Innovative single-mode VCSEL light sources for sensor applications

Single-mode VCSELs are the perfect choice for demanding sensor applications due to their improved optical characteristics. Higher-order longitudinal and transversal modes are suppressed by the innovative chip design. At the same time, the polarization is linearly stable.

**Which application fields?**

In the field of automotive, consumer electronics or industrial sensing there are various applications. Some examples for the single-mode VCSEL solutions are oxygen spectroscopy sensing, high precision depth sensing or optical encoder for high precision positioning.

**Why TRUMPF?**

TRUMPF Photonic Components is a family-owned global leader in VCSEL technology. We design, manufacture and sell VCSEL-based light sources. Our solutions support the growing demand of 3D sensing application. With over 20 years of VCSEL technology development and offering VCSEL products to the market, being the leading VCSEL supplier to smartphone customers, TRUMPF has proven to be your VCSEL partner for 3D sensing applications.
Single-mode VCSEL light sources offer excellent and reliable performance over a wide range of conditions

Features:
- TRUMPF proprietary VCSEL technology
- Wavelengths: 760 - 764 nm, 850 nm, 940 nm
- Narrow 2 nm spectral width
- Precise wavelength tunability
- High frequency modulation up to 100 MHz
- Sub ns single pulses
- Wide range of duty cycles
- Gaussian beam profile
- Hermetically sealed package
- Integrated TEC and thermistor
- Easy application to system
- Small footprint
- High reliability

In the far field, the intensity distribution of the single-mode VCSEL is perfectly Gaussian shaped. The absolutely symmetrical and Gaussian-shaped beam profile makes the optical design of applications significantly easier.

Product Specifications

<table>
<thead>
<tr>
<th>Product</th>
<th>Part number*</th>
<th>Dimensions (l x w x h)</th>
<th>CW optical output power</th>
<th>Emission wavelength</th>
<th>Number of VCSEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>TO5 with TEC and thermistor</td>
<td>TTO-002-764-A</td>
<td>5.84 Ø x 6 mm</td>
<td>0.2 mW</td>
<td>764 nm</td>
<td>1</td>
</tr>
<tr>
<td>VCSEL Chip 850 nm</td>
<td>TVT-006-850-A</td>
<td>200 x 200 x 99 µm</td>
<td>2 mW</td>
<td>850 nm</td>
<td>1</td>
</tr>
<tr>
<td>VCSEL Chip 940 nm</td>
<td>TVT-007-940-B</td>
<td>187 x 187 x 99 µm</td>
<td>18 mW</td>
<td>940 nm</td>
<td>12</td>
</tr>
<tr>
<td>VCSEL with integrated photodiode</td>
<td>TVP-001-850-A</td>
<td>165 x 165 x 130 µm</td>
<td>0.5 mW</td>
<td>850 nm</td>
<td>1</td>
</tr>
</tbody>
</table>

Product specifications in this overview are typical values under defined operating conditions. Table shows a selection of products, information on other products on request.

*Some of these are new part numbers for existing parts, check with your local sales

Product variants of single-mode VCSEL

TOS - VCSELS in a hermetically sealed TO5 housing, also available without TEC
Chip die - 2 mW 850 nm VCSEL for high-volume applications and highly integrated sensors
Chip die - 18 mW 940 nm VCSEL array for high-volume time-of-flight proximity sensing in camera auto-focus sensors with short distance linearity
Chip die – two 850 nm VCSELS with single integrated photodiode for high-volume self-mixing interferometry sensing applications and integrated speed sensors

For more information visit
www.trumpf.com/s/VCSEL-solutions

Safety information:
- Invisible laser radiation / avoid beam exposure / class 3B laser product
- Electrostatic sensitive devices / observe precautions for handling

TRUMPF Photonic Components GmbH
Lise-Meitner-Straße 13 · 89081 Ulm · Germany
E-mail: photonic.components@trumpf.com · Homepage: www.trumpf.com/s/VCSEL-solutions
January 2022