

Innovative Lamination Process for Flexible Electronics and LED Technology

# LumProtect®

FLEXIBLE LIGHT FOR TOUGH USE



  
made in germany

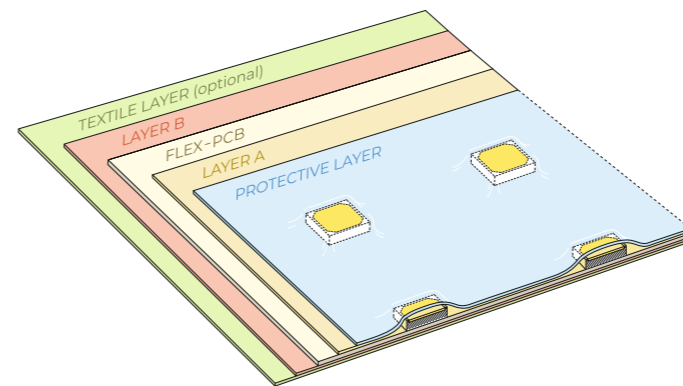
 **LUMITRONIX®**  
High-Performance LED-Technologies & Solutions

BASELINE

## Reliably Protect Sensitive Electronics

The market for flexible electronics is growing steadily. LUMITRONIX® is increasingly producing lighting solutions based on flexible substrates. Due to the rising variety of products and the desire for individuality, the technical challenges are growing accordingly. Flexible electronics and especially printed electronics are particularly sensitive:

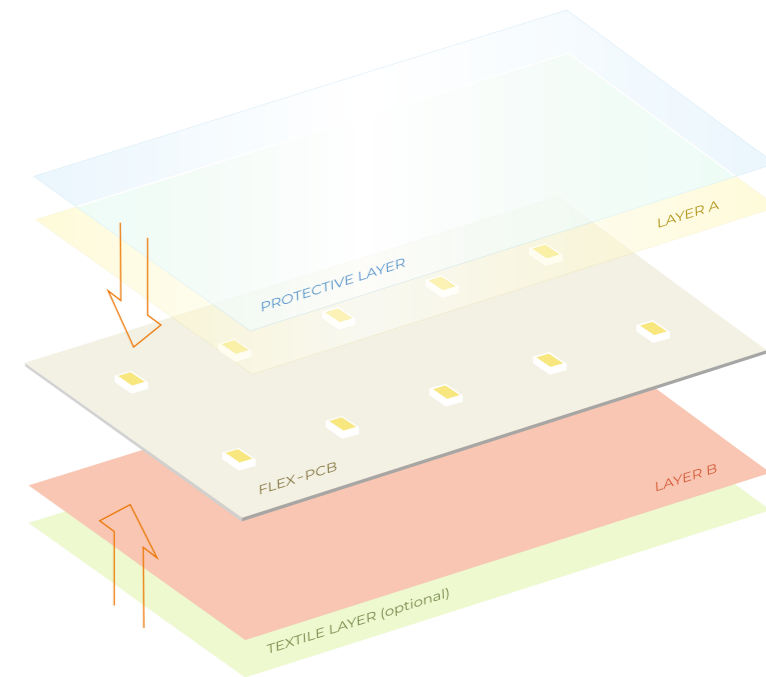
both in further processing and in the application itself. In demanding applications, the flexible modules must reliably withstand the corresponding load. In order to meet the high requirements, LUMITRONIX® has established the innovative LumProtect® production process to make the sensitive electronics more robust for use in challenging applications.



INNOVATIVE TECHNOLOGY

## The Lamination Process

In the new production plant, both flat and linear electronic assemblies are laminated with several polymer materials. The material composition can be adapted depending on the intended use. The total layer thicknesses are 200 µm - 1000 µm. In the lamination process, several plastic layers are applied to the front and back of the flexible PCB material by applying heat (temperatures < 230°C) and high pressure. The components mounted on the flexible



components are encapsulated in this process, whereby air residues in the material composite are largely displaced. Since only very thin layers are used, the flexibility of the module is maintained and at the same time the mechanical resistance increases significantly. The high transparency and low colour shifts of the materials used makes the innovative technology a perfect complement for assemblies with LEDs or optical sensors.



HIGH PROTECTIVE EFFECT

## Well Protected for Difficult Operating Conditions

The innovative lamination technology offers reliable protection against a wide range of environmental influences. Whether solar radiation, wind or water - the modules can withstand any weather and can thus be used in outdoor areas for flexible lighting solutions, for example. Furthermore, the lamination reliably protects flexible modules against various chemicals from the air, such as exhaust

fumes, or in direct contact with the surface with paint, cleaning agents or dust. Mechanical stresses, such as direct contact with the electronics by the user, can also be largely avoided. Despite the lamination, the flexibility of the assembly is maintained so that multi-dimensional installations remain possible.



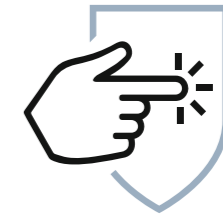
Protected against humidity  
(IP67 possible)



Protected against gases, dust and other particles



Protected against various chemicals



Protected against physical stress and weather influences

## How Can Lighting Applications Be Protected from Environmental Influences?

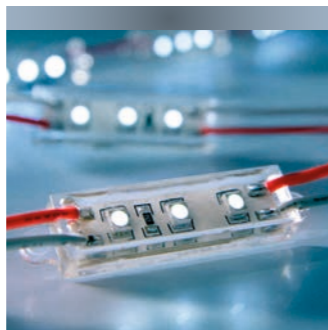


HOUSING

Besides LumProtect®, there are three common methods that are used to protect sensitive electronics. Depending on the application requirements of the respective electronics application, the common protection methods can achieve very good results, but also show strong weaknesses in certain criteria. For example, in many applications it is important that flexible LED



COATING/  
PROTECTIVE  
LACQUER

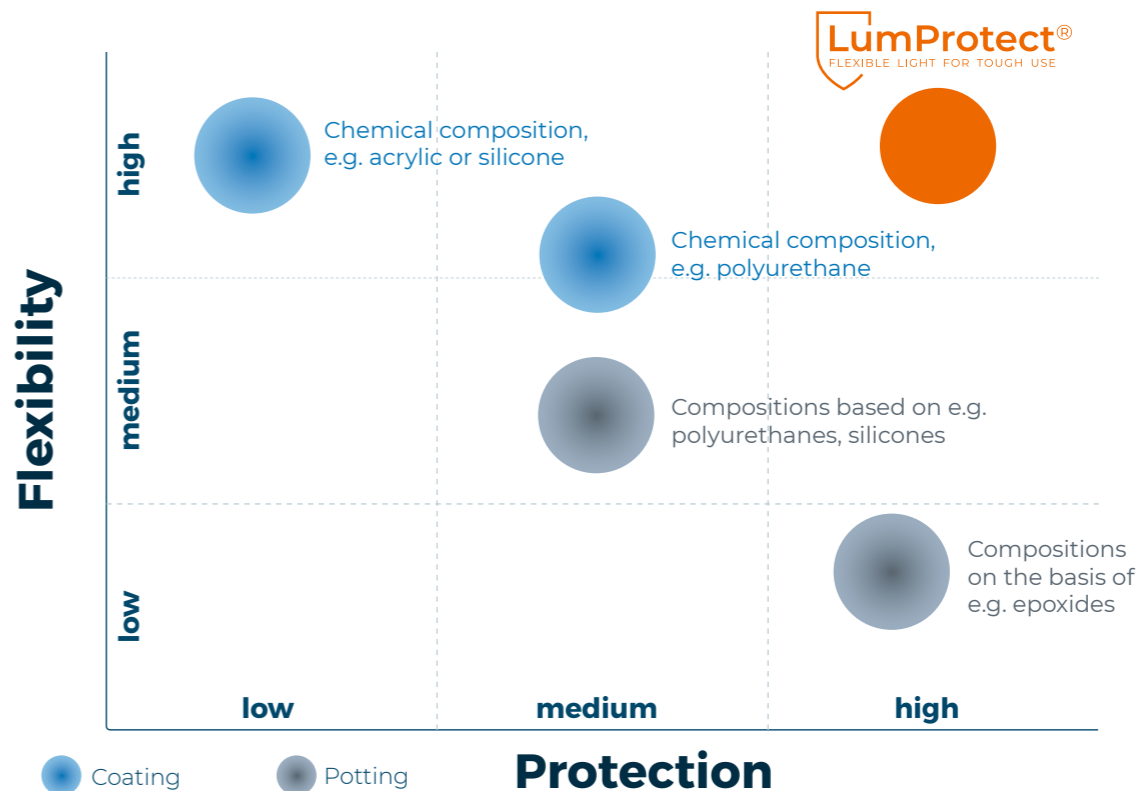


POTTING

modules remain very flexible even when protected, so that three-dimensional installations can be implemented without restrictions. As only very thin layers are fused together during the LumProtect® lamination, the flexibility of the LED module is still maintained. At the same time, the mechanical resistance increases significantly.



LUMPROTECT®



LUMPROTECT® IN COMPARISON

## LumProtect® vs. Potting

We have also evaluated other properties of the common protection methods and compared them with the characteristics of LumProtect®.



LumProtect®



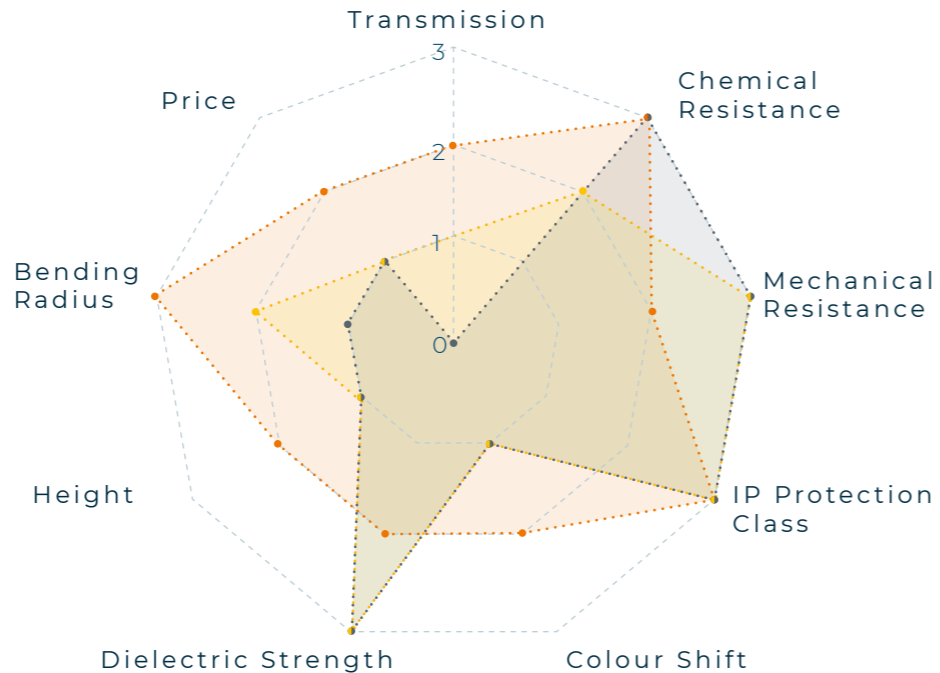
Silicone Potting



Epoxy Potting 2K-PUR

**Scale: Fulfilment of the attribute**

**3:** Highest **2:** High **1:** Moderate **0:** Low



LUMPROTECT® IN COMPARISON

## LumProtect® vs. Coating vs. Housing



LumProtect®



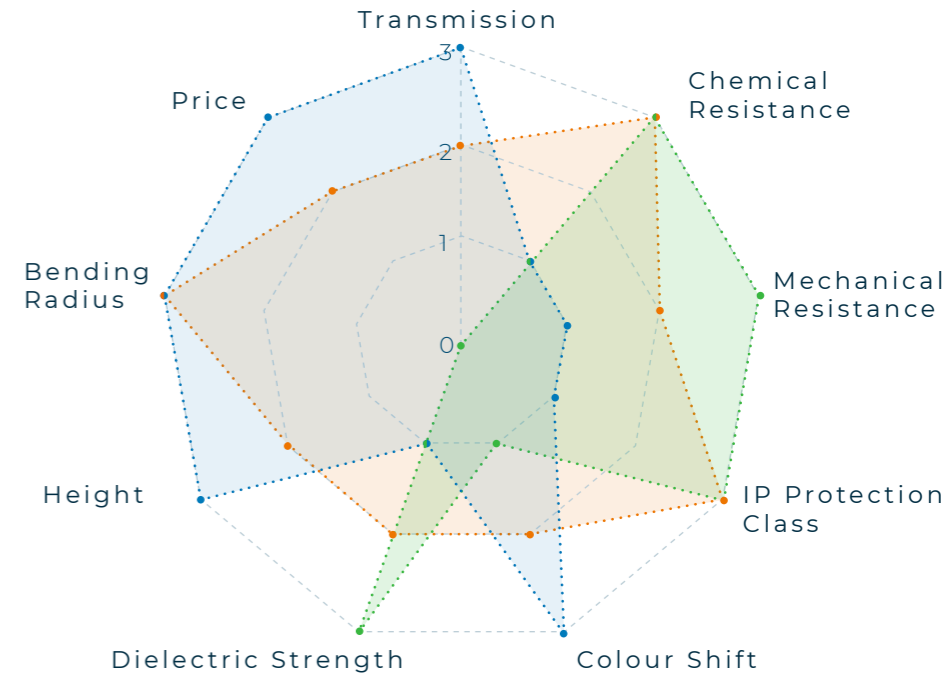
Housing with Plexiglas Pane



Coating

**Scale: Fulfilment of the attribute**

**3:** Highest **2:** High **1:** Moderate **0:** Low



## PROTECTED LIGHTING

# Perfectly Suitable

The high transparency of the materials used makes the innovative LumProtect® technology a perfect complement for assemblies with LEDs or optical sensors.

It brings **unique features** that cannot be achieved by other protection methods in applications with flexible LED strips and flexible area modules.



**Maximum customisability**  
with protected lighting



**Highest flexibility**  
with protected lighting



**Highest colour fidelity**  
with protected lighting



**Lowest overall height**  
with protected lighting

## Features

### MECHANICAL PARAMETERS:

- Minimum bending radius
- Hardness: 70 Shore D (ISO 868)
- Max. ambient temperature
- Fire protection class V-0

### OPTICAL PARAMETERS:

- No yellowing effects
- **High material transparency**  
(92 - 94 % typical)
- **Hardly any colour shifts**  
(< 200 K with warm white LED light)

### ENVIRONMENTAL INFLUENCES:

- IP67 protection = standard
- Dry heat (DIN 60068-2-2)
- Temperature and humidity cycles  
(DIN 60068-2-38)
- Salt spray test  
(DIN EN 60068-2-11: 2000-02)

- **High dielectric strength**  
(> 80 kV / mm, 4-5 KV at 50 µm)

- **Structured and smooth surfaces**

- **Customised designs, shapes and colours** through the use of textile layers

- **Different connection and sealing options** with cables, plugs, eyelets & crimp contacts

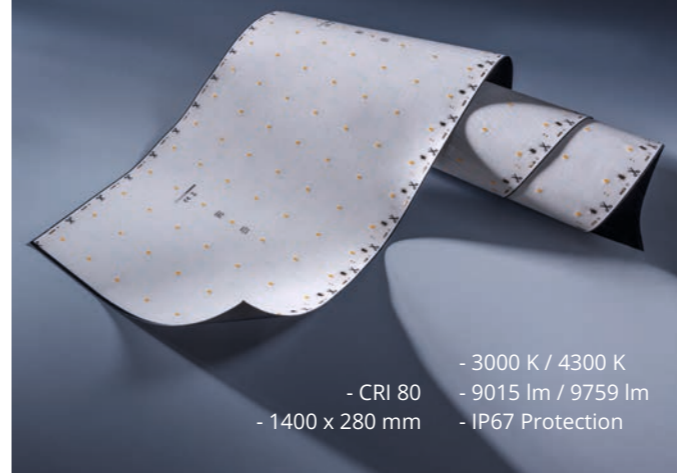
- **Applicable to the entire LUMITRONIX® standard portfolio** with LED strips and customer-specific solutions on flexible substrates

## TECHNOLOGY DEMONSTRATORS AVAILABLE

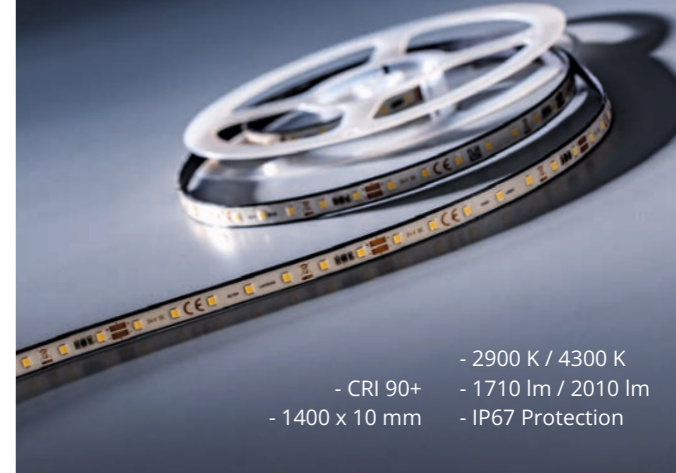
# See for Yourself

To showcase the quality of the technology, we offer two laminated LED modules: a **surface module** and an **LED strip**. The technology is applicable to the entire standard product portfolio of LUMITRONIX® on flexible base materials and can also be used for customised flexible LED solutions within the scope of individual projects.

Z-Flex LED Module, 24 V



LumiFlex350 Pro LED Strip, 24V





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