

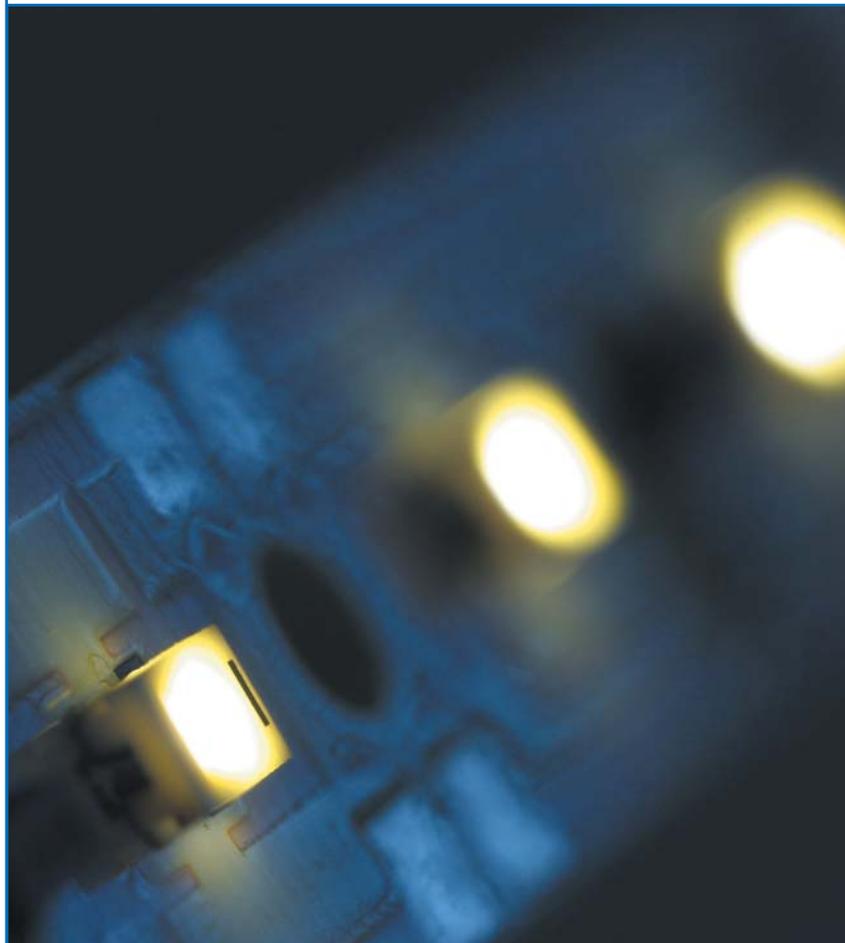
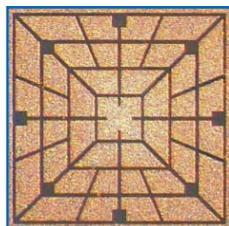
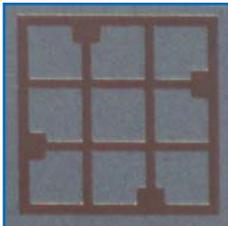
osa opto light

Bright ideas - custom designed

LED-Chips

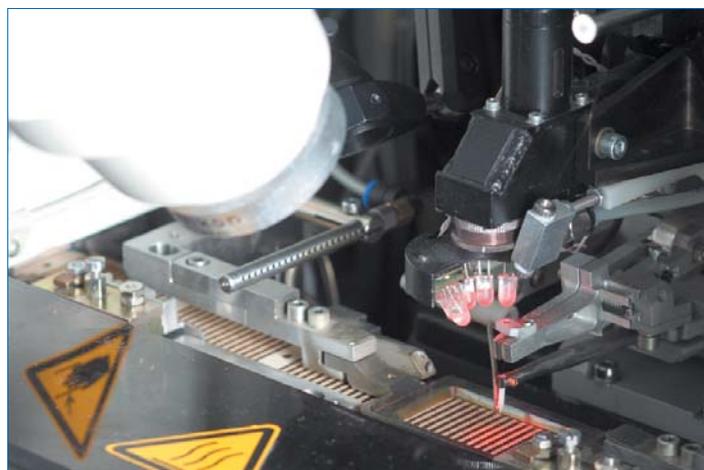
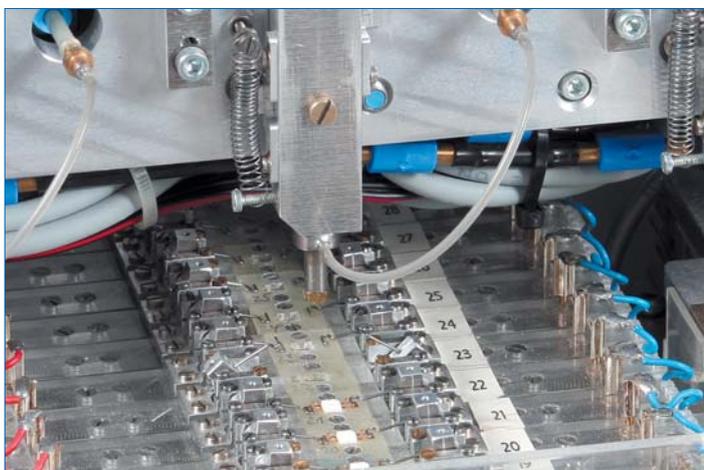
SMD-LEDs

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.

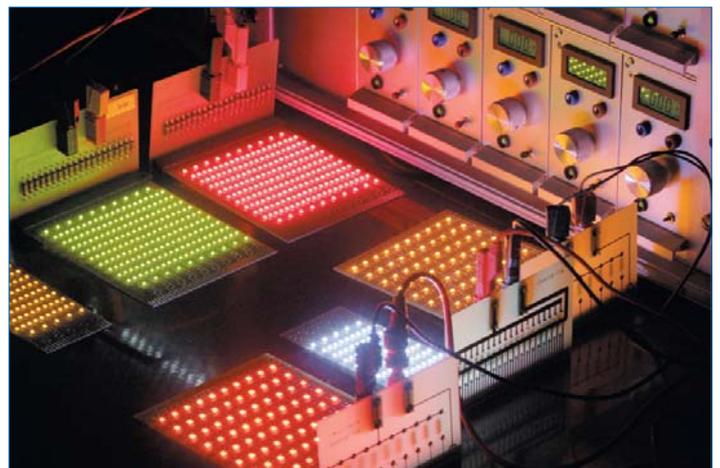
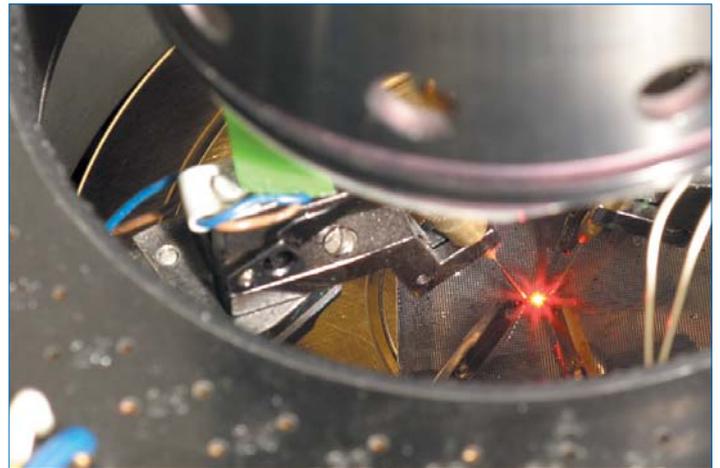
OSA was founded in Berlin, Germany during 1991 and most of the OSA employees have more than 25 years experience in the field of solid state lighting.

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

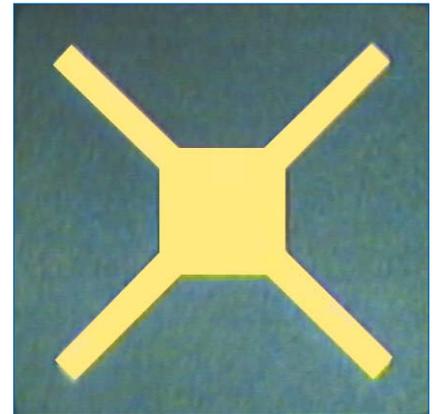
Based on the material systems **(Ga,Al)As**, **(Ga,In)As** **Ga(As,P)**, and **(Al,In,Ga)P** we offer a wide product spectrum of LED - chips in the visible **(550 - 650 nm)** and near IRED-**(660 - 1060 nm)** range. With these chip technologies we can cover the demand for lower intensity ranges as well 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.

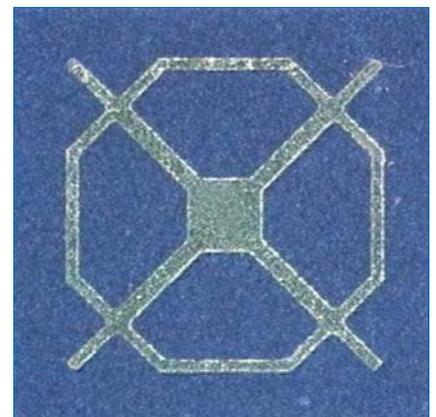
Our **(Ga,Al)As** technology provides chips without secondary peak. Some of the designs are developed for short **switching times till 5 ns**.

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 $365 \mu\text{m}$ square.

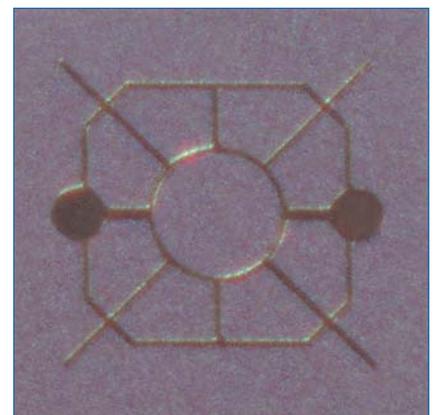
For high power applications OSA Opto Light GmbH developed chips with large area p/n-junctions. The chip layout has been designed for different direct currents in the range between **100 mA and 2 A**. The table lists the standard chip sizes. The maximum applicable current depends on the thermal resistance of surrounding, on material and operating conditions.



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



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



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

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

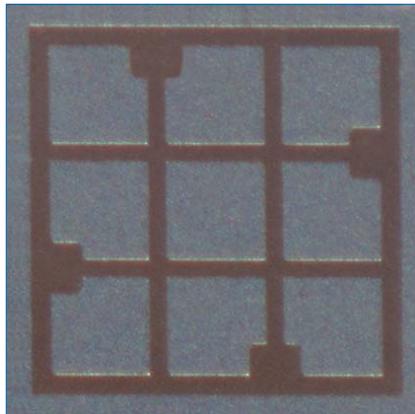
chip. Most of our chips can be provided as bare dices, packaged in our SMD - packages (see next pages) or in **3 mm and 5 mm** standard LED-lamp packages with viewing angles between **10° and 100°**.

Table of chip size and areas

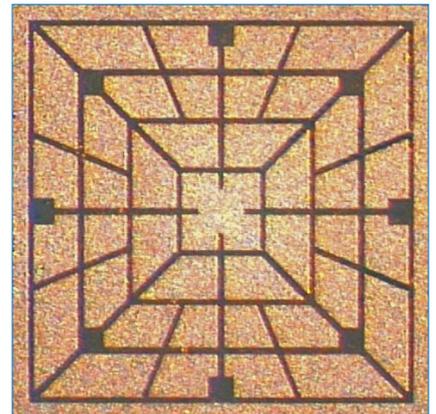
Chip size [μm]	p/n Area [mm ²]	Pad
265	0.07	1 square or circle
325	0.09	1 square or circle
360	0.12	1 square or circle
415	0.16	1 square
465	0.20	1 square
700	0.47	2 circle 80 μm
960	0.89	4 square 105 μm
1960	3.78	8 square 120 μm



IRED Lamp 3 and 5 mm



RED Chip 960 μm



RED Chip 1960 μm

Monolithic integrated displays

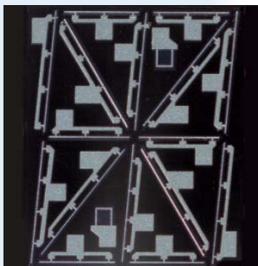
Conventional red monolithic displays (660 nm)

- High integration density of elements on reduced space
- Smallest distances between the elements down to 20 μm

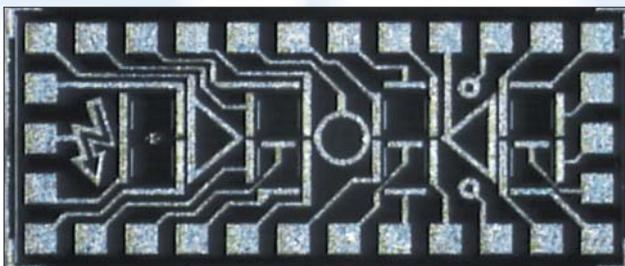


40 μm in square lighting dot with 20 μm distance to the next element

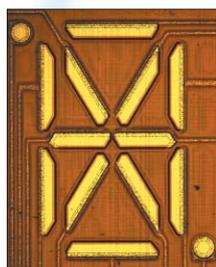
High integration density of the elements on smallest areas e.g. printing line 128 elements at 8 mm length



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



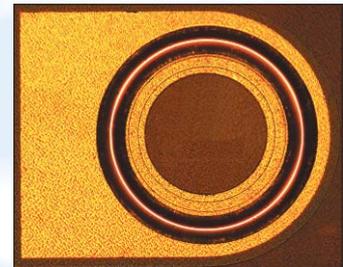
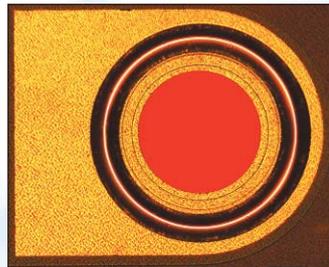
Manufacturing of various numeric displays for application in different optical devices, medical equipment or measurement systems

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

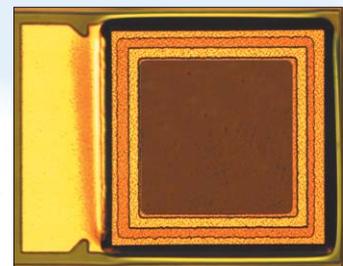
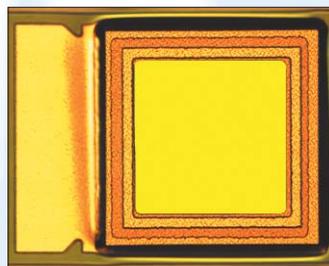
Point source 625 nm
switched on / off
chip size 450 x 550 μm
sign size 200 μm



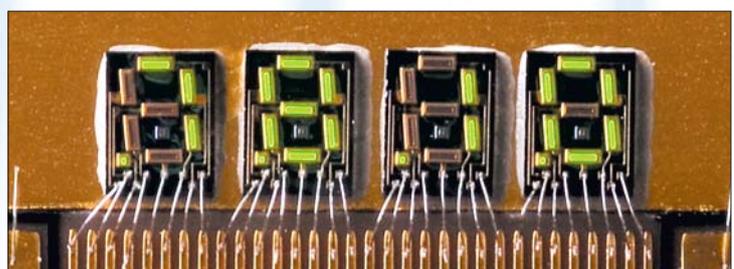
triangle 615 nm
switched on / off
chip size 290 x 290 μm
sign size 120 μm



square 572 nm
switched on / off
chip size 480 x 530 μm
sign size 280 μm



7-segment display 572 -660 nm
switched on / off
chip size 1470 x 1980 μm
sign size 600 x 1100 μm



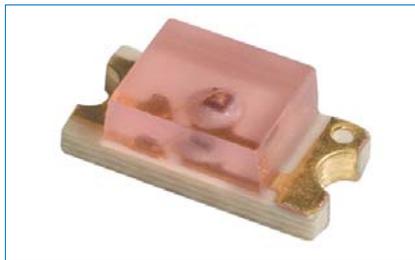
SMD-LEDs - visible and infrared

OSA Opto Light GmbH has designed several PCB - based SMD-LED packages for various sizes, radiant characteristics and chip types. This packages fits the requirements of visible and infrared light in the wavelength range 460 -1500 nm

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 thin film technology enables a doubled external

quantum efficiency. These visible LED (red, amber, yellow, green) achieve 1-3 Candela light intensity @ 20 mA in the package OLS-330. The wavelength 660, 850 and 950 nm are available in this technology too.

OLS-150
Size 1206



OLS-170
Size 0805



OLS-153
Size 1206
bipolar-bicolour



OLS-173
Size 0805
bipolar-bicolour



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



Low Power ceramic series OCU-4xx

The series OCL-4xx is an Al₂O₃- ceramic based ceramic package is providing superior temperature stability (even under autoclave conditions for some chip technologies) and

excellent long time stability for UV, Blue and colour conversion types. The series OCL-410 is a bipolar / bicolour type like red / green or red/ white color switchable LED. If the polarity

of the external circuit is unknown or shall not defined, the series OCL-420 is a bipolar indicator LED in different colours like blue, white, warm white and green.

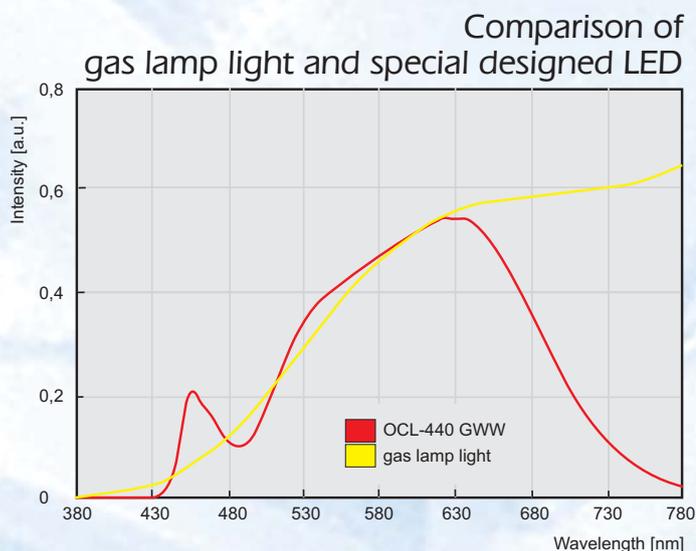


left: OCL-420 BE460/BE460
right: OCL-400 SWW

Colour conversion is more than white or warm white light for general lighting. OSA opto light develops and produces, based on different excitation LED- Chips and numerous phosphors, special LED with

high conversion rates, pure colours like green and yellow with a brilliant colour homogeneity and stability. Typical for these LED are comparable wide FWHM- values in the range of 60-100 nm. OSA opto

light can furthermore combine these phosphors to realize customized, ultra wide light sources with FWHM > 300 nm or specific spectral characteristics.



Comparison of gas lamp light and special designed LED as an combination of three different phosphors

UV-LEDs

Low Power



The product family OCU-400 meets the requirements of low power applications. Available wavelengths are in the range of 350 nm ... 430 nm. Typical applications are document checking systems and illumination systems.

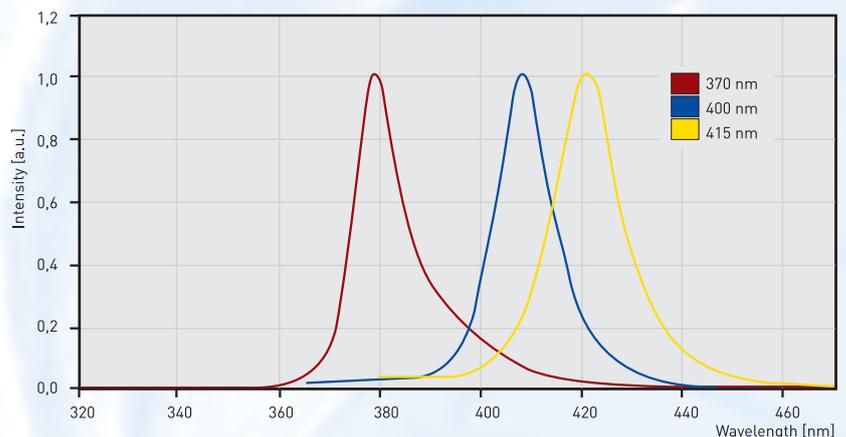
High Power up to 1.5W



The OCU-440 range has been designed for high power applications in the range up to 1.5 W electrical power dissipation with a very good reliability and life time. At present the available wavelengths are between 365 and

430 nm. Some key applications are illumination systems and curing of photo-sensitive systems like photoresist, ink and glue.

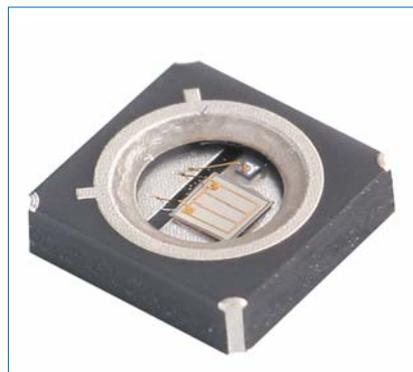
Typical spectra of UV-LED are characterized by a FWH below 15 nm. Wavelength tolerances are ± 3 nm also for customized solutions.



High Power LEDs

High power packages are the necessary bridge between high current chips and customer applications. Their main task is to conduct the heat from the chip to surrounding area in order to provide a high quality device performance and reliability. Based on the broad existing chip selection in the wavelength range between 365 nm 1550nm we are able to choose the right wavelength for customers application. LED's with colour conversion (OCX-440) provide a wider spectral FWHM than direct emitting chips. Besides single wavelength application the combination of several chips also enables the simulation of defined energy distributions like shown in the figure below.

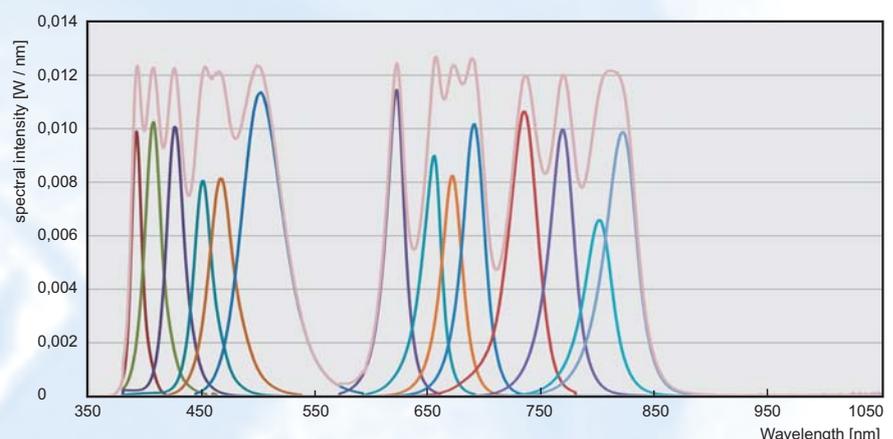
Spectral distribution of the radiation, emitted by a LED-array, consisting of 14 different LED- types



- OCX-440 family ceramic based
- High temperature solution
- $R_{th} < 10 \text{ K/W}$
- Power dissipation max 1.5 K/W
- Radiative characteristic Lambertian (120°)
- Colour conversion



- OLS-690 family P.C.B. based for $R_{th} 30-40 \text{ K/W}$
- OCL-690 family ceramic based for $R_{th} < 5 \text{ K/W}$
- Electrical insulated thermal pad
- 40° viewing angle



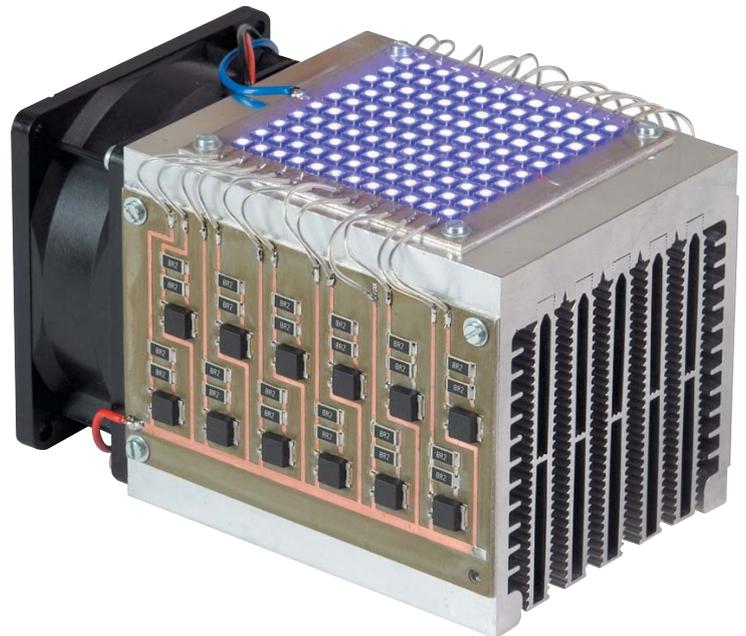
LED-Modules

OSA opto light utilizes its high experience in solid state lighting technology also in the custom design of LED-modules from prototypes to volume production quantities. We can apply here the full wavelength

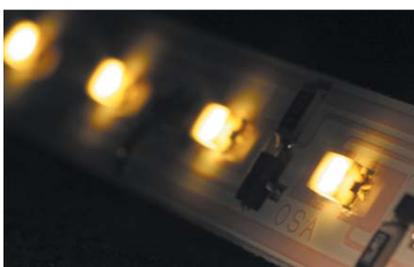
range from 350 to 1550 nm. Our capability for in-house selection of LEDs according to tight tolerances in brightness, colour and forward voltage can also be applied in LED modules for OEM- customers. Our

module technology includes also thermal management solutions like metal core P.C.B., active or passive heat sinks and temperature protection of the LED by a special circuit on the P.C.B.

Visible LED solutions (PWM-dimmable RGB- Module, white module)



UV- high power module 405 nm,
optical power 15 W,
electric power 120 W

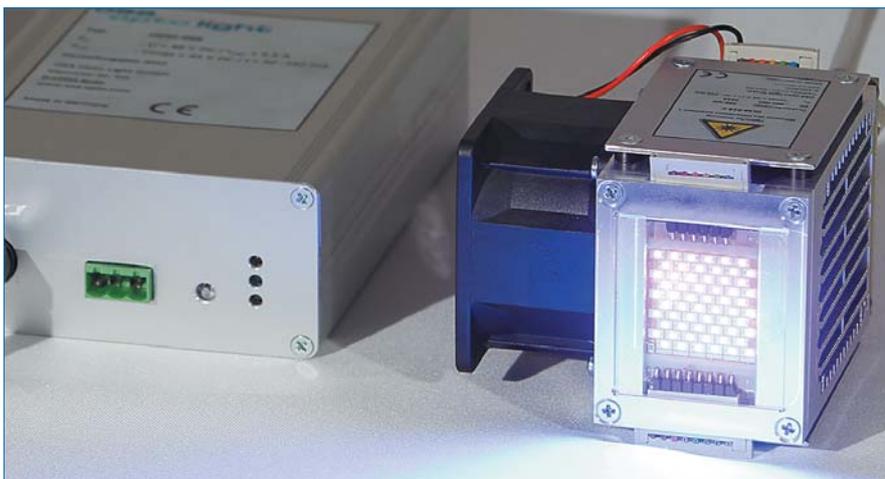


UV-Modules

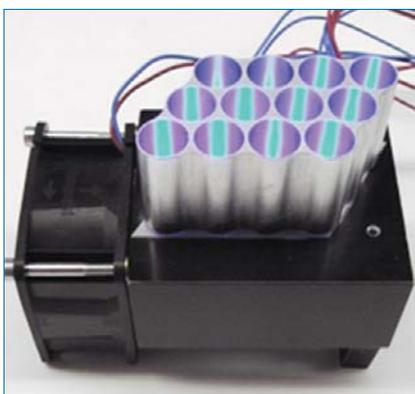
Photochemical processes like curing requires higher power densities not achievable with discrete LED. Thus OSA opto light developed solutions in COB - technology. The Module OLM-018 meets the require-

ments of medium radiant densities, e.g. at a wavelength of 395 nm a power density of 1,5-2 W/cm² can be achieved. This module can be combined with the control unit OEM-006 to operate chips in the whole wave-

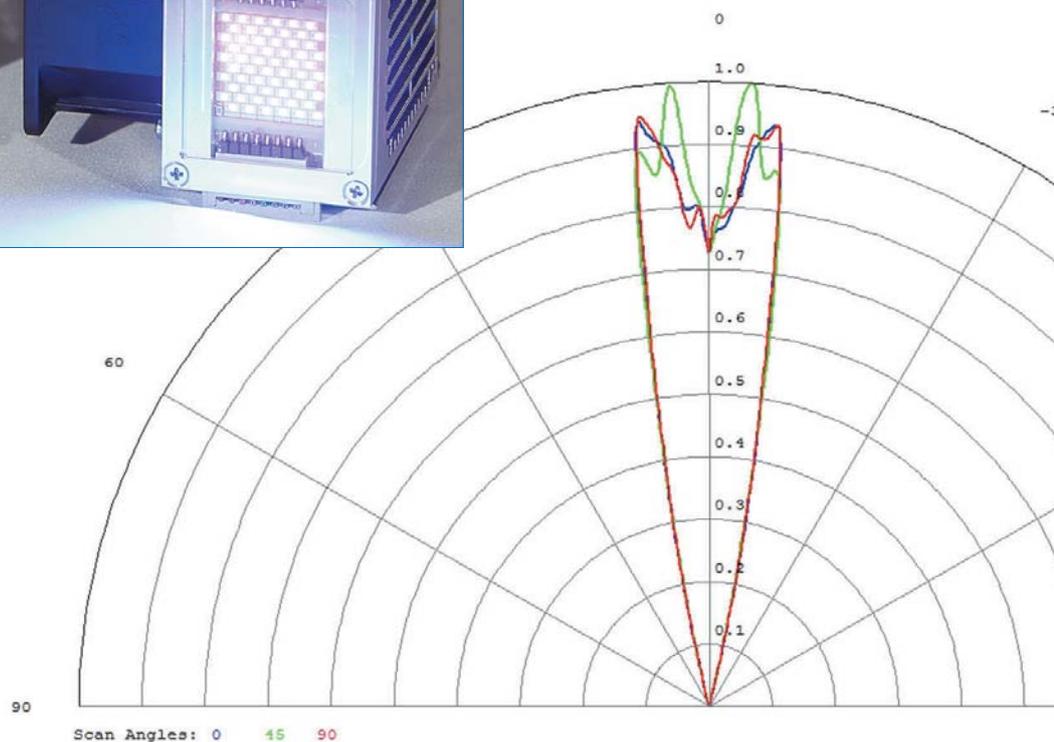
length range. The reflective optics for the module OLM-021 provides a full viewing angle of 18 degrees.



System OLM018 Air - turnkey ready system with forced air cooling



OLM-021 module with reflector



calculated radiative characteristic

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
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.
$\lambda_{1/2}$	nm	Full width at half maximum, depends on epi-technology, largest values for diffused p/n- junctions, smallest values for QW-p/n junctions
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)
ϕ_v	lm	Total light flux of an emitting system
I_v	Cd	Light intensity, measured acc. CIE 127 cond. B (0,01 sr)
CRI	%	Colour rendering index, key parameter for light quality. Describes the feasibility of a light source to illuminate an object like a human face in a way, that the human eye get the same appearance in comparison to a black body radiator. For indoor applications a CRI of > 85% is necessary.

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:

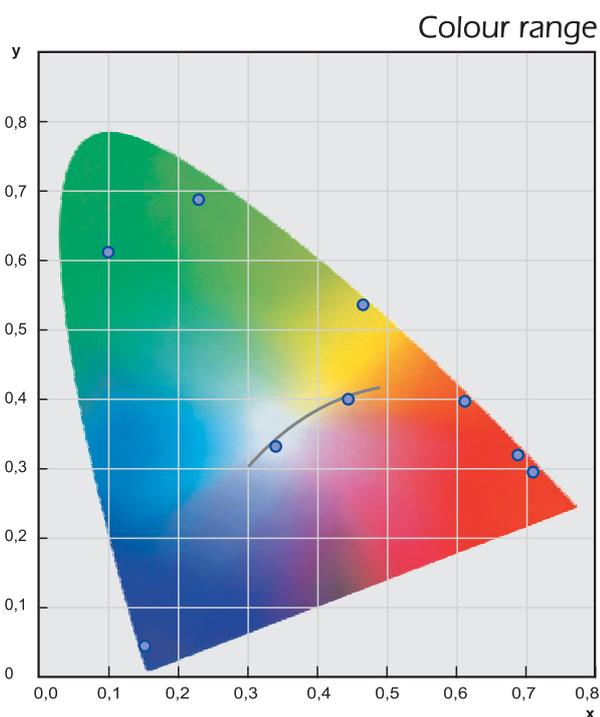
- the total failure
- the degradation as a time dependent reduction of light intensity.

For the total failures one observes two effects:

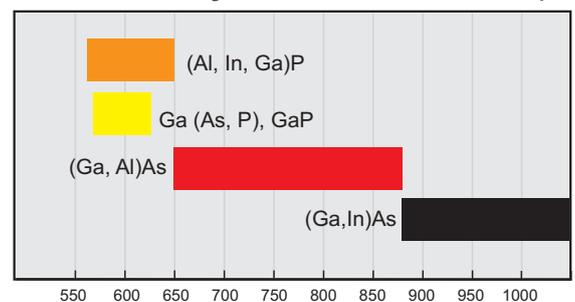
- early life failures (failures visible in the function test at the application) (for OSA diodes in the range of 10 ppm)
- failures during operation (for OSA diodes below 1 ppm).

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

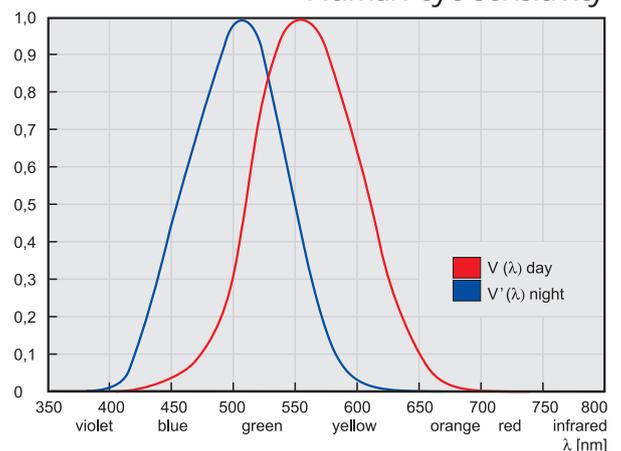
The mean time to failure varies between several 10.000 hours for white SMD LEDs and above 100.000 hours for (Ga,Al)As and (Ga,Al,In)P based LEDs.



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 your radiation or light source.

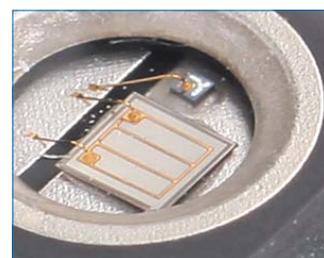
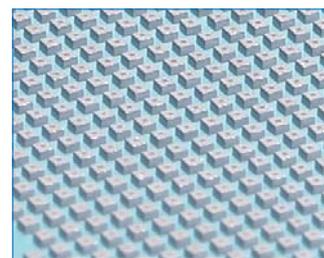
Please contact us with your requirements and applications. Our engineers have the ability to assist you in the development phase of your product. By working closely together we will ensure you will achieve a high quality cost effective solution.

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

