

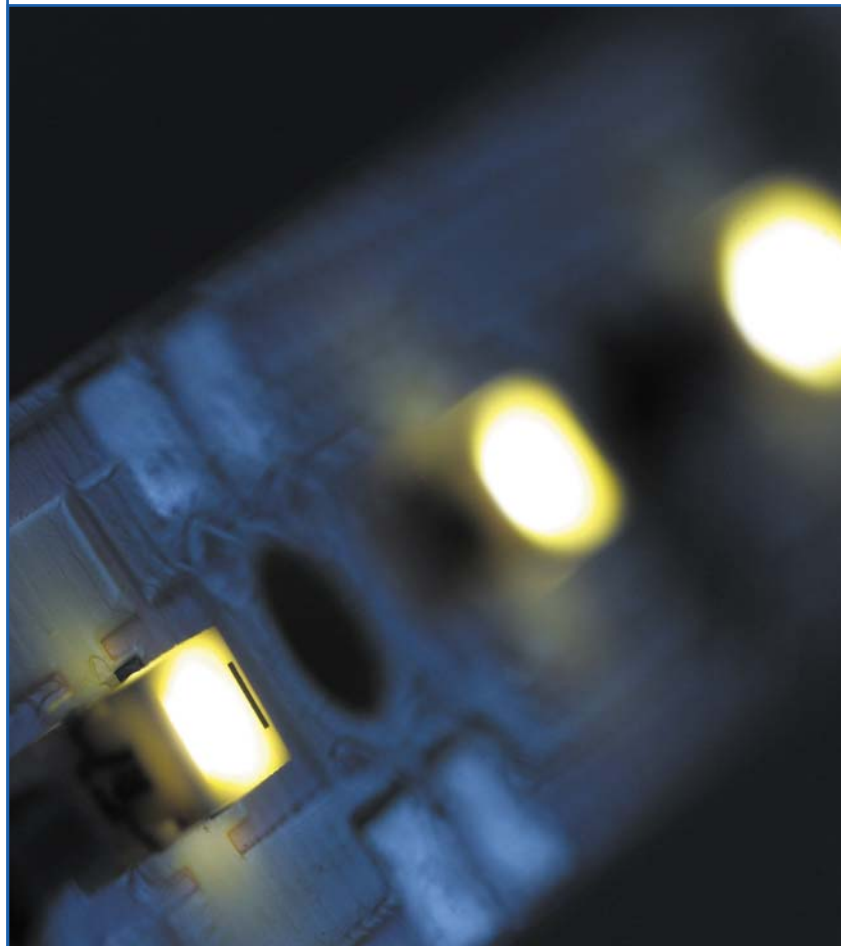
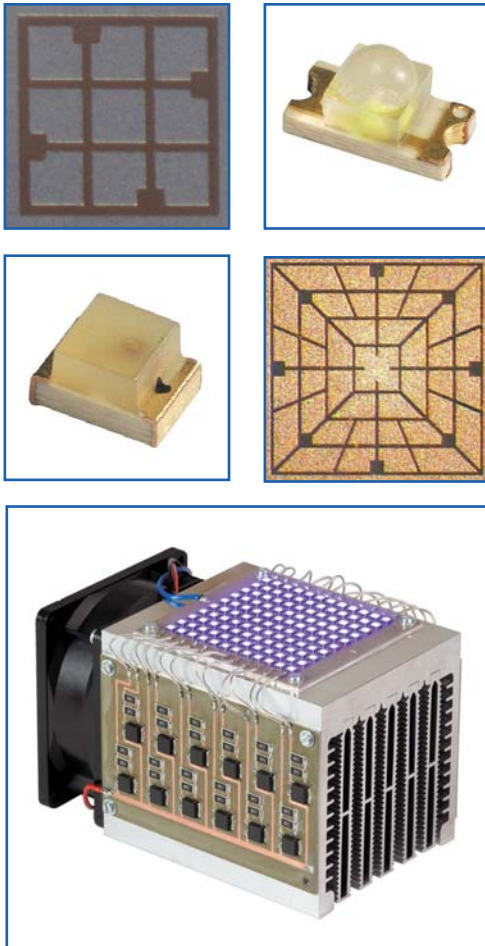
osa opto light

Bright ideas - custom designed

LED-Chips

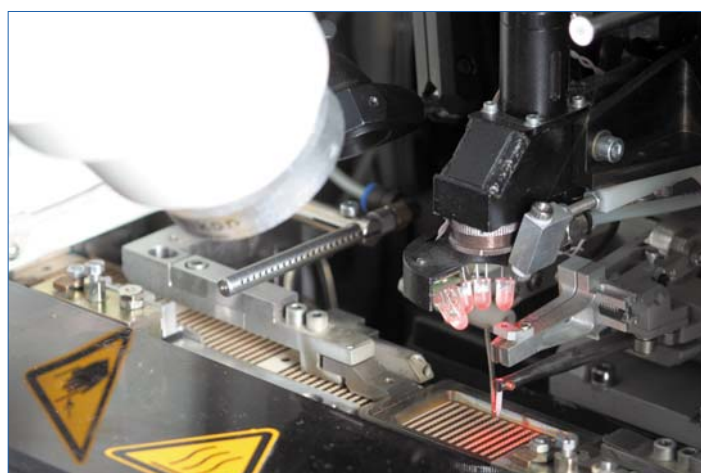
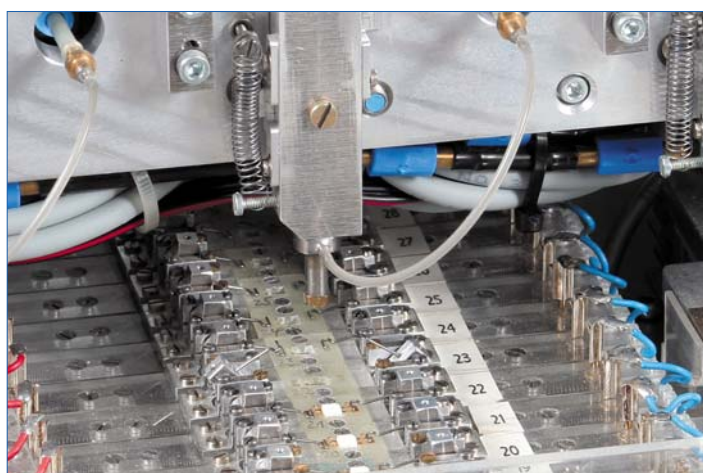
SMD-LEDs

LED-Modules



Made in Germany

Bright ideas - custom designed



OSA Opto Light GmbH markets its products worldwide under the trademark "OSA" through numerous representatives at home and abroad.

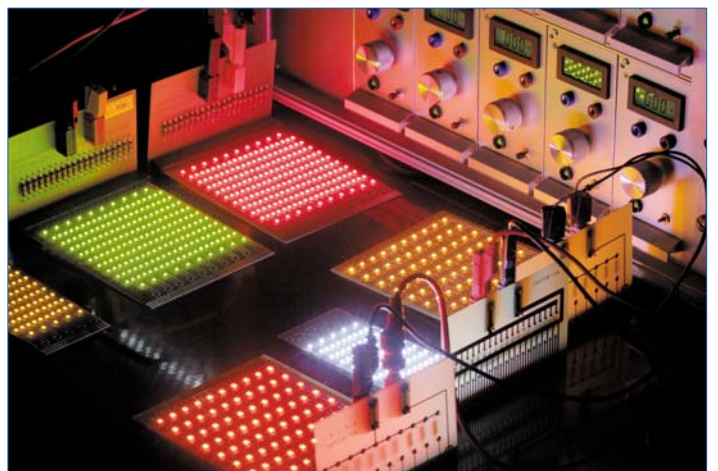
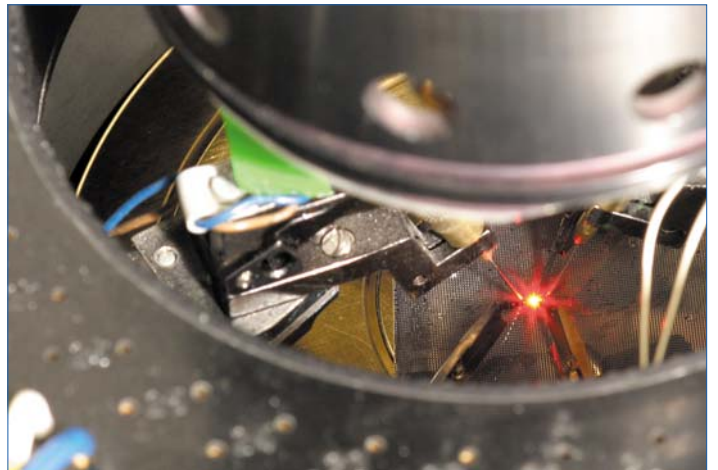
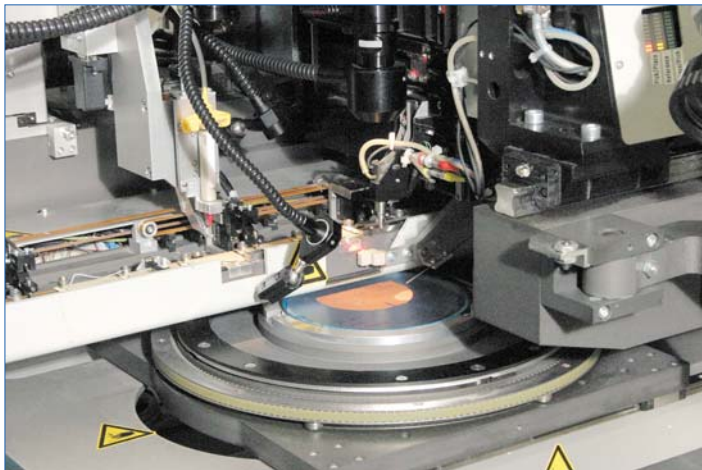
OSA was founded in Berlin, Germany during 1991 and most of the OSA employees have more than 25 years experience in the field of solid state lighting.

Our highly motivated team of

chemists, physicists and engineers develop and manufacture special LED - chips, surface mounted LEDs (SMD - LEDs) including white and high power SMD-LEDs as well as custom designed LED - modules for medical, automotive, industrial electronics, back lighting and general lighting applications. We are a medium size company,

innovative and flexible.

Our factory is located in Berlin and utilizes more than 1500 sqm (including 300 sqm clean room). We have state-of-the-art production facilities, technologies and processes which include product development, testing, a flexible automated production of chips, SMD packaging of various package sizes including high power



packages, 100% testing, LED-module assembly, development and construction of production equipment and tooling. Our quality management system is certified to ISO 9001 and operates also according to ISO TS 16949. Responsibility for quality at all levels is an essential element of our company's strategy, i.e. to develop, produce and supply

products that achieve a quality standard which guarantees customer satisfaction. We realize this goal by close teamwork among all employees according to the principle of "a continuous improvement in quality and productivity".

OSA Opto Light GmbH is committed to providing cost effective quality solutions and to remain your innovative technology partner.

**Optoelectronics-
Made in Germany**

LED - Chips

OSA Opto Light GmbH is your partner for development and production of standard and custom - designed LED - chips such as:

- High power chips
- High speed chips
- Monolithic displays
- Special chip designs

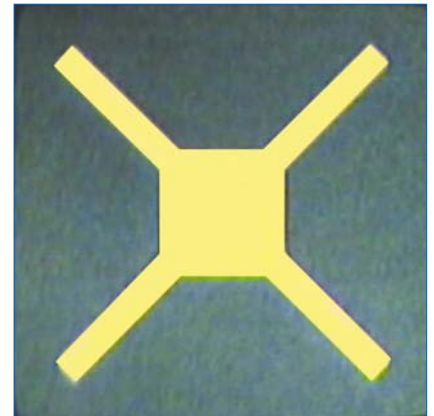
Based on the material systems **(Ga,Al)As**, **Ga(As,P)** and **(Al,In,Ga)P** we offer a wide product spectrum of LED - chips in the visible **(550 - 650 nm)** and near IRED-**(660 - 970 nm)** range. With these chip technologies we can cover the demand for lower intensity ranges as well as for high efficient chips.

One of our key competences is the substrateless **(Ga,Al)As** - technology, which allows us to offer our customers LED - chips in the wavelength range of $\lambda_p = 635 - 970 \text{ nm}$ with a high external quantum efficiency and an excellent long time stability. The emission wavelength can be chosen in **5 to 10 nm steps** and narrow wavelength selections **(down to tolerances of $\pm 3 \text{ nm}$)** can be offered.

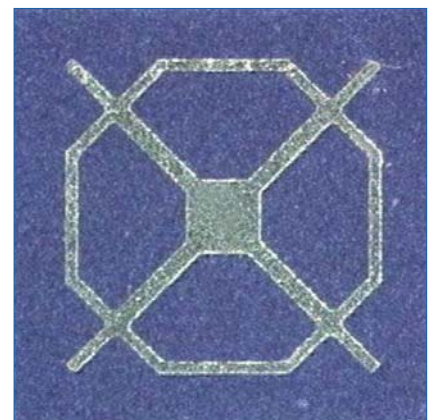
When the customer takes adequate care of the thermal control within the application OSA Opto Light GmbH can cover the complete range of the wavelength with our products. Our **(Ga,Al)As** technology provides chips without secondary peak. Some of the designs are developed for short **switching times till 5 ns**.

A 100 % high speed test of the emitted spectrum is realized to fit our customers demand. The test includes **peak, dominant and centroid wavelength, half width (FWHM), check for secondary peaks, and radiant intensity / luminous intensity**. The standard chip sizes for currents up to 50 mA DC are between $210 \mu\text{m}$ and $310 \mu\text{m}$ square.

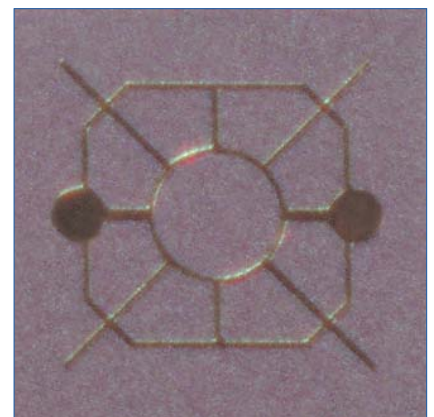
For high power applications OSA Opto Light GmbH developed chips with large area p/n-junctions. The chip layout has been designed for different direct currents in the range between **100 mA and 1 A**. The table lists the standard chip sizes. The maximum applicable



Standard Chip $360 \mu\text{m}$



RED (Ga, Al) As, Chip $700 \mu\text{m}$



(Al, In, Ga) P, Chip $700 \mu\text{m}$

current depends on the thermal resistance of surrounding, on material and operating conditions.

All these layouts are available in the material systems (Ga,Al)As substrateless and (Al,Ga,In)P / GaAs. Customer specific chip layouts can be designed within a short time frame for small

and large production volumes. There is also the possibility to **adjust the values for brightness, forward voltage as well as the tolerance for a wavelength selection** according to customer specification. Custom designed chip metallisations including **solderable systems** are possible for the

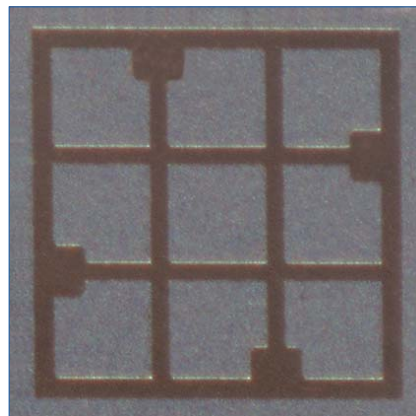
front and reverse side of the chip. Most of our chips can be provided as bare dices, packaged in our SMD - packages (see next pages) or in **3 mm and 5 mm** standard LED-lamp packages with viewing angles between **10° and 100°**.

Table of chip size and areas

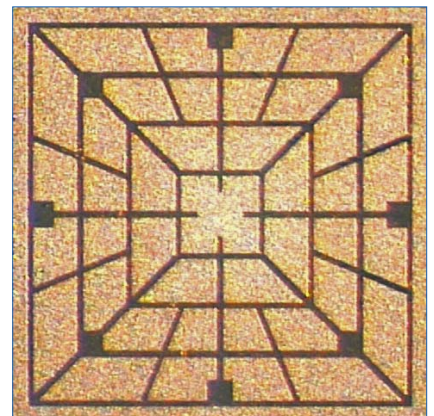
Chip size [μm]	p/n Area [mm ²]	Pad
235	0.05	1 square or circle
265	0.07	1 square or circle
325	0.09	1 square or circle
360	0.12	1 square or circle
415	0.16	1 square
465	0.20	1 square
700	0.47	2 circle 80 μm
960	0.89	4 square 105 μm
1960	3.78	8 square 120 μm



IRED Lamp 3 and 5 mm



RED Chip 960 μm



RED Chip 1960 μm

Monolithic integrated displays

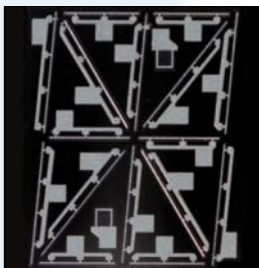
Conventional monolithic displays with the advantages

- High integration density of elements on reduced space
- Smallest distances between the elements down to $20\ \mu\text{m}$

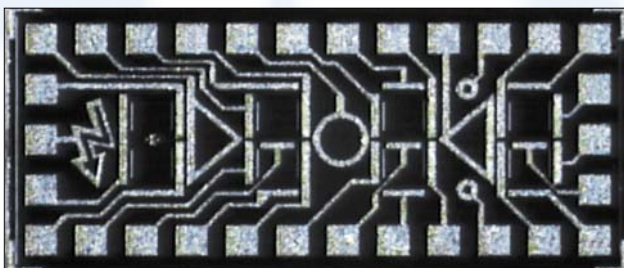


$40\ \mu\text{m}$ in square lighting dot with
 $20\ \mu\text{m}$ distance to the next element

High integration density of the elements on smallest areas e.g. printing line 128 elements at 8 mm length



Presentation of numbers and letters on where the space is limited e.g. alpha numeric display with 16 segments and 2 digit points



Arrangement of different symbols in various shapes were complex displays are needed on reduced areas



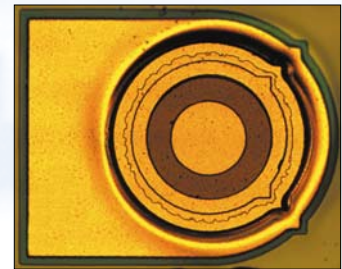
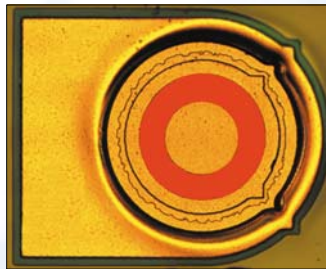
Manufacturing of various numeric displays for application in different optical devices, medical equipment or measurement systems

Miniature integrated displays

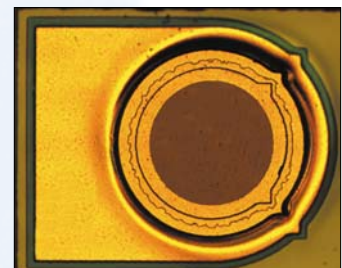
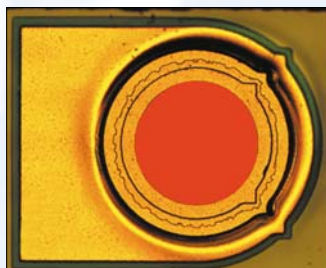
Presentation of different symbols in various colours with the advantages

- 100 times higher luminous intensity in comparison to conventional monolithic displays
- Colours from green (572 nm) up to red (645 nm) are applicable

circular ring 625 nm
switched on / off



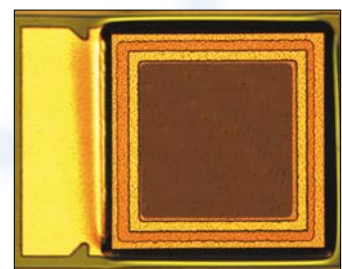
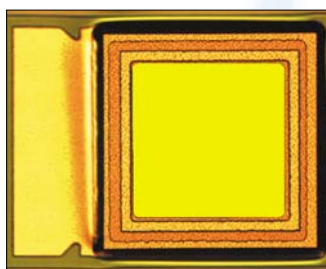
circular 625 nm
switched on / off



triangle 615 nm
switched on / off



square 572 nm
switched on / off



SMD-LEDs

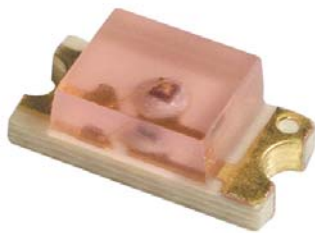
OSA Opto Light GmbH has designed several PCB - based SMD-LED packages for various sizes, radiant characteristics and chip types. Almost all of our standard chips can be mounted in our SMD-packages.

All devices can be characterized at 20 mA, 2 mA (low current) and under custom specific conditions. Most of them can be packaged tape up and tape down.

The thermal resistance of the device itself is **about 150 K/W**

(Kelvin/Watt), depending on chip technology a power dissipation up to **100 mW** can be realized.

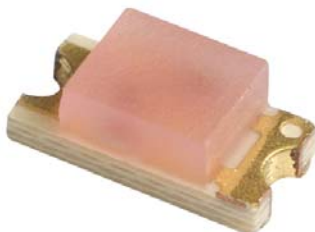
OLS-150
Size 1206



OLS-170
Size 0805



OLS-152
Size 1206
bipolar



OLS-172
Size 0805
bipolar



OLS-13x
Size 1206
duplex and
triplex



OLS-180
Size 0805
low profile



OLS-330
Size 1206
with lens, 40°



OLS-210
Size 1208
Side-view



Thinfilm-LEDs

High efficient thin film dices are the basis for new devices with **doubled external quantum efficiency** and thus brightness. They are based on OSA packages OLS-330, an 1206 SMD with lens, and OCL-400, a white ceramic package. Based on the improved thermal resistance of **60 K/W** (OLS-330 150 K/W), the OCL-400 line can be used at increased

currents (30 mA for green and blue, 50 mA for yellow and red). The degradation analysis showed an excellent long time stability of the devices. All types are ROHS compliant and lead free solderable.

Other packages like 0805, 1206 and bicolour solutions (OLS-130, OLS-153) are also possible.



OCL-330

Colour	Type	Light intensity [mcd] (20 mA)
■ red	OLS-330 MSD	1400
■ yellow	OLS-330 MY	1400
■ green	OLS-330 EG525	1600
■ blue	OLS-330 EB460	400



OCL-400

Colour	Type	Light intensity [mcd] (20 mA)
■ red	OCL-400 MSD	400
■ yellow	OCL-400 MY	400
■ green	OCL-400 EG525	450
■ blue	OCL-400 EB460	120
■ white	OCL-400 EW	500
■ warmwhite	OCL-400 EWW	500

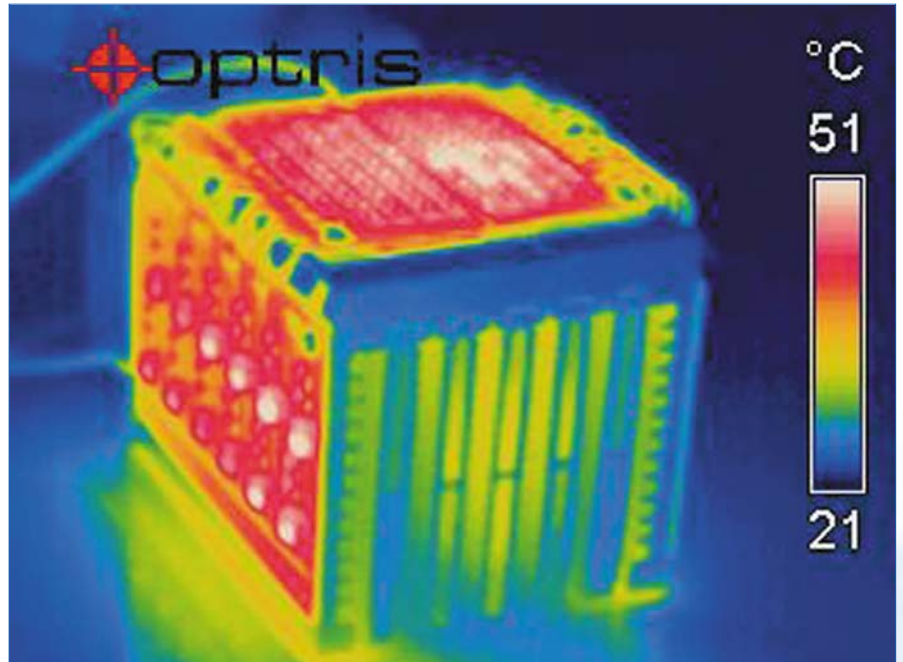
UV-LEDs

The extension of the LED wavelength towards the near UV region requires both new chip and packaging technologies. Driven by the market requirements OSA Opto Light GmbH developed two new LED packages to meet the high reliability expectations for UV-LEDs like **lifetime up to several 10.000 hours**.

The package family **OCU-400** meets the requirements of low and medium power applications.

OCU-400 UV-LEDs are available in the wavelengths range of 350 nm ... 430 nm.

The package family **OCU-440** was developed for high power applications in the range up to **1.5 W electrical power** dissipation. At present the available wavelengths are between 350 and 430 nm.



Thermal picture of a UV high power module



OCU-400 package

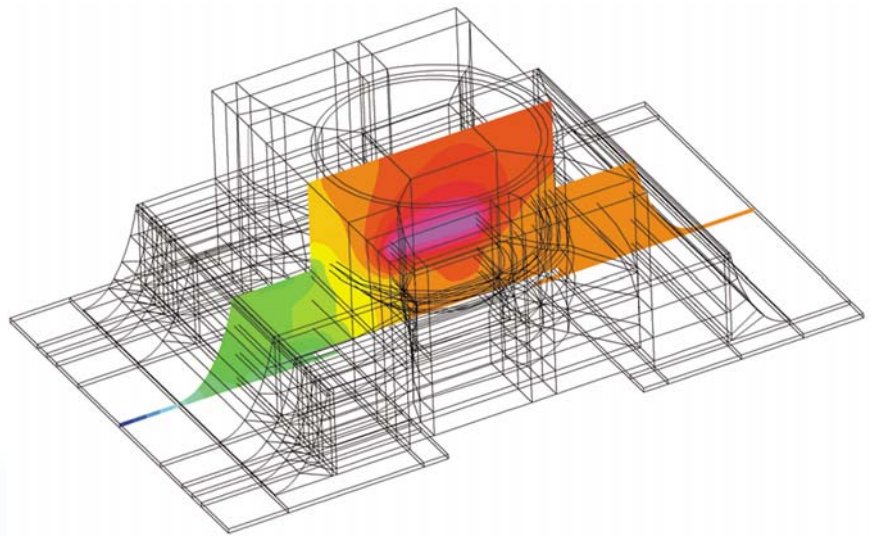


OCU-440 package

High Power LEDs

High power packages are the necessary bridge between high current chips and the customer application. Their main task is to conduct the heat from the chip to the surrounding area in order to provide a superior reliability in the customer's application.

All our following high power packages are lead-free reflow solderable and will be provided in tape and reel for automatic assembly.



- High power ceramic based OCL-44x
- High temperature solution
- Power dissipation up to 1.5 W
- Thermal resistance below 10 K/W



- PCB based OHL-6xx
- Excellent thermal chip-surrounding connection
- Power dissipation up to 1 W
- Thermal resistance below 15 K/W
- With and without lens



- Medium power ceramic based OCL-40x
- For high temperature applications
- Colour conversion
- Power dissipation up to 300 mW
- Thermal resistance about 60 K/W

LED-Modules

OSA Opto Light GmbH utilizes its high experience in solid state lighting technology also in the custom design of LED-modules.

OSA develops and delivers such LED-modules from prototypes to volume production quantities.

Our capabilities for in-house selection of LEDs according to narrow tolerances in brightness, colour and forward voltage can also be applied in LED-modules for OEM customers.

A fine tuned technology for white LEDs with colour temperatures in the range between 9000 Kelvin and 2500 Kelvin provides uniform, shipment to shipment equal white LED solutions e.g. for furniture lighting, interior and exterior lighting.

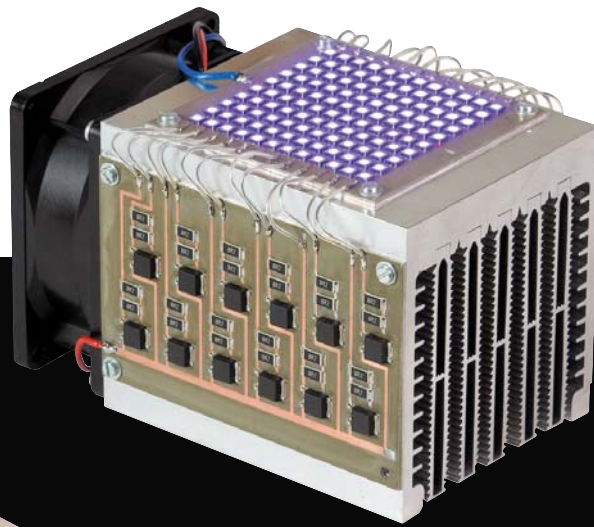
High power LED-modules utilizing OSA's high power SMD-LEDs are an excellent addition to the spectrum of light sources for general illumination. Both our white and our

coloured as well as IRED and UVLED modules have been designed for these purposes. OSA Opto Light GmbH has developed the high power LED-modules for the first European street lamp. Besides the excellent reliability, the warmwhite color temperature

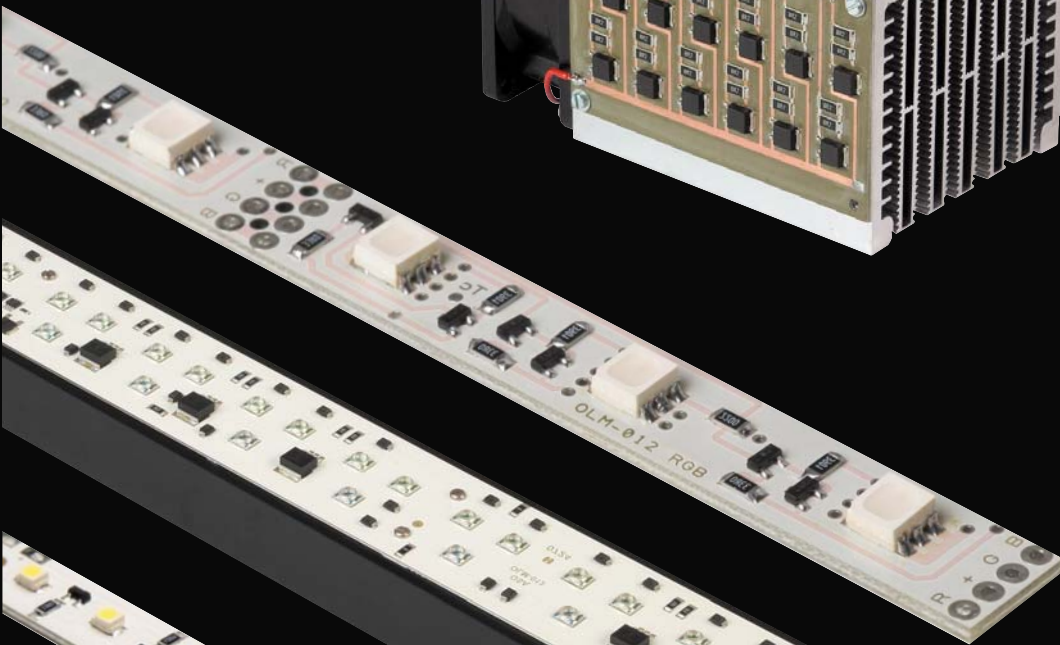
of about 3000 Kelvin provides a soft, warm and convenient light.

Our module technology includes also thermal management solutions like metal core PCB and temperature protection of the LEDs by a special circuit on the PCB.





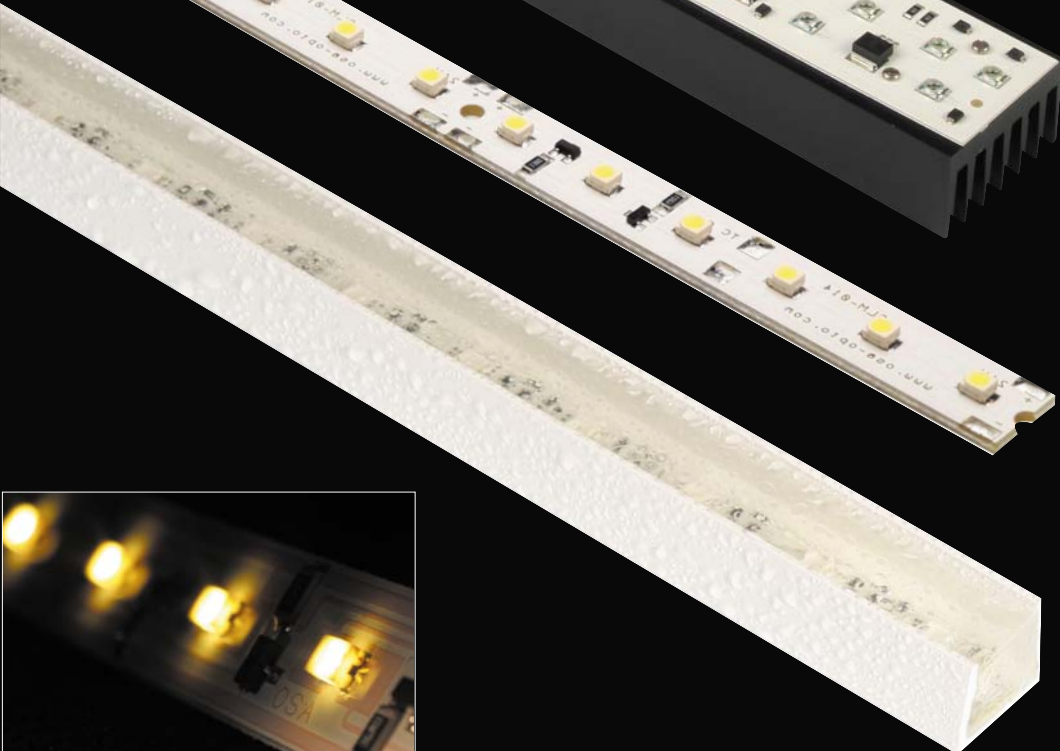
UV High Power Module
405 nm
optical power 15 W
electric power 120 W



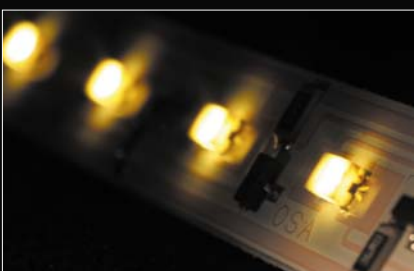
PLCC6 RGB Module
24 Volt DC
OLM-016



RGB High Power Module
24 Volt DC
OLM-013



PLCC2 Warm and
Coldwhite Module
24 Volt DC
OLM-014



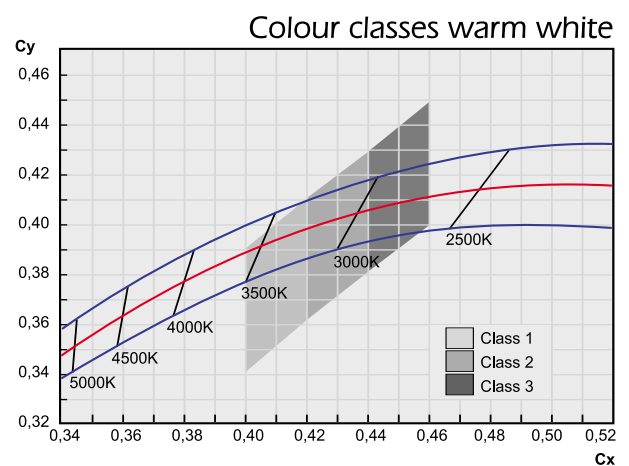
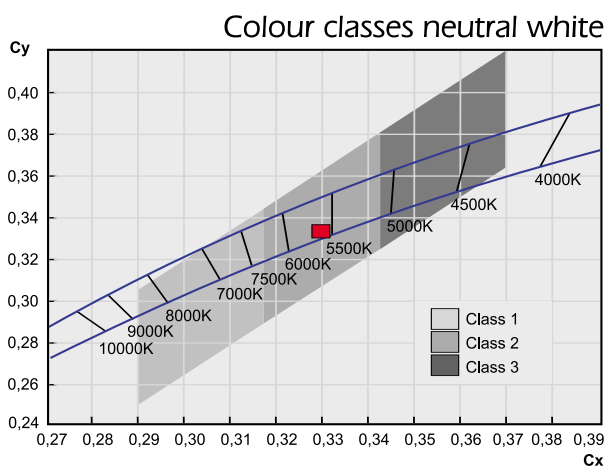
Waterproof - Line
under development

Technical information

Dim	Unit	Description
λ_p	nm	Peak wavelength, maximum of radiant intensity $I = I(\lambda)$ typically used for IR – applications
λ_C	nm	Centroid wavelength - the wavelength which divides the integral of the spectrum into equal parts
ϕ_e	W	Power, total radiant flux of an emitting system
I_e	W/sr	Radiant intensity, measured acc. CIE 127 cond. B (0,01 sr)
$\lambda_{1/2}$	nm	Full width at half maximum, depends on epi-technology, largest values for diffused p/n- junctions, smallest values for QW-p/n junctions
λ_D	nm	Dominant wavelength, calculated as maximum of function $I_V(\lambda) = I_e(\lambda) V(\lambda)$ with $V(\lambda)$ eye response function at day light. Due to this, the peak wavelength for red LEDs is larger than the dominant wavelength, for blue LEDs it is smaller. In the dark the function $V(\lambda)$ is shifted, therefore the colour appearance at low intensity levels may be shifted, too.
ϕ_V	lm	Total light flux of an emitting system
I_V	Cd	Light intensity, measured acc. CIE 127 cond. B (0,01 sr)

Explanation of the units:

□ nm: Nanometer □ W: Watt □ W/sr: Watt per steradian □ Lm: Lumen □ Cd: Candela



Reliability and life time

To describe the reliability and lifetime of LEDs, it is necessary to distinguish between two different failure modes:

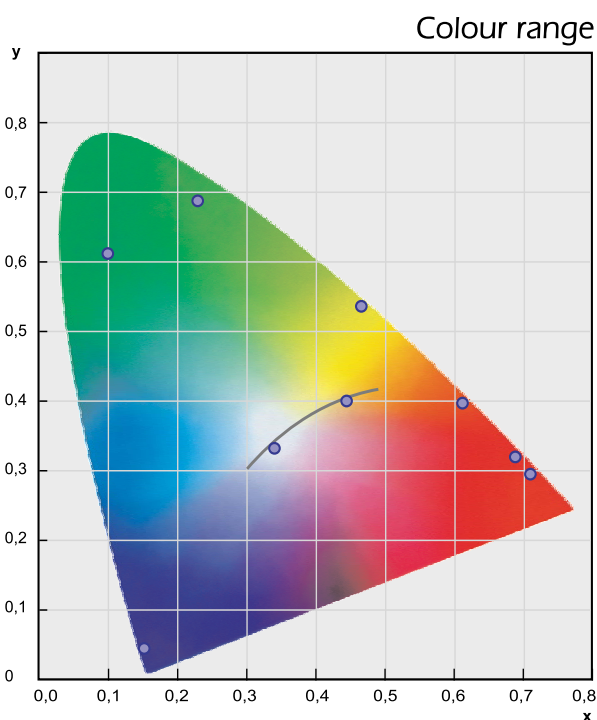
- the total failure
- the degradation as a time dependent reduction of light intensity.

For the total failures one observes two effects:

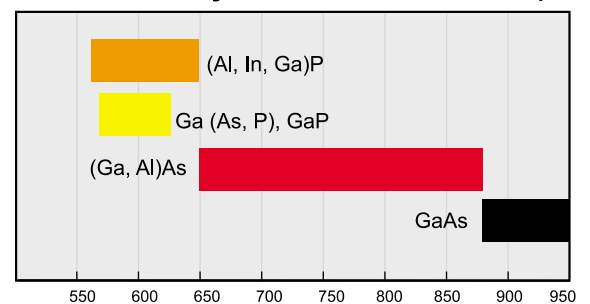
- early life failures (failures visible in the function test at the application) (for OSA diodes in the range of 10 ppm)
- failures during operation (for OSA diodes below 1 ppm).

Degradation determined failures (intensity below 50% of initial intensity) depend very strong on operating conditions, chip material system and packaging technology.

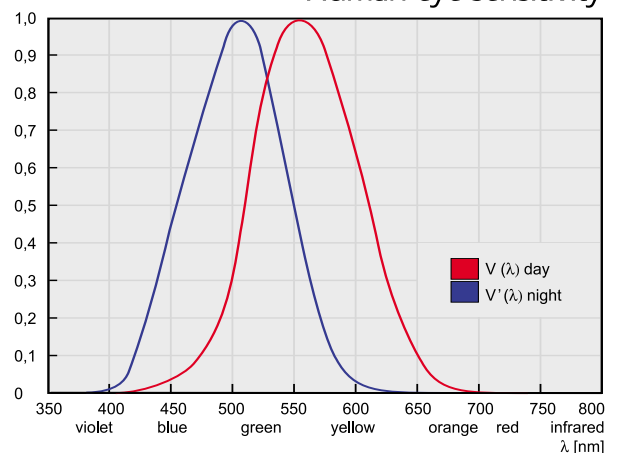
The mean time to failure varies between several 10.000 hours for white SMD LEDs and above 100.000 hours for (Ga,Al)As and (Ga,Al,In)P based LEDs.



Material systems for OSA-LED-chips



Human eye sensitivity



Bright ideas - custom designed

OSA Opto Light GmbH - we are your partner for customised solutions in the field of solid state lighting. A various range of chips, chip and packaging combinations will provide you the right solution for your application.

Our custom designed LED-modules for OEMs are an efficient way for luminaries and other lighting applications.

Please contact us with your requirements and applications. Our engineers have the ability to assist you in the development phase of your product. By working closely together we will ensure you will achieve a high quality cost effective solution.

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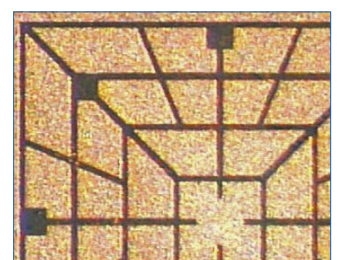
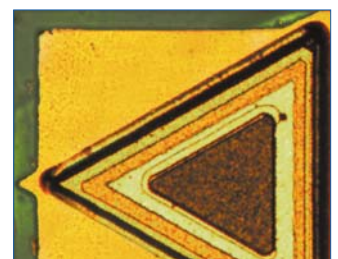
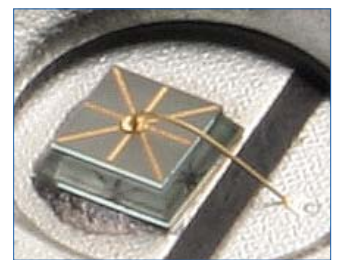
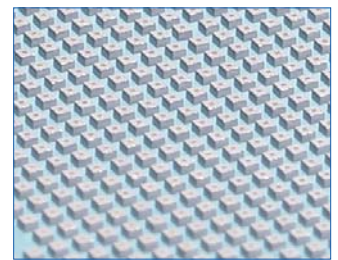
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 Certificate No. 12 100 16393 TMS



- LED Chips
- Monolithic displays
- Miniature displays
- SMD-LEDs
- Thinfilm-LEDs
- UV-LEDs
- High Power LEDs
- LED-Modules

