

# New creativity in lighting design

LED modules for illuminated signs

Opto Semiconductors

**OSRAM**

# Illuminated signs with LED modules. Modern. Professional. Creative.

An excellent way to advertise:  
LED modules (BACKlight,  
LINEARlight and LINEARlight  
Flex) from OSRAM are the  
innovative alternative to  
conventional light sources,  
particularly neon tubes.  
They are ideal especially for  
applications in which coloured  
light dominates.

Numerous companies have  
already switched to illumina-  
ted signs with LED modules  
from OSRAM.



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# LED modules – a small light with great benefits

## How does an LED work?

An LED (light emitting diodes) consists of several layers of semiconductor material. If the diode is operated in the forwards direction, light is generated in one of these thin layers, the active layer. In contrast to incandescent lamps, which produce a continuous spectrum, an LED emits light of a particular colour. The colour of the light depends on the material used. Two material systems (InGaAlP and InGaN) are used to produce LED with high brightness in all colours from blue to red and also white (luminescence conversion). The efficiency of LED has increased considerably and now, depending on the colour, is significantly greater than 20 lm/W. This high level of efficiency is achieved by high-quality manufacture and advanced technology.

## Features and advantages of LED

Innovative LED and LED modules are being used more and more in signs, for example in advertising. Compared to conventional neon technology, they have some remarkable advantages:

### Small size

The compact size of the LED modules enables them to be installed even in narrow letters and still provide excellent illumination.

### New design options

The operating voltages of the LED modules (10 V DC and 24 V DC) come under low-voltage guidelines. This means that there is no need to maintain minimum distance between the modules and metallic parts, so there is much greater freedom for design of lettering.

### Flexible installation

The flexible geometry of the modules means that standard products can be used instead of custom-made neon tubes and savings can be made on procurement costs and/or production costs.

### High breaking strength

LED are constructed without filaments, electrodes or glass tubes so packaging costs are reduced and breakages during transport and installation are prevented.

### Long service life

The long service life of between 20,000 and 50,000 hours (at optimum operating temperatures) leads to considerable savings compared with conventional technology in terms of maintenance and replacement costs.

### Energy savings

Energy costs in normal operation are reduced because internal efficiency is high and coloured light is generated directly.

### No problems in low temperatures

The LED modules are designed to start reliably and emit their normal luminous flux at temperatures as low as minus 30 °C.

### Brilliant colour saturation

Monochrome radiation achieves a much higher colour saturation than conventional light sources and guarantees brilliant colours.

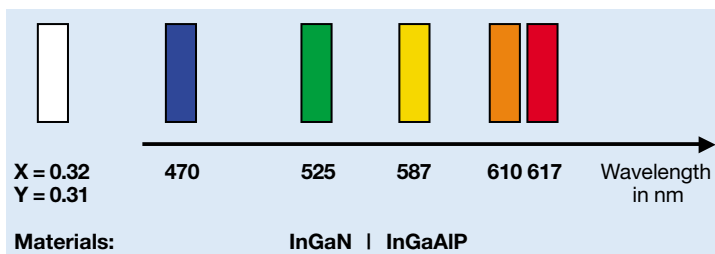
### Broad colour spectrum

The large number of available colours, such as red, orange, yellow, green, blue and white, can be mixed to produce many other shades.

### Cost/benefit comparison between LED and neon tubes

When it comes to economy, innovative LED modules are far superior to conventional neon tubes. The cost/benefit analysis below (performance and cost comparison) speaks for itself.

Colour spectrum of LED

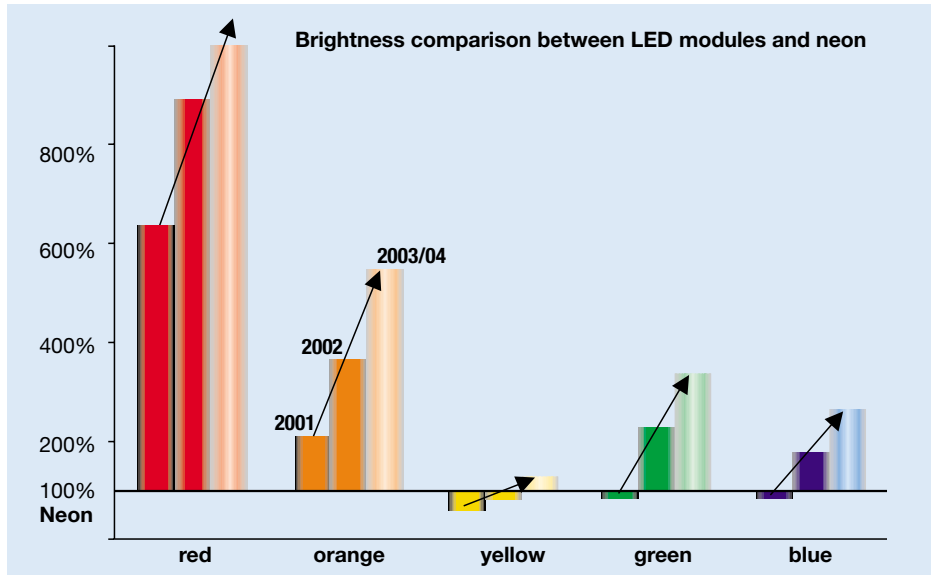


### Conclusions

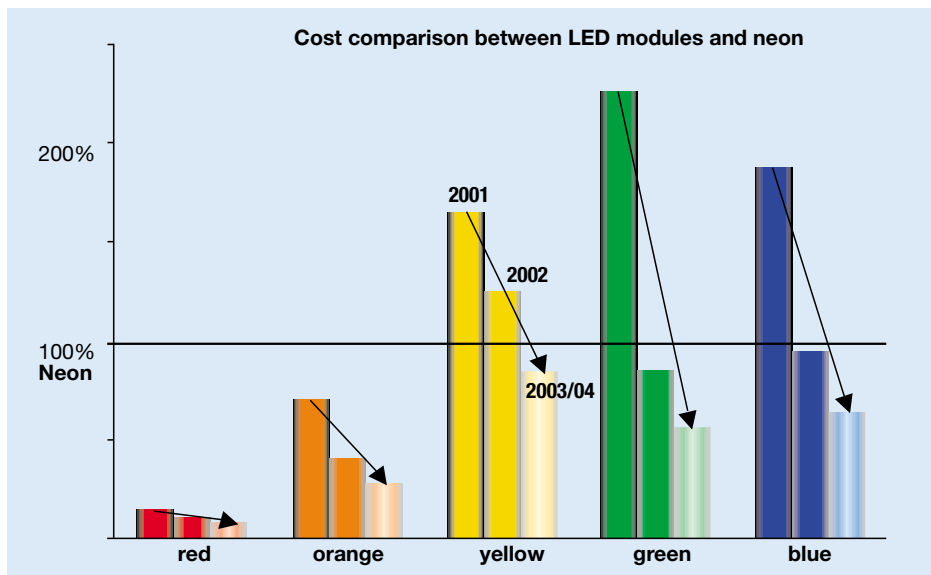
- Red and orange OSRAM LED modules are far superior to conventional neon tubes for backlighting acrylic in terms of brightness, price and service life.
- Blue and green LED modules are already better than neon tubes in terms of their brightness and are similar in price. Since their luminous efficacy has almost doubled every two years for the past few years, the “balance of power” will shift in favour of LED modules for these colours too. This trend can also be seen with yellow modules.

#### Basis for comparison:

- Two identical illuminated signs (letter height 600 mm) – one fitted with neon tubes, the other with LED modules
- The brightness (luminance in cd/m<sup>2</sup>) is measured on the surface of the acrylic behind which the light sources are located
- The equipment under review comprises three generations of LED modules for the years 2001, 2002 and 2003/04 (this latter with estimated values, given that the luminous efficacy of LED doubles more or less every two years)
- The price basis for neon tubes is their current market prices
- The price basis for LED modules is the average selling price of OSRAM GmbH
- The amortisation period for the equipment has been set at 10 years
- The light sources are operated according to their published operating data



*The brightness values of neon tubes are used as the basis for comparison (100%). LED modules produce higher brightness values for the colours green, blue and orange than conventional neon tubes; for red the value is more than five times as high. For yellow, the brightness value is almost the same as that of neon tubes.*



*The initial costs of neon tubes are used as the basis for comparison (100%) – with reference to the same brightness. Even today, initial costs are considerably reduced with red and orange LED modules. From 2002 onwards, LED modules will be more cost-effective than neon for the colours green and blue, a trend that will continue with yellow over the next few years.*

# OSRAM LED systems for illuminated signs

## Full range of components. Full range of expertise.

OSRAM LED systems for illuminated signs are a perfectly matched combination of products and services:

- LED modules
- OPTOTRONIC® electronic power supply units
- Dimmer module (available from mid 2002)
- OSRAM consultation expertise

As a global player in the semiconductor market, OSRAM Opto Semiconductors has 30 years of experience in optoelectronics and core competence in all aspects of the manufacture of LED modules – from individual LED components to complete modules, including electrical, thermal and optical design. As a system supplier, we can also offer you the right control gear for the modules. What's more, you have direct access at all times to the experience and know-how we have built up in numerous successful applications.

## LED modules

- The professional design of the LED in terms of heat removal and packing density produces optimum brightness and service life.
- For backlighting dispersing material such as coloured acrylic, the distribution of light is homogeneous at mounting depths of just 25 mm.
- The LED modules must be protected from external influences by the manufacturer of the illuminated advertising.
- The board can be shortened at defined points along its length for greater flexibility at the installation stage. The rest of the board remains fully functional.

## BACKlight

BACKlight is a module chain comprising eight individual boards each with four LED. The module can be separated after any number of boards and can be individually shaped thanks to the cable connections. Mounting holes in the board enable it to be installed easily with screws or snap-lock connectors.

The modules can be wired in parallel; series connection is also possible. They are covered with a protective coating and are drip-proof to IP22. Available in red, orange, yellow, green, blue and white.



## LINEARlight

LINEARlight has a linear structure, an overall length of 448 mm and a width of only 10 mm. The module can be shortened to a unit of just 56 mm (corresponding to four LED) without any loss of function for the rest of the board. The modules can be wired in parallel; series connection is also possible. They are available in red, yellow, green, blue and white. LINEARlight must be protected against moisture and external influences.

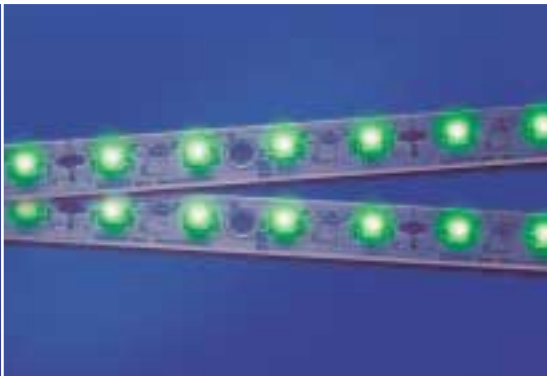
*Can be individually shaped:  
BACKlight*



## LINEARlight FLEX

LINEARlight Flex is a module with a flexible printed circuit board so three-dimensional arrangements are possible. It is available with light emitted at the top (Power TOPLED) or at the side (SIDELED) in red, yellow, green, blue and white. The LED module can also be shortened at defined points along its length. The back of LINEARlight Flex has an adhesive strip so that it can easily be attached to various materials. It must be protected against moisture and external influences.

*A versatile line-up:  
LINEARlight*



## OPTOTRONIC® electronic power supply units

- Output voltages 10 V and 24 V DC
- Available wattages: 6, 12 and 20 W
- These short-circuit-proof and overload-proof units have been designed to meet relevant technical and safety standards.

## OPTOTRONIC® OT 12/230-240/10 and OT 20/230-240/24

Designed as separate units. Can be connected via internal screw terminal with strain relief.



**OPTOTRONIC® OT 12/230-240/10 and OT 20/230-240/24**

## OPTOTRONIC® OT 06/100-240/10 COS and OT 06/100-240/24 COS:

For installation in flush-type boxes. Can be connected via open cable ends. The unit offers protection against dust and jets of water according to IP66.

## OSRAM consultation expertise

Our sales engineers with their consultation skills and their technical know-how are on hand to help you with your projects.

## Note

As soon as more powerful generations of LED are available they will be used for our LED modules to improve their photometric parameters even further. For the latest data sheets and further information on the modules go to [www.osram-os.com](http://www.osram-os.com) (Products, LED Modules).

For an overview of all the available LED modules for these and other applications see the brochure entitled "LED for general lighting".

**LED**  
**SYSTEMS**  
**FOR**  
**LIGHTING**



**OPTOTRONIC® OT 06/100-240/10 COS and OT 06/100-240/24 COS**

*New roll for innovative light:  
LINEARlight Flex*



## Technical data

<b>BACKlight</b>						
Available types Colour	<b>OS-LM03A-A</b> red	<b>OS-LM03A-O</b> orange	<b>OS-LM03A-Y</b> yellow	<b>OS-LM03A-T</b> green	<b>OS-LM03A-B</b> blue	<b>OS-LM03A-W1</b> white
No. of LED per module	32	32	32	32	32	32
Wavelength $\lambda$	617 nm	610 nm	587 nm	525 nm	470 nm	X = 0,32 Y = 0,31
Electrical data $V_B; I_B; P_V$	10 V <sub>DC</sub> 0,4 A; 4 W	10 V <sub>DC</sub> 0,32 A; 3,2 W	10 V <sub>DC</sub> 0,32 A; 3,2 W	10 V <sub>DC</sub> 0,4 A; 4 W	10 V <sub>DC</sub> 0,4 A; 4 W	10 V <sub>DC</sub> 0,32 A; 3,2 W
Other data valid for all types	Photometric data: latest values as per data sheet, go to <a href="http://www.osram-os.com">www.osram-os.com</a> (Products, LED Modules) Module: 8 boards connected by cables; dimensions of single board: approx. 30 x 30 mm; Dimensions: total module: 240-540 x 30 x 4 mm; cable wire: 50 mm Beam angle (FWHM): 120°; operating temperature: -30 to +65 °C					

<b>LINEARlight</b>					
Available types Colour	<b>OS-LM01A-A</b> red	<b>OS-LM01A-Y</b> yellow	<b>OS-LM01A-T</b> green	<b>OS-LM01A-B</b> blue	<b>OS-LM01A-W1</b> white
No. of LED per module	32	32	32	32	32
Wavelength $\lambda$	617 nm	587 nm	525 nm	470 nm	X = 0,32 Y = 0,31
Electrical data $V_B; I_B; P_V$	10 V <sub>DC</sub> 0,4 A; 4 W	10 V <sub>DC</sub> 0,32 A; 3,2 W	10 V <sub>DC</sub> 0,4 A; 4 W	10 V <sub>DC</sub> 0,4 A; 4 W	10 V <sub>DC</sub> 0,32 A; 3,2 W
Other data valid for all types	Photometric data: latest values as per data sheet, go to <a href="http://www.osram-os.com">www.osram-os.com</a> (Products, LED Modules) Dimensions: total module 448 x 10 mm; smallest unit with 4 LED approx. 56 x 10 mm Beam angle (FWHM): 120°; operating temperature: -30 to +65 °C				

<b>LINEARlight Flex</b>										
Available types	<b>OS-LM10A</b>					<b>OS-LM11A</b>				
Colour	<b>-A</b> red	<b>-Y</b> yellow	<b>-T</b> green	<b>-B</b> blue	<b>-W1</b> white	<b>-A</b> red	<b>-Y</b> yellow	<b>-T</b> green	<b>-B</b> blue	<b>-W</b> white
LED type	Power TOPLED	Power TOPLED	Power TOPLED	Power TOPLED	Power TOPLED	SIDELED	SIDELED	SIDELED	SIDELED	SIDELED
No. of LED per module	600	600	600	600	600	300	300	300	300	300
Wavelength $\lambda$	617 nm	587 nm	525 nm	470 nm	X = 0,32 Y = 0,31	615 nm	587 nm	525 nm	470 nm	X = 0,32 Y = 0,31
Electrical data	24 V <sub>DC</sub>	24 V <sub>DC</sub>	24 V <sub>DC</sub>	24 V <sub>DC</sub>	24 V <sub>DC</sub>	10 V <sub>DC</sub>	10 V <sub>DC</sub>	10 V <sub>DC</sub>	10 V <sub>DC</sub>	10 V <sub>DC</sub>
Smallest unit $V_B; I_B; P_V$	0,05 A; 1,2 W	0,04 A; 0,96 W	0,05 A; 1,2 W	0,05 A; 1,2 W	0,04 A; 0,96 W	0,02 A; 0,2 W	0,02 A; 0,2 W	0,04 A; 0,4 W	0,04 A; 0,4 W	0,04 A; 0,4 W
Total module	3 A; 72 W	2,4 A; 57,6 W	3 A; 72 W	3 A; 72 W	2,4 A; 57,6 W	1,5 A; 15 W	1,5 A; 15 W	3 A; 30 W	3 A; 30 W	3 A; 30 W
Other data valid for all types	Photometric data: latest values as per data sheet, go to <a href="http://www.osram-os.com">www.osram-os.com</a> (Products, LED Modules) <b>OS-LM10A-x</b> Dimensions: total module (LxW) 8400 x 10 mm; dimensions of smallest unit with 10 LED (LxW) approx. 140 x 10 mm; can be separated into smallest unit (60 per module) with no loss of function for the rest of the board; beam angle (FWHM): 120°; operating temperature: -30 to +65 °C <b>OS-LM11A-x</b> Dimensions: total module (LxW) 4200 x 10 mm; dimensions of smallest unit with 4 LED (LxW) approx. 56 x 10 mm; can be separated into smallest unit (75 per module) with no loss of function for the rest of the board; beam angle (FWHM): 120°; operating temperature: -30 to +65 °C									

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