consists of a series of solar cells optimized for indoor lighting conditions, offering easy integration into various applications.

For more information visit epishine.com

# 1 Epishine Standard Modules

Epishine indoor solar cells come in multiple standard sizes suitable for a variety of applications. Available for purchase via epishine.com. For a more detailed drawing see Section 3.

If our standard module sizes do not fit your requirements, please contact sales@epishine.com.




| Standard Cell Code | # cells | Aperture area (cm²) | Active area (cm²) | MPP Voltage [1] (V) | MPP Current [1] (µA) | MPP Power [1] (µW) | Open Circuit Voltage [1] (V) |
|---|---|---|---|---|---|---|---|
| OC15-21x34-1 | 1 | 7.2 | 7.2 | 0.50 | 110 | 55 | 0.61 |
| OC15-25x29-1 | 1 | 7.3 | 7.3 | 0.50 | 110 | 55 | 0.61 |
| OC15-20x50-1 | 1 | 10 | 10 | 0.50 | 152 | 76 | 0.61 |
| OC15-50x50-1 | 1 | 25 | 25 | 0.50 | 380 | 190 | 0.61 |
| OC15-28x365-1 | 1 | 102 | 102 | 0.50 | 1553 | 777 | 0.61 |

Table 1. Summary of products
[1] Typical values measured at 200 lux under standardised measurement conditions in Section 6

## Typical output power density:

| Lux | Min Power Density [1] (µW/cm²) | Power Density [1] (µW/cm²) | Max Power Density [1] (µW/cm²) | MPP Voltage[1] (V) |
|---|---|---|---|---|
| 50 | 1.6 | 1.8 | 2 | 0.45 |
| 200 | 6.8 | 7.6 | 8.4 | 0.50 |
| 500 | 17.0 | 20.3 | 22.3 | 0.50 |

Table 2. Electrical characteristics of indoor solar cell
[1] Typical values measured under standardised measurement conditions described in Section 6

## Empower Your Evaluation – Measure, Test, and Confirm

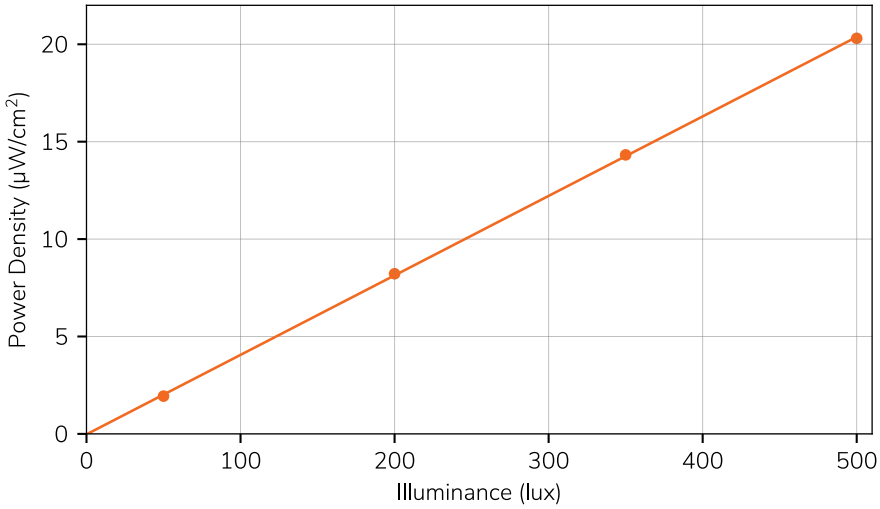
Our datasheets are grounded in thorough testing, following the standard for evaluating indoor solar cell performance (IEC TS 62607-7-2). What we promise is what you get. However, real-world conditions vary depending on lighting, environment, and use case. For accurate insights, we encourage you to validate performance under your specific conditions using the same reproduceable light and measurement conditions.

**Epishine supports real-world validation** – we offer rapid sample delivery so you can assess manufacturing readiness, evaluate performance consistency, and compare across batches. Contact us for guidance or support with testing and scaling.

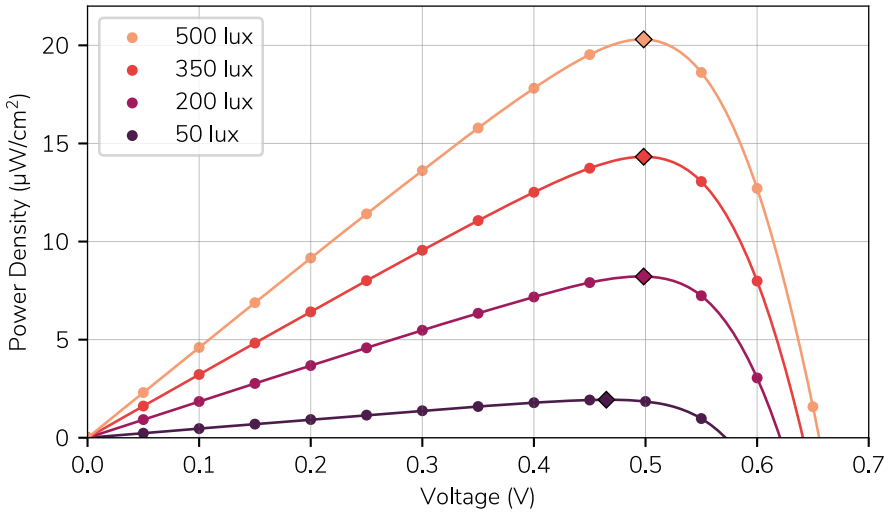
# 2 Electrical Characteristics

Typical data from standard measurement conditions. See section 6 for details.

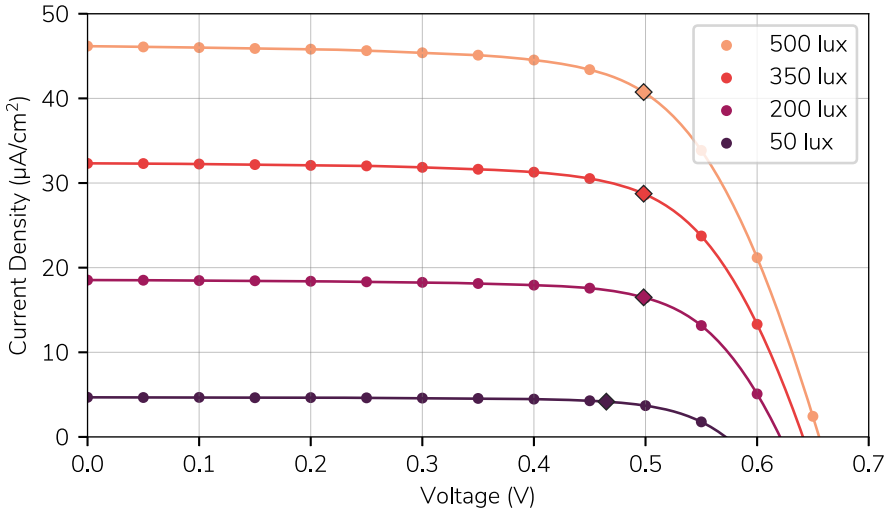
## Power density as a function of illuminance




## Power-Voltage characteristics




## Current-Voltage characteristics



# 3 Dimensions

The position of the electrical contacts are indicated in the drawing in Figure 10.
The production tolerance of the physical dimensions of Epishine's modules is ±0.1 if not specified otherwise.

Color of cells, busbars and electrodes might be subject to change.

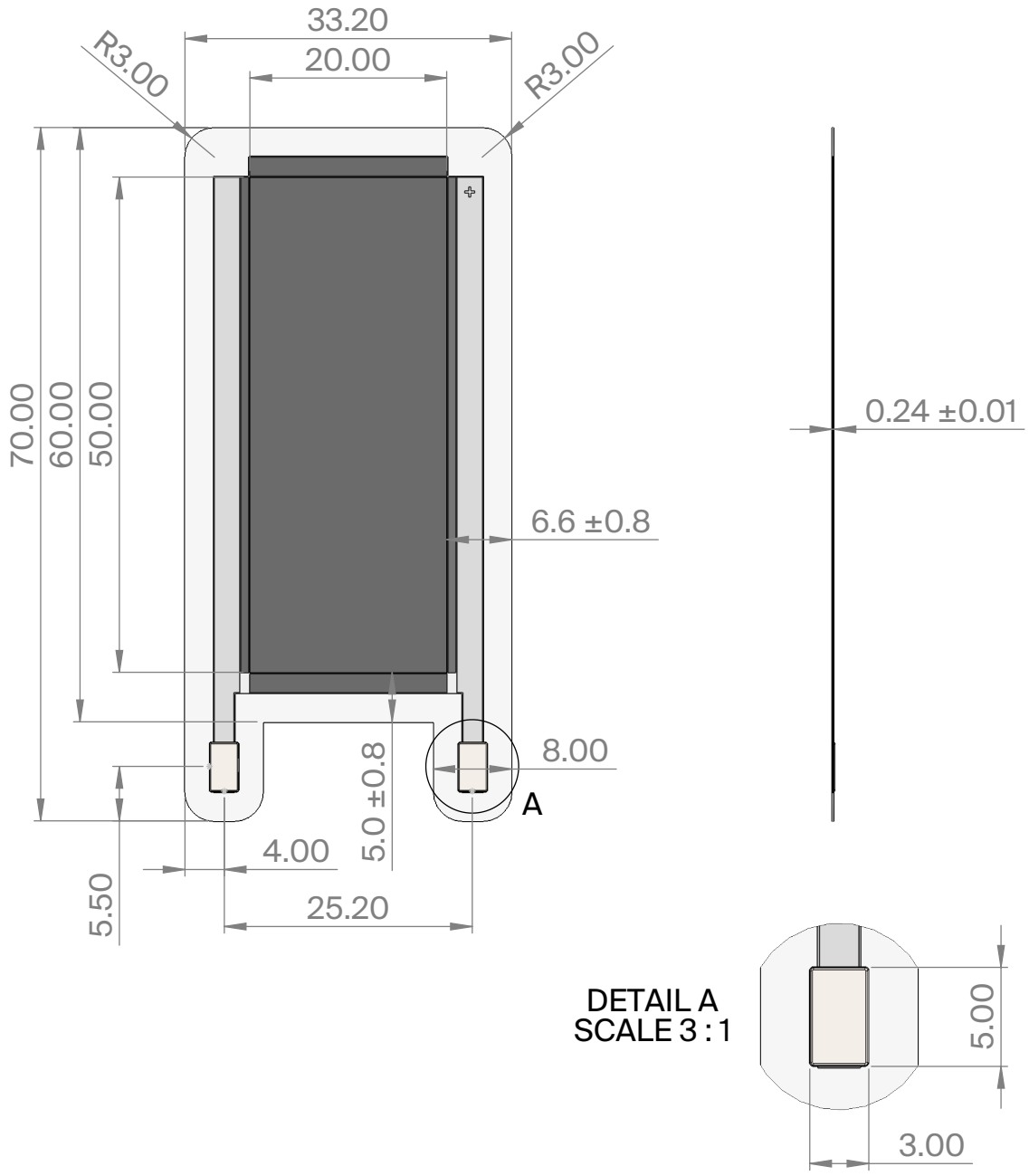



Figure 10. Mechanical dimensions and tolerances of Epishine's modules on the example of an OC15-20x50-1-200 module.

The side shown in the drawing (with the contacting) should be facing inwards when assembled.

# 4 Thermal and Light Stability

Epishine's modules are stress-tested in highly accelerated stress tests (HAST) to simulate accelerated aging. All tests are designed to be indicative of approximately 10 years service life, conditioned by standard operating conditions specified in Section 6. For clarification purposes, the aforementioned does not constitute a representation or warranty or binding commitment of Epishine. Warranties are exhaustively and exclusively provided for in Epishine's General Terms and Conditions, forming part of the purchase agreement.
https://www.epishine.com/gtc

| Test | Test condition | Pass criterion | Comment |
|---|---|---|---|
| Accelerated Lifetime Test (Temperature and Humidity) | -20°C / 12 %RH / 3000 h | No power loss | SENZ SEFR845EW |
| | 55°C / 85 %RH / 2000 h | ≤ 20% power loss | Nuve TK 120 |
| Temperature Cycling Test | -20°C to 70°C / 72 cycles / 1.2 h per cycle | No power loss | Performed by BK Services Linköping |
| High Illuminance Test (Warm white LED) | 22°C / 45 %RH / 42.000 lux 3 h / day / 100 days | ≤ 5% power loss | Standby illumination 200lux |

Table 3: Summary of environmental stress test conditions and pass criteria

# 5 Mechanical and Electrical Stability

Our modules feature a high flexibility. Mechanical stress tests are compiled in Table 3.

| Test | Test condition | Pass criterion | Comment |
|---|---|---|---|
| Cycling Bending Test - Module | Bending radius 1 cm / 180° / 10000 cycles | No power loss | Performed on automated bending tester |
| Drop test | Drop from 5 m | No power loss | |
| Shipping Test | Storage at 0.75 bar for 14 h 25°C / 45 % RH / 0 lux | No power loss | |
| ESD Immunity Test EN 61000-4-2 | ±4kV indirect discharges and direct contact charges ±8kV air discharges at 25°C / 30 %RH | No power loss | Performed by BK Services Linköping |

Table 4. Summary of mechanical stress test conditions and pass criteria

# 6 Operating conditions

## Standard operating conditions (SOC)

Temperature: 20±5°C
Humidity: 40 % RH (non-condensing)
Illumination intensity: 20 - 1000 lux 8 h/day
Different operating conditions may affect lifetime.

## Measurement conditions for electrical performance:

Temperature: 22±2°C
Humidity: 40±5 % RH
Illuminance: 200±5 lux 5000K LED. White background behind the module.
The electrical performance characterization lamp spectrum can be seen below.

## Electrical measurement and lamp calibration:

In order to ensure a standardized test environment measurement, it is important that equipment and lamps are calibrated accurately. The light intensity is calibrated using a reference silicon solar cell of the type SRI 6014 with a KG5 filter, purchased from and calibrated by the National Institute of Standards and Technology (NIST). The calibration of the reference cell is to a warm white LED array.

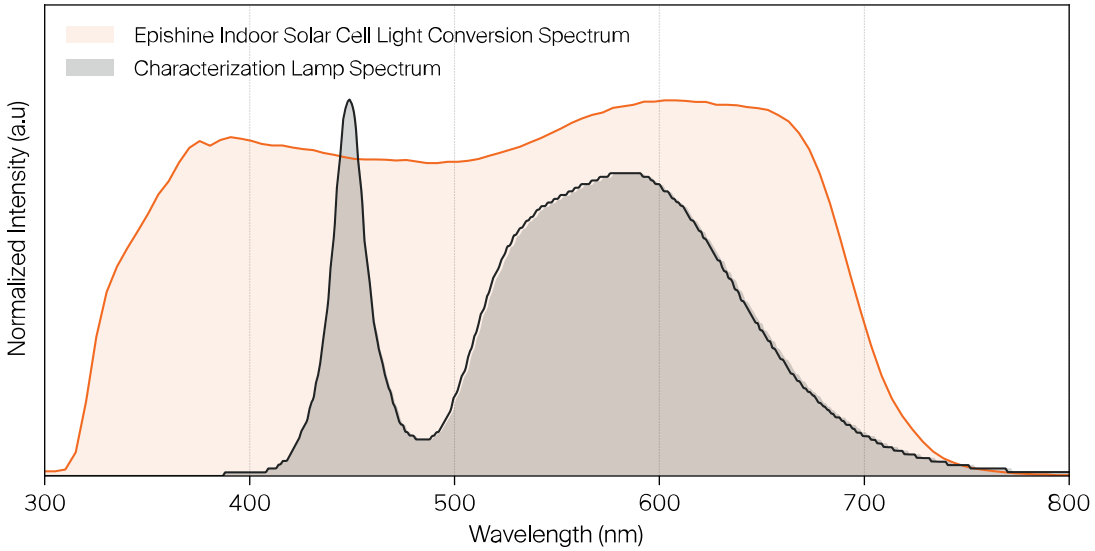



Figure 11. Indoor warm white LED characterization lamp spectrum (gray trace) and Epishine cell sensitivity (orange trace)

# 7 Conversion Spectrum

Different indoor light sources have different spectral distributions, resulting in different colors and luminosities. Epishine's active material is designed to capture light across the whole visible spectrum, covering all common indoor light sources. This fact is shown in Figure 12, where it can be seen that Epishine's conversion spectrum (orange) fully covers emission spectra for the most common indoor light sources.

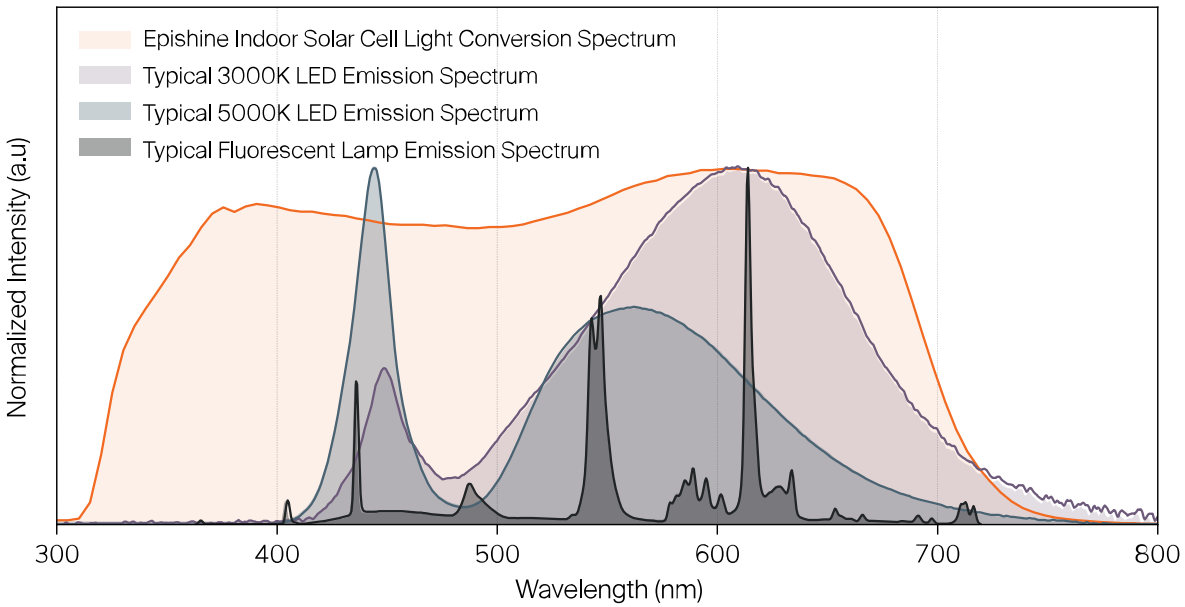



Figure 12. Sensitivity of Epishine indoor solar cells (orange trace) in comparison to typical indoor light sources

# 8 Instructions for Use

Contact info@epishine.com if you want to get access to our knowledge base and information regarding how to do mechanical and electrical integration into a variety of electronic devices.

Please note that information related to the products and services supplied by Epishine may be subject to updates continuously without prior notice. Please contact Epishine or visit epishine.com for updates.

## Storage

Epishine recommends storing the indoor solar cells at temperatures below 30°C as long-term storage at higher temperatures may have an adverse impact on their lifetime.

## Cautions before use[1]

Epishine indoor solar cells are sensitive to excessive heat. Over-heating for extended periods of time may result in degradation of performance and lifetime.

Epishine cells are designed for indoor use and are sensitive to high light intensities.

Placing the cells in direct sunlight for a prolonged time may result in degradation of performance and lifetime. Occasional short exposure to strong light intensities, e.g. sunlight through a window glass, will not affect their performance or lifetime.

For optimal performance use a white background reflector such as white copying paper or similar, directly behind the Epishine cell.

Epishine cells may not be folded or cut.

Epishine cells may lose functionality if attached to a surface with double adhesive tape and pulled off again.

## Electrical Contacting

Epishine delivers cells with patches for electrical contacting. These contact pads cannot be soldered on directly. Epishine cells are not suitable for infrared or hot-air reflow soldering.

For assembly use either of the following methods:

- Anisotropic conductive film (ACF), Isotropic conductive film to connect the solar cell directly to the PCB or to an FPC.
- Conductive tape to connect the solar cell directly to the PCB or solder a wire onto the tape and then connect to the solar cell
- Conductive adhesive to connect the solar cell directly to the PCB or to an FPC.
- Mechanical attachment through springs, foams, fabric-over-foam or similar to connect the solar cell directly to the PCB.

For support with contacting and other product integration inquiries, please contact sales@epishine.com.

This symbol on the product and / or accompanying documents means that used electrical and electronic equipment (WEEE) should not be mixed with general household waste. For proper treatment, recovery and recycling, please take this product to designated collection points where it will be accepted free of charge.