SCHOTT

SOLIDUR® LEDs

Unmatched robustness.
For innovative lighting designs.

Solidur® LEDs – gastight and custom-designed

The challenge

The polymeric sealing compounds typically used for LED encapsulation provide minimal protection against moisture ingress and thermal stress, leaving internal electronics vulnerable to degradation and failure in demanding environments.

The solution

Hermetically sealed LEDs reliably address the durability challenges of medical and dental applications. Solidur® LEDs feature vacuum-tight housings made exclusively of inorganic materials – such as metal, glass, and ceramics – which do not age, degrade, or break down over time. This enables long-term performance even under harsh sterilization and operating conditions.

Product information

Solidur® LEDs feature high-quality, vacuum-tight housings that completely protect the internal LED chips, enabling long-term functionality for “fit-and-forget” applications in harsh and safety-critical environments. SCHOTT’s fully hermetic LED modules can withstand extreme operating conditions, including repeated sterilization in autoclaves. After 3,500 sterilization cycles at 2 bar ambient pressure and 134 °C, SCHOTT LED modules maintained hermetic integrity and optical performance.

Solidur® portfolio

Solidur® Mini LED

- Extremly small, fully hermetic and autoclavable high-brightness (HB) LED
- Tiny footprint opens up new application possibilities
- Can be integrated into devices with minimal available space

Technical information	Mini LED	Mini LED 2.0	Mini LED 3.0
Color temperature CCT	5.000 - 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.	100 mA	350 mA	350 mA
Luminous flux I_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
Viewing angle (FWHM) Φ_V	110°	68°	58°
Other colors/wavelengths		available	available
Size ⊓	2.3 mm	2.3 mm	2.0 mm
Height h	1.7 mm	1.7 mm	1.4 mm
Autoclavable	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 flexibility to incorporate chips with different wavelenghts, or other components – such as camera chips – into the inside of the ring

Technical information	Ring LED 1.0	Ring LED 2.0
Color temperature CCT	4.000 - 6.000 K	4.000 - 6.000 K
Color rendering index R_a	> 90	> 92
Forward current I_F max.	350 mA	350 mA
Luminous flux I_V	typ. 10 lm at 50 mA	> 100 lm at 350 mA
Viewing angle (FWHM) Φ_V	typ. 60 – 130°	customized
Other colors	upon request	upon request
Size ⊓	8.4 mm	< 10 mm
Height h	< 2 mm	< 2 mm
Autoclavable	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 I_v	> 20 lm at 150 mA	> 30 lm at 150 mA	> 30 lm at 150 mA	> 80 lm at 150 mA
Viewing angle (FWHM) Φ_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, also possible for 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 ‖	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 I_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

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 tailored to meet specific customer requirements.

High performance
Delivering outstanding long-term optical performance, high hermeticity and gas tightness, excellent thermal conductivity and stability, optimal efficiency, and extended service life.

Miniature sizes
Available in ultra-compact form factors with diameters as small as 2 mm. Solidur® LEDs are inherently robust, eliminating the need for additional housing.

Fully autoclavable
Can withstand intensive autoclave sterilization. Proven to endure 3,500+ cycles at 2 bar pressure and 134 °C without compromising performance.

Cost-efficient & reliable
Enabling reduced total cost of ownership by minimizing replacement needs, maintenance efforts, and downtime – saving both money and operational headaches.

Applications

The robust Solidur® LEDs are ideal for environments where conventional LEDs would fail. Their compact, hermetic design simplifies existing systems and enables entirely new design possibilities, including integration at instrument tips or in confined spaces. Solidur® LEDs can add lighting to equipment that lacks illumination options, unlocking new functionality across medical, dental, industrial, and safety-critical applications.

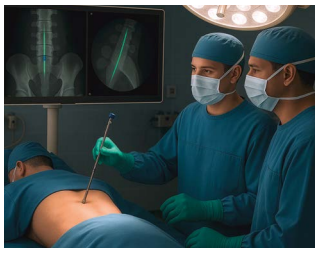
Robotic

Endoscopy

Dental scaler

Dental endodontic

Power tools

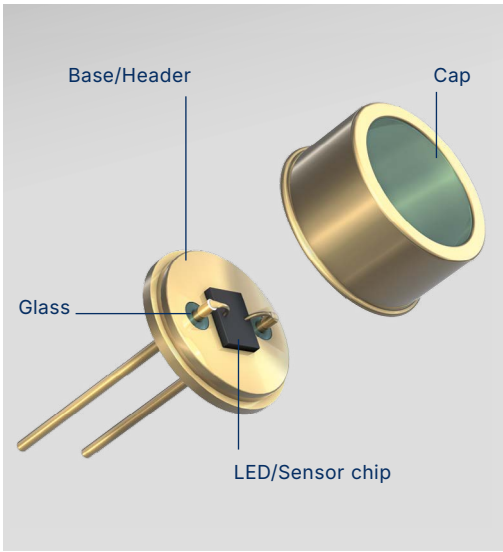

Navigation surgery

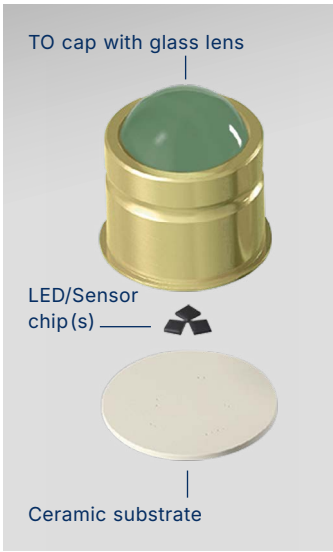
Dental drill

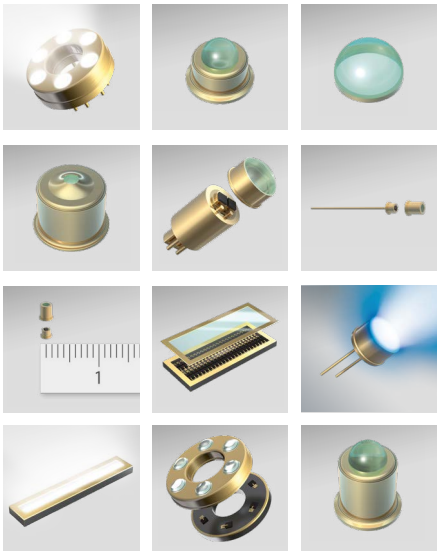
Industrial

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)

Chip

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

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

Sensor

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

Reliability specification

Technical information	
Autoclaving: Proven functionality for	▪ Oils ▪ Steam sterilization (2 bar; 135 °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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