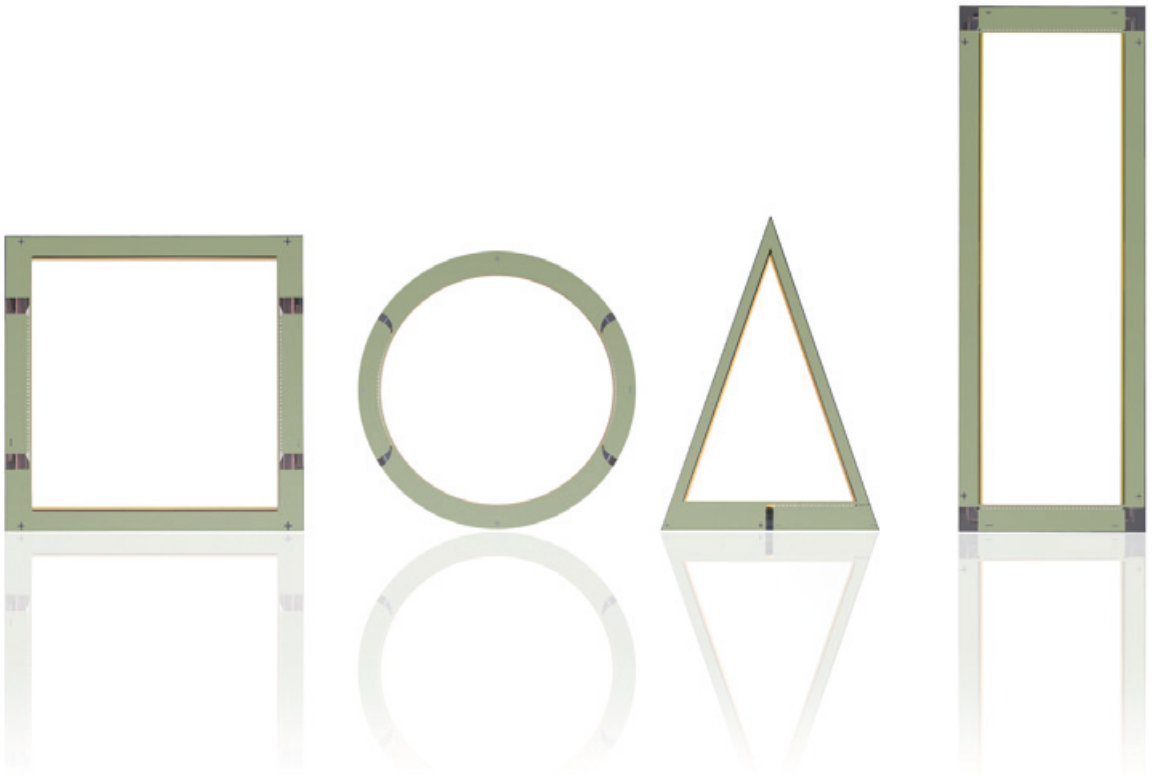
Lumiblade OLED GL46

Data Sheet

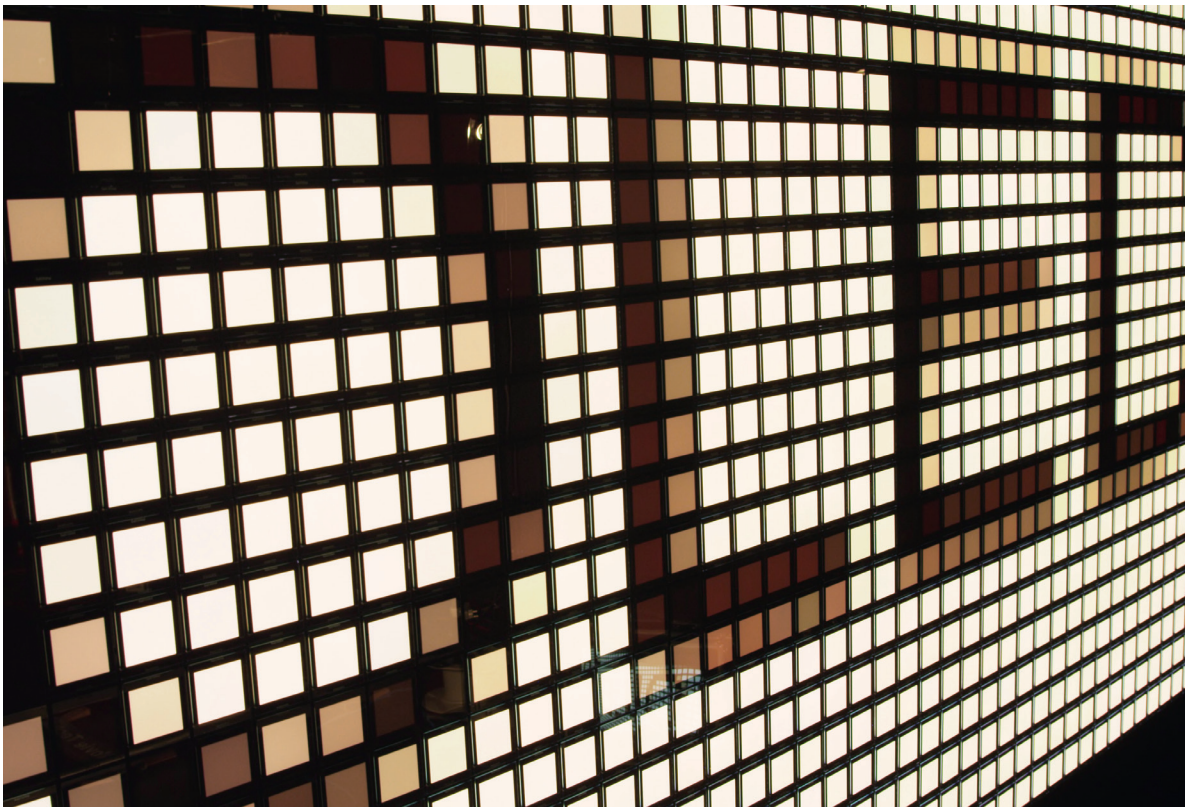
PHILIPS

Welcome to the world of OLED lighting



Lumiblade is OLED lighting at Philips and definitely more than just another light source – it is a highly-adaptable material that removes the boundaries of shape and size associated with conventional lighting. It offers incredible potential to change the way we use light to shape objects and architecture.

At the forefront of OLED technology, Philips Lumiblade demonstrates unique characteristics and capabilities that can redefine lighting, and the way we use and experience it: its homogenous output, unusual appearance, low heat emission, extremely flat nature and high degree of controllability.



Reduce to the max

With less than 2mm total height of the light emitting surface, Lumiblade OLEDs enable thin lighting applications. Plus, there is no secondary optics needed anymore as the lit material can already be the functional surface. This adds up to 100% system efficiency and 0% waste of space.

Finest material in lighting

If quality of lighting matters, the natural light from the surface of Lumiblade OLED panels will be the right material to satisfy any customers' requirements. As an alternative to the shiny reflective surfaces, Philips is also offering solutions which contain a light outcoupling foil for higher light output and for a soft and warm material surface.

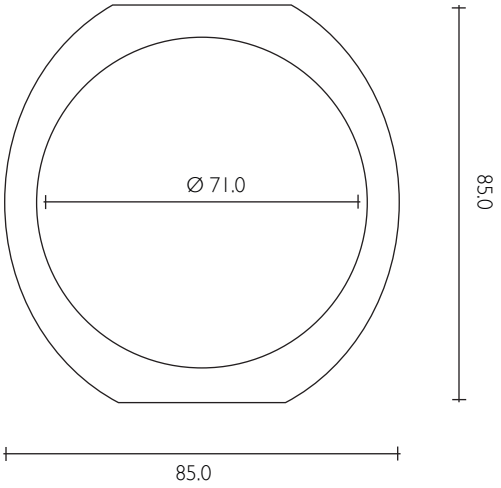
Almost no heat, definitely in all materials

With OLEDs being surface emitters, they also do not have a heat sink as the temperature is already distributed. Thus, Lumiblade OLED panels can be used in harmonic coexistence with most other materials, where using other light sources was simply not possible before.

These factors open up endless opportunities to create groundbreaking new lighting concepts and experiences, which will in turn provide consumers with dramatic and unexpected ways to create atmosphere in a room.
This catalog can only deliver basic information on the nominal operating characteristics. In case you cannot find the characteristics you are looking for or you want to discuss an OLED lighting project with our experts, feel free to contact us any time.

Philips Lumiblade OLED Panel GL46

Matted Finish



Type / Order No.	Color / CCT	Lum. Flux	CRI	Voltage	Rated Current
Philips Lumiblade OLED Panel GL46 9254.000.034	white 3200K	48.0 lm	89	7.1 V	350 mA

Notes: All values are measured at standard temperature and pressure.

Connectors

OLEDs of this product family are shipped with cables, finished with Molex Picoblade connector: 51021-0500.

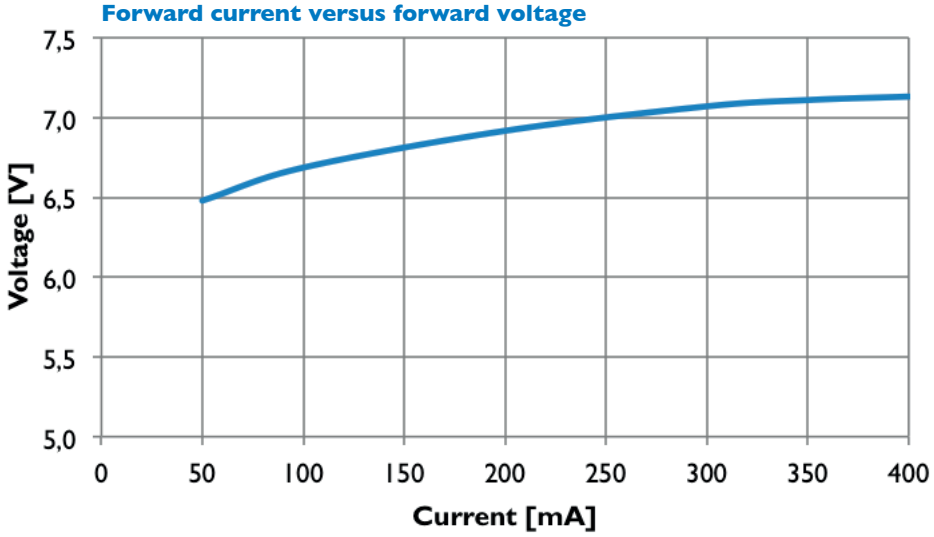
Electrical

Rated voltages

Rated Current	Max Current	Minimum voltage	Nominal voltage	Maximum voltage
350 mA	400 mA	6.9 V	7.1 V	7.3 V

Values apply to new OLEDs. Voltage can increase over lifetime. Philips strongly recommends the usage of SCP 1002, see page 28.

Forward current versus forward voltage

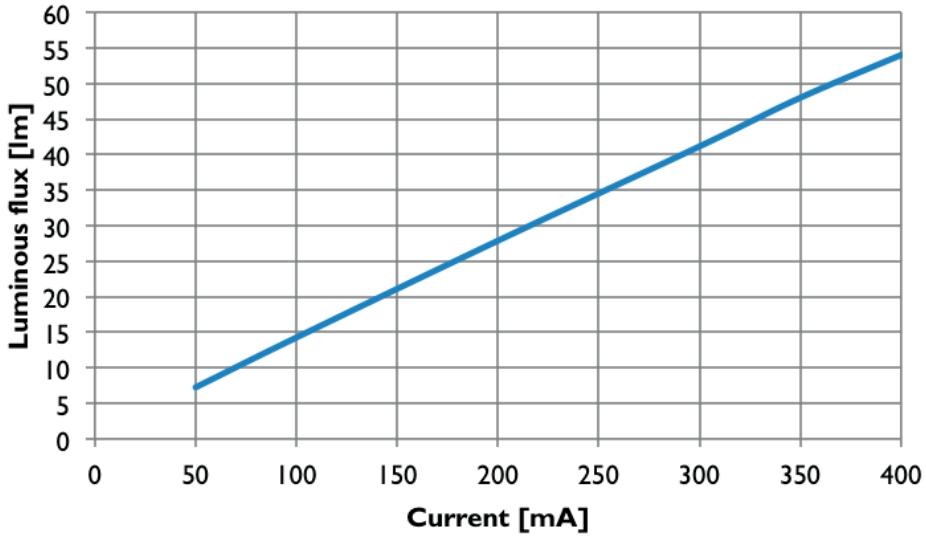


Luminous flux

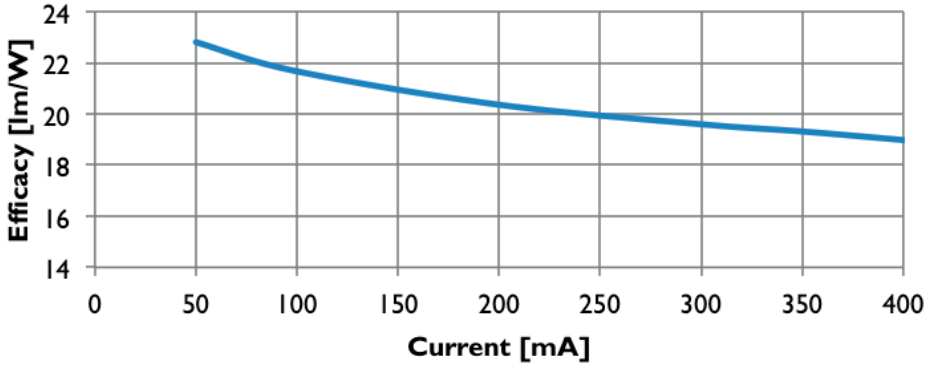
Rated luminous flux

Rated Current	Luminous flux min	Luminous flux nominal	Luminous flux max
350 mA	43.0 lm	48.0 lm	53.0 lm

Luminous flux



Luminous efficacy



Lifetime

Lifetime

Lifetime
10000 h[1]

[1] Until 50% decrease in luminance or defect (L50B50) at rated current.

Homogeneity

Homogeneity

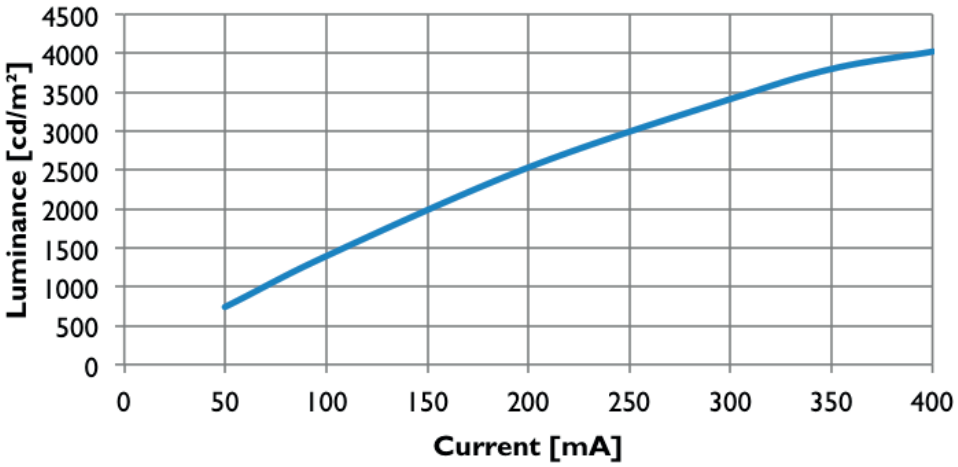
Rated Current	Homogeneity nominal
350 mA	75%

Luminance

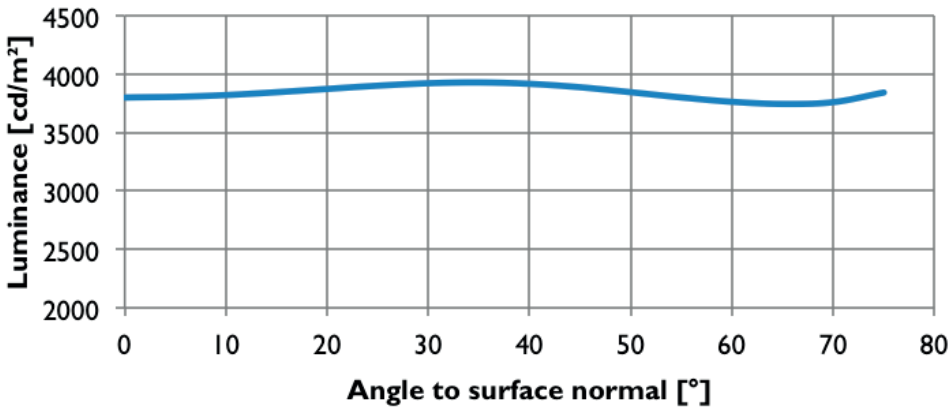
Luminance

Rated Current	Luminance min	Luminance nominal	Luminance max
350 mA	3400 cd/m²	3800 cd/m²	4200 cd/m²

Luminance

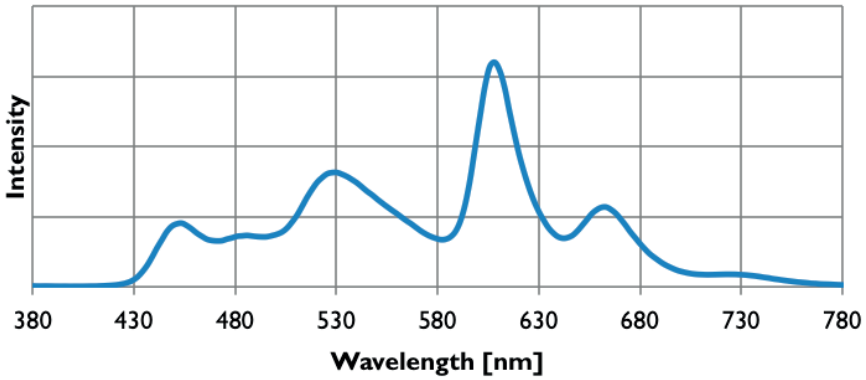


Luminance



Color

Integral spectrum



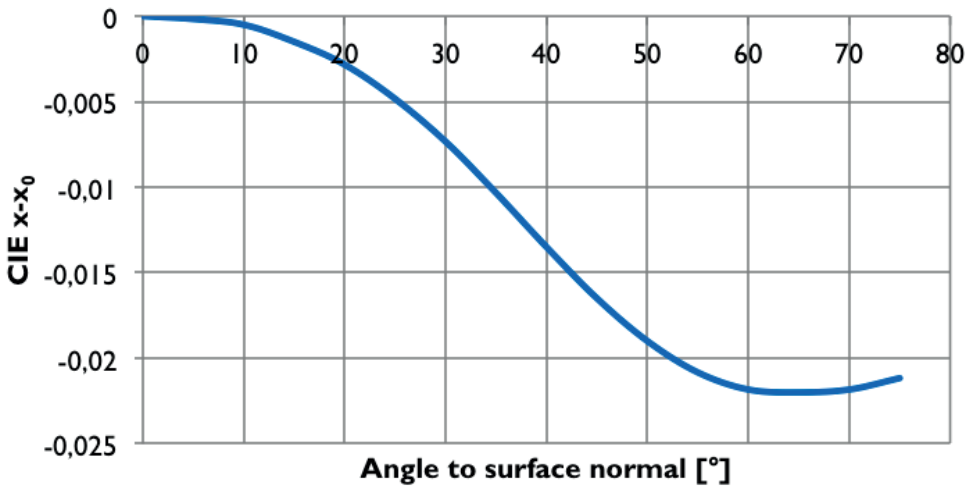
Correlated Color Temperature

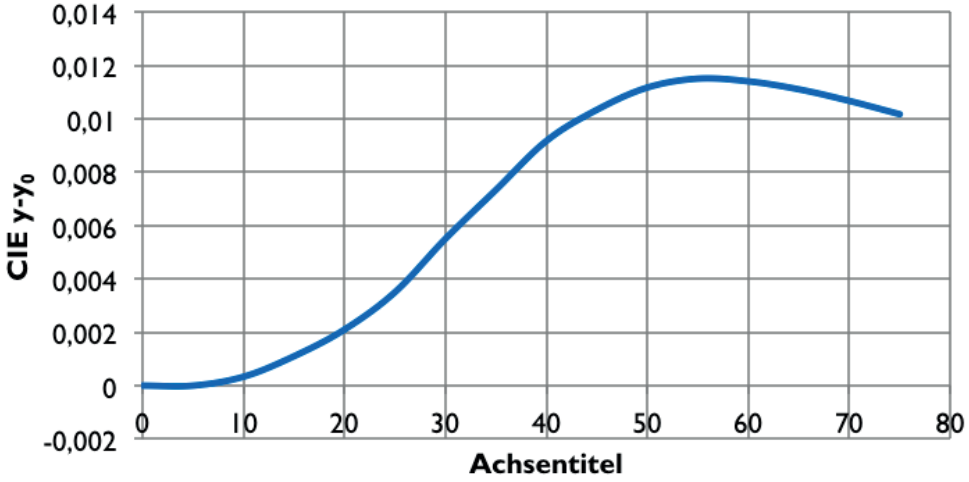
Rated Current	CCT nominal
350 mA	3200 K

Color rendering index

Rated Current	CRI nominal
350 mA	89

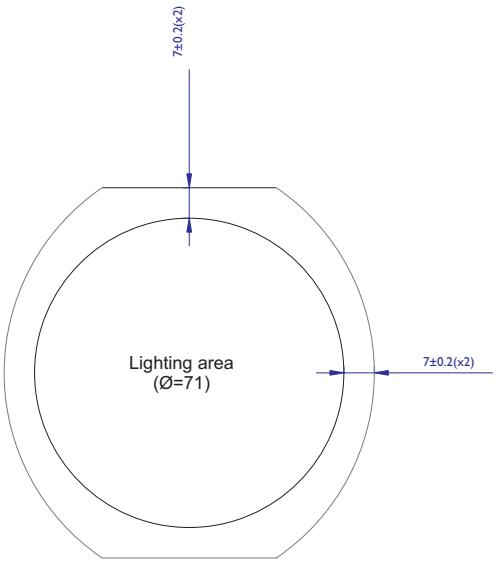
Color



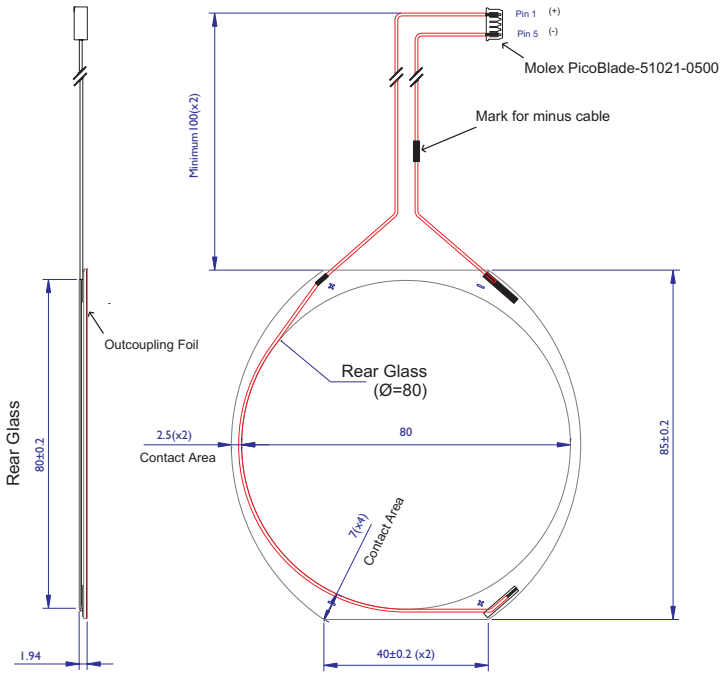


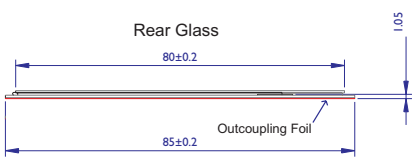
Philips Lumiblade OLED Panel GL46

Emission Side



Back Side





OLED Application Note

Introduction

The purpose of this application note is to give general information on how to drive and handle an organic light emitting diode (OLED). Recommendations are made and a few best practice examples are presented.

OLED

OLED Architecture

A typical example of the architecture of an OLED is depicted in figure 1. It comprises the following layers/components:

- glass substrate
- transparent anode made of indium tin oxide (ITO) being the first electrode
- multiple organic layers, each having a different function
- metallic cathode being the second electrode
- cover glued to the substrate protecting the organic materials, mostly made of glass
- getter to chemically bind oxygen and water penetrating through the glue rim.

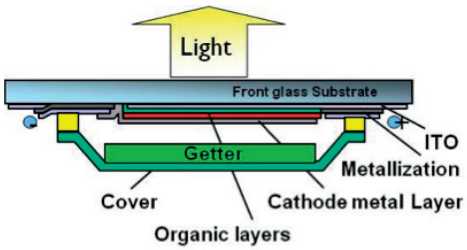


Figure 1: Lumiblade GL350 B1 STAN

In the case a constant voltage is applied to the electrodes of the OLED a current starts to flow through the organics generating light.

Electrical parameters

OLEDs are supplied by direct current (DC). The OLED current depends on the size of the OLED and the light output one wants to achieve. The voltage of an OLED depends on the organic stack, the internal architecture and the aging of the OLED. Details about voltage and current are given in the individual datasheets.

A simple equivalent OLED model is given in figure 2. It comprises the ITO resistance, OLED capacitance and the OLED IV-characteristic, which can be described with a parabolic or exponential equation.

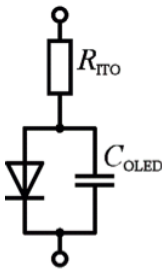


Figure 2: Simplified equivalent circuit of an OLED

The obtained model is well suitable to use for the design of the OLED driver, especially for simulations, e.g. with PSpice, Matlab/ Simulink and Simplorer.

OLED Short Circuit Protection

In the rare event that an OLED fails it goes into a short condition, its voltage decreases. This condition should be avoided! Hence, an electronic circuitry to prevent local heating due to shorts is strongly recommended. Philips offers approved short circuit protection circuitries.

DRIVER ARCHITECTURES

Drivers for LEDs

Drivers developed for inorganic LEDs can be used for OLEDs. An example of a LED driver that can be used to power OLEDs is the Philips Xitanium 25W LED TD/Is.

Figure 3: Xitanium LED driver

However, these drivers do not shut off in the case a short occurs in the OLED. Philips has designed products, so called short circuit protection, to overcome this problem. Examples are the SCP1002 and the Philips Lumiblade SCP GL350. The resulting architecture is depicted in the example below.

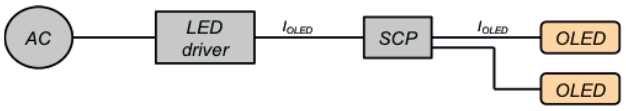


Figure 4: Dual-stage architecture using LED driver and SCP

Low-voltage intermediate bus

A second driver architecture is depicted in figure 5. It uses an intermediate low-voltage bus. Short-circuit protection is implemented in the LV drivers.

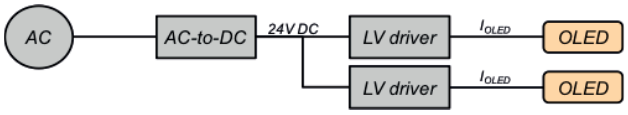


Figure 5: Dual-stage driver architecture with 24V DC bus

The LV driver can be integrated in the module as has been done in the Philips Lumiblade TILE-T product. Integrating the driver in the OLED lamp enables the inclusion of special functions. Examples are protection circuits, e.g. over current, over temperature and short circuit protection, dimming (AM and/or PWM), communication and compensation techniques.

Figure 6: Lumiblade TILE-T

BEST PRACTICES

GL350

An example system based on GL350 that is recommended by Philips. It comprises:

- 3 OLEDs of type Lumiblade GL350 B1 STAN
  Order No.: 9254 000 019
- 1 SCP of type Lumiblade SCP GL350 PCBK
  Order No.: 9254 000 020
- 1 cable of type Fortimo LED DLM cable
  Order No.:9290 004 631
- 1 driver Xitanium LH 0.3-1A 62V TD/TE/I 230V
  Order No.:9290 006 171

All components can be easily clicked together. The light output of this system is 350 lm.

Philips Lumiblade OLED Panel GL26 / GL30 / GL46 / GL55

A second system that has been tested is depicted in figure 7 below.

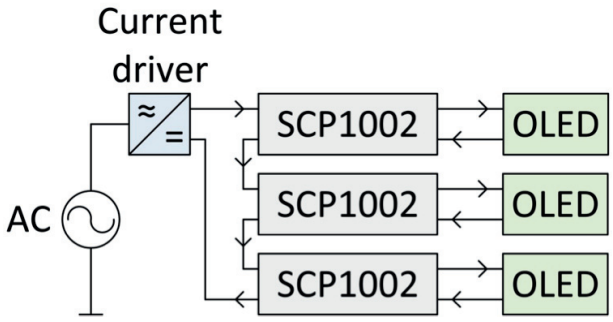


Figure 7: Proposed architecture for Lumiblade OLED Panel GL55 with LED drivers (AC-to-DC)

The system setup comprises the following components:

- 3 OLEDs of type Lumiblade OLED Panel GL26 / GL30 / GL46 / GL55
- 3 SCP of type Lumiblade SC1001 or SCP1002
- 1 driver: Microdriver 9 MDU-9-SC-35/70

The components have to be wired according to the scheme depicted in figure 7.

DOS AND DON'TS

Electrical handling

– OLEDs should be powered by direct current (DC).
– The OLED driver should be current controlled.
– OLEDs can only conduct current in forward direction.
– Dimming can be done by amplitude modulation (AM) or by pulse width modulation (PWM).
– It should be guaranteed that OLEDs are not powered during fault conditions (shorted OLED).
– Preferably OLEDs are connected in series not in parallel.

Mechanical handling

OLEDs are made of 1.8 mm glass, thus please avoid mechanical stress, such as shock, pressure and especially point loads on the OLED. To avoid fingerprints on the glass, preferably pick up the OLED by touching the sides. Gloves or finger cots are recommended to wear during the contact with the OLED at any time. Also the OLED edges are very sensitive. Please handle OLEDs with care and caution at any time.
Please avoid contact with water, because the contact area might be damaged due to corrosion of the conductive metal. So if water has to be used, please pay attention to cover the contact areas with waterproof material. Do not submerge OLEDs in any kind of solvent, acids, bases, salts or other chemicals. Please avoid touching the OLED's front glass and the electrodes with bare fingers, as this will leave moisture and cause corrosion.

Cleaning

Please avoid scratching the front glass with any hard or sharp object. Do not use any other chemical than isopropanol or ethanol for removing stains and finger prints. OLEDs can be cleaned with any soft textile.
For every day cleaning, it is advised to use a compressed air deduster spray to remove regular dust from the individual panels. Cleaning should start on the top left and go from left to right downwards. Should finger prints or more persistent contamination have occurred, a lint-free cloth in combination with Isopropyl alcohol should be used. Apply a little of the liquid to the cloth and gently clean the surface of each OLED in circular movements beginning at the center of the OLED towards the outside. Never use water on the OLEDs as this may damage the electronic back plane of the installation.

Storage and Operating

Please note that the recommended storage temperature is 15°C to 40°C. The recommended relative storage humidity is below 70%. The optimal operating temperature range is between 15°C and 25°C.

Safety

Please be cautious when handling OLEDs. Especially, the edges of the OLED panels are sharp, can chip and break. Since OLED is a low voltage technology, no further danger from electricity is expected.

Disposition

Dispose OLED according to the local legislation.

Safety Statement

Intended use

This OLED panel is a component intended to be incorporated as light source into luminaires for indoor use only. It shall be installed by qualified professionals in accordance with these instructions and general safety requirements for electrical installations.

Safety instructions

In case of damage to the product, the OLED must be disconnected from the supply voltage immediately. It may not be reconnected or used in any other way. For safety reasons it is not permitted to convert or modify the product.

Philips Lumiblade OLED panels may only be used in conjunction with a short circuit protection approved for the OLED panel to be used. Short circuit protections are available from Philips Lumiblade.
The OLED panel is a class III electrical component with accessible live parts. Care must be taken that adequate electrical protection is provided when the OLED is connected to a power supply. This can be achieved by supplying the OLED from an SELV power supply and/or through appropriate electrical insulation.

OLED panels are intended for use in dry, weather-protected locations. OLEDs may not be exposed directly to any liquids.
OLEDs are fragile electrical components and not toys. Keep out of reach of children!
OLEDs contain glass with sharp corners. In case of improper use OLEDs can break and glass splinters may be exposed. Please handle all OLEDs with care to avoid breakage. In case of broken OLEDs or OLEDs with sharps edges/corners, protective gloves shall be worn to avoid injury. Avoid direct contact with broken OLEDs.
OLEDs are sensitive to direct pressure to the glass surface. Avoid applying pressure to the glass surface by handling OLEDs near the edges.

Standards, compliance and sustainability

Philips Lumiblade products are environmentally friendly by avoiding the use of hazardous materials and by providing efficient illumination.

These products are RoHS (EU directive 2002/95/EC) compliant.

Contact:

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