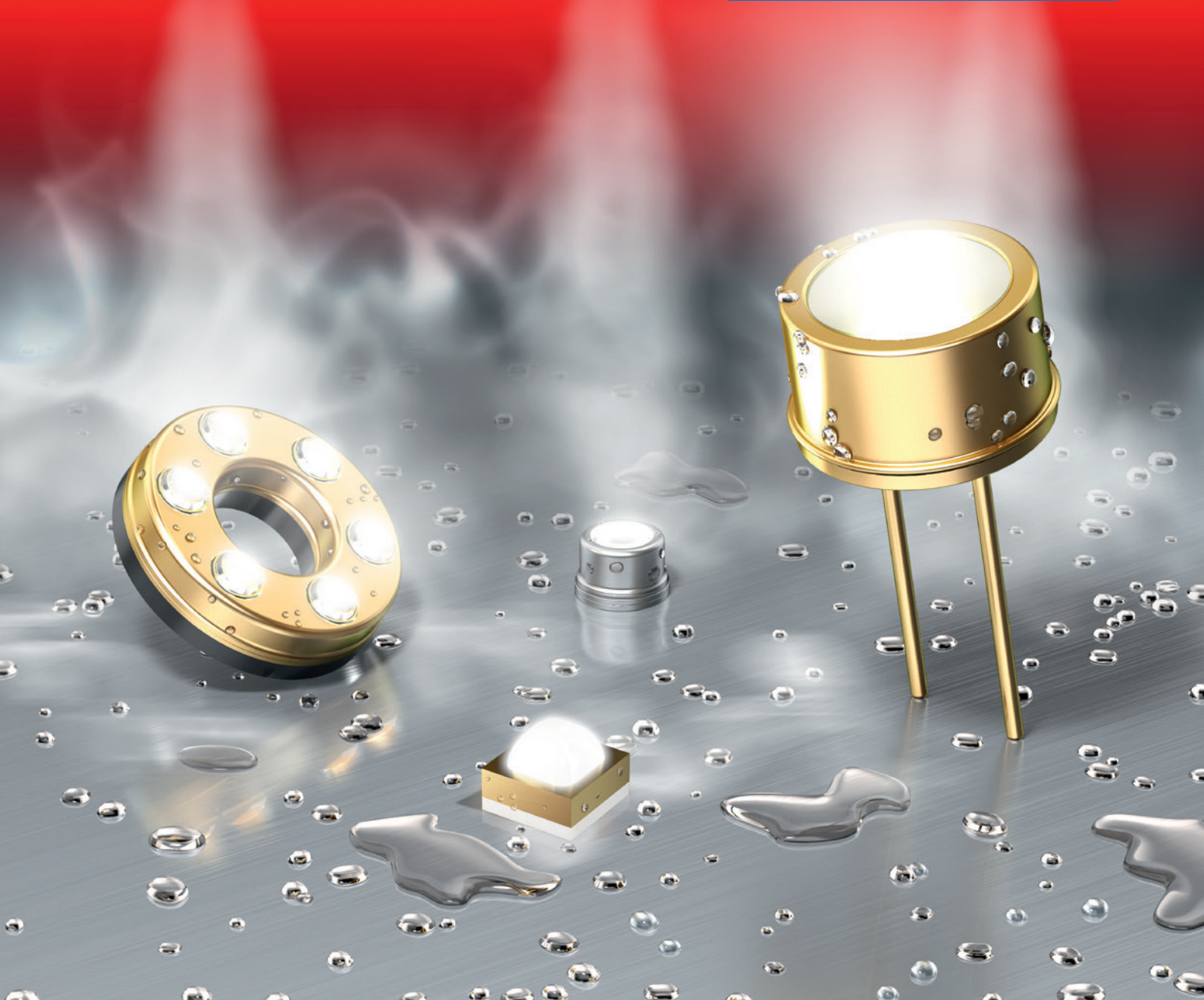
SCHOTT
glass made of ideas

Solidur® LEDs

Impressive robustness.
Enabling innovative
light designs.



SCHOTT Solidur® LEDs – gastight and custom-designed

The challenge

Conventional LEDs are typically encapsulated using polymer sealing materials. They do little to protect the sensitive internal electronics.

The solution

Hermetically sealed LEDs represent an answer to the reliability challenge found, for example, in medical and dental applications. The vacuum-tight housings of SCHOTT Solidur® LEDs are made only of inorganic materials, such as metal, glass or ceramics – none of which age or break down over time.

Product Information

SCHOTT Solidur® LEDs are made with high-quality, vacuum-tight housings that deliver complete protection for their internal LED chips, supporting long-term functionality for „fit-and-forget“ applications in harsh environments and safety-critical settings. SCHOTT has developed fully hermetic LED modules that are able to reliably withstand extremely harsh operating environments. This includes typical sterilization conditions in autoclaves: In 3,500 test cycles at an ambient pressure of 2 bar and a temperature of 134 °C, SCHOTT LED modules have proven to remain hermetically sealed with outstanding optical performance.

Advantages

Superior robustness
Resistant to water, moisture, humidity, chemicals, vibrations, shock, mechanical impact, UV, pressure, and temperatures up to 300°C

Customizable optical properties
Optical parameters such as light color temperature, CRI, radiation pattern, luminous flux and the lens or window type of Solidur® LEDs can be custom-modified according to customer specifications.

High performance
Outstanding long-term optical performance, high hermeticity and gastightness, excellent thermal conductivity and stability, optimal efficiency and long service life.

Miniature sizes
Can be delivered in extraordinarily small form-factors with a diameter of just 2 mm. Solidur® LEDs are extremely robust, eliminating the need for any additional housing.

Fully autoclavable
Able to endure intensive autoclave sterilization, withstanding more than 3,500 cycles at an ambient pressure of 2 bar and a temperature of 134°C.

Save money & headaches
Enabling the possibility for reduced total cost of ownership by saving costs and effort incurred due to replacements, maintenance, downtime etc.

Applications

Unmatched robustness makes Solidur® LEDs ideal for environments that LEDs could not previously withstand. They can simplify existing designs or enable new ones, including integration at the tip of an instrument. Solidur® LEDs even enable integration into equipment that previously offered no lighting options.


Surgical instruments


Otoscopes


Turbines


Endoscopes


Ophthalmoscopes


Mirrors


Cameras


Hand tools


Industrial Applications


UV devices

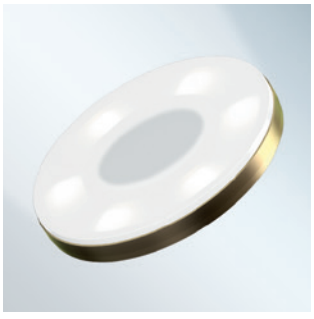
Product Variants

Solidur® Mini LED

- Smallest, fully hermetic and autoclavable High Brigthness (HB) LED currently on the market
- Tiny footprint opens up new application possibilities
- Can be integrated into devices with minimal available space

Under development

Technical Information	Mini LED	Mini LED 2.0	Mini LED 3.0	Mini LED 4.0
Color temperature CCT	5.000 - 6.000 K	4.000 - 6.000 K	4.000 - 6.000 K	4.000 - 6.000 K
Color rendering index R_a	> 90	> 92	> 92	> 92
Forward current I_F max.	100 mA	350 mA	350 mA	350 mA
Luminous flux ϕ_v	7 lm at 100 mA	16 lm at 100 mA 42 lm at 350 mA	16 lm at 100 mA 38 lm at 350 mA	20 lm at 100 mA 45 lm at 350 mA
Viewing angle (FWHM) Θ_V	110°	68°	58°	~ 40°
Other colors/wavelengths		available	available	available
Size ∅	2.3 mm	2.3 mm	2.0 mm	1.5 mm or 2.0 mm
Height h	1.7 mm	1.7 mm	1.4 mm	1.7 mm
Autoclavable	yes	yes	yes	yes

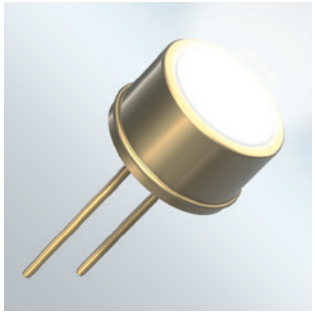


Solidur® Ring LED

- As the world's first ring-shaped, High Brightness (HB) LED, this innovative light source provides powerful and shadow-free illumination
- Designers have the possibility to incorporate other components onto the inside of the ring, such as a camera chip

Under development

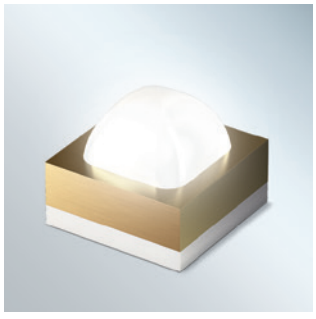
Technical Information	Ring LED 1.0	Ring LED 2.0	Ring LED 3.0
Color temperature CCT	4.000 - 6.000 K	4.000 - 6.000 K	4.000 - 6.000 K
Color rendering index R_a	> 90	> 92	> 92
Forward current I_F max.	350 mA	350 mA	350 mA
Luminous flux ϕ_v	typ. 10 lm at 50 mA	> 100 lm at 350 mA	> 150 lm at 350 mA
Viewing angle (FWHM) Θ_V	typ. 60 – 130°	customized	customized
Other colors	upon request	upon request	upon request
Size ∅	8.4 mm	< 10 mm	< 10 mm
Height h	< 2 mm	< 2 mm	< 2 mm
Autoclavable	yes	yes	yes



Solidur® Transistor Outline (TO) LEDs

- Encased in vacuum-tight housings, Solidur® Transistor Outline (TO) LEDs are based on industry-standard TO footprints
- Easy integration into existing equipment and devices, with a broad range of standard housing geometries and glass optics, as well as through-hole/connector of SMD (surface mount) formats

Technical Information	TO 33	TO 41	TO 46	TO 39 Multi die
Color temperature CCT	4.000 - 6.000 K	4.000 - 6.000 K	4.000 - 6.000 K	4.000 - 6.000 K
Color rendering index R_a	> 90	> 90	> 90	> 90
Forward current I_F max.	350 mA	700 mA	700 mA	700 mA
Luminous flux ϕ_v	> 20 lm at 150 mA	> 30 lm at 150 mA	> 30 lm at 150 mA	> 80 lm at 150 mA
Viewing angle (FWHM) Θ_V	< 120°	15 - 120°	12 - 135°	12 - 135°
Other colors/wavelengths	upon request	upon request	upon request	upon request
Size ∅	2.75 mm	3.55 mm	4.7 mm	8.6 mm
Height h	> 2.7 mm	> 2.7 mm	> 2.7 mm	> 2.7 mm
Autoclavable	yes	yes	yes	yes



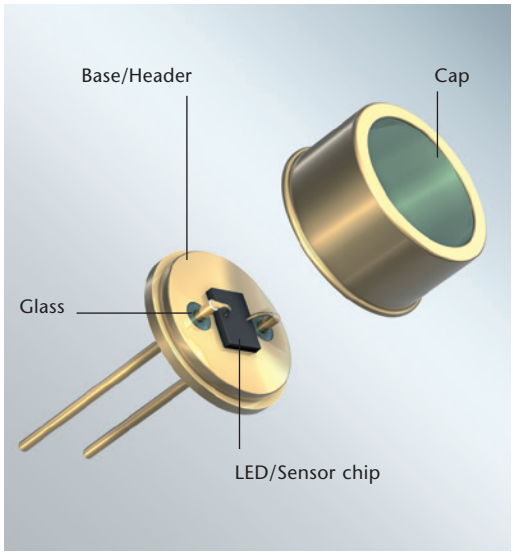
Solidur® Surface Mounted Device (SMD) LEDs

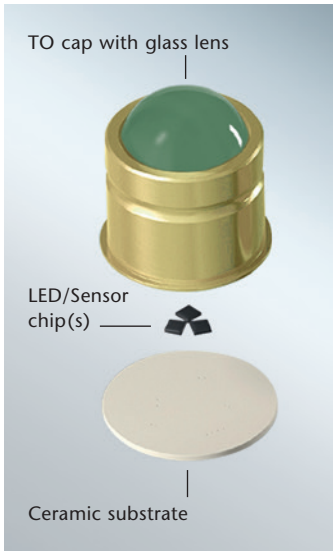
- Developed for long-term durability and efficiency, especially in UVB/C applications
- Excellent optical performance with high radiation power at defined wavelengths and stable optical properties
- Materials and designs for high thermal conductivitiy

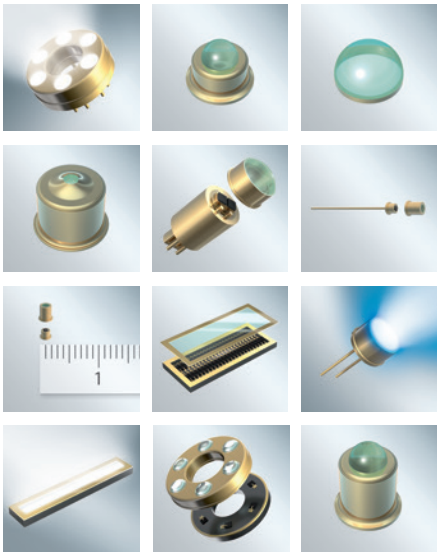
Technical Information	SMD 1.0	SMD 2.0
Spectral range	UVB/C	UVB/C
Wavelength λ	265 nm, 280 nm, 310 nm	265 nm, 280 nm, 310 nm
Forward current I_F max.	typ. max. 700 mA	typ. max. 700 mA
Radiation flux ϕ_v	customized	customized
Other colors/wavelengths	available	available
Size	5 x 5 mm^2	3.5 x 3.5 mm^2
Height h	1.5 mm	1.5 mm
Hermetic	yes	yes

Customized Designs

Solidur® LEDs are fully customizable and can be designed to fulfill exact customer requirements.







Design & Dimensions

- Materials, shapes and electrical interfaces:
  - Copper, Kovar, or Steel header with SMD or through-hole design
  - Ceramic base with SMD design
- Size: Miniaturization down to Ø 1.5 mm
- Surface: Individual surface coatings (Gold, Nickel, Silver)

Caps/lenses

- Large variety of lens shapes (beam angle: 10–180°)
- High-quality primary optics for UV, VIS and IR applications
- Specially-adapted UV transparent glasses

Chip

- Single or multi-chip configuration
- Customizable chips: white, UV, VIS, and IR

Sensor

- Combination of LED chips and sensors in one package
- High efficient coupling to optical fiber possible

Reliability Specification

Technical Information	
Autoclaving: Proven functionality for	• Oils • Steam sterilization (2 bar; 134 °C for 15 minutes; > 3500 cycles tested)
Temperature stability:	> 260 °C
Gastightness/hermeticity:	1 x 10^{-8} mbar x l/s
Electrical insulation:	> 10 GΩ
Chemical resistance:	High
Thermal shock stability:	– 65 °C to 150 °C for 15 cycles

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