DFB Interband Cascade Lasers from 2800 nm to 4000 nm

**nanoplus single mode IC lasers**

nanoplus is the only manufacturer worldwide routinely providing single- and multimode lasers at any wavelength from 760 to 6500 nm. At wavelengths up to 14 \( \mu \text{m} \), QCLs complete nanoplus’ laser portfolio.

Our IC lasers deliver single mode emission with well defined optical properties enabling a wide range of applications.

**nanoplus lasers operate reliably in tens of thousands of installations worldwide, including chemical and metallurgical industries, gas pipelines, power plants, medical systems, airborne and satellite applications.**

**key features**

- very high spectral purity
- narrow linewidth < 3 MHz
- excellent reliability
- wide variety of packaging options
- customer-specific designs available

**application areas**

- high performance gas sensing for process and environmental control
- precision metrology
- spectroscopy
- space technology

**nanoplus lasers with excellent performance are specifically designed and characterized to fit your needs.** This data sheet summarizes typical properties of nanoplus DFB lasers in the range from 2800 nm to 4000 nm. In this wavelength regime e. g. \( \text{NH}_3 \), \( \text{C}_2\text{H}_2 \), \( \text{CH}_3\text{Cl} \), \( \text{HCl} \), \( \text{N}_2\text{O} \), \( \text{H}_2\text{S} \), \( \text{CH}_4 \) and \( \text{CH}_3\text{O} \) can be detected with particularly high sensitivity, since the detection sensitivity typically increases at long wavelengths. Overleaf data for DFB lasers optimized for \( \text{CH}_4 \) detection is shown as an example.

<table>
<thead>
<tr>
<th>general ratings</th>
<th>symbol</th>
<th>unit</th>
<th>typical</th>
</tr>
</thead>
<tbody>
<tr>
<td>optical output power at peak wavelength</td>
<td>( P_{\text{out}} )</td>
<td>mW</td>
<td>10</td>
</tr>
<tr>
<td>typical maximum operating voltage</td>
<td>( V_{\text{op}} )</td>
<td>V</td>
<td>3 - 5</td>
</tr>
<tr>
<td>forward current</td>
<td>( I_f )</td>
<td>mA</td>
<td>120</td>
</tr>
<tr>
<td>side mode suppression ratio (SMSR)</td>
<td>dB</td>
<td>&gt; 35</td>
<td></td>
</tr>
</tbody>
</table>

**laser packaging options**

- TO66 with TEC and NTC, sealed
- other packaging options will follow soon, or may be discussed on request

On request, lasers with specifically optimized properties, such as higher output power, are available.

For dimensions and accessories, please see www.nanoplus.com

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nanoplus DFB ICL at 3270 nm

A wide variety of gas molecules exhibit characteristic absorption lines in the near infrared. DFB lasers emitting at 3270 nm are e.g. suited for highly sensitive detection of small CH₄ concentrations. For this application, highly stable laterally and longitudinally single mode lasers are required.

This data sheet reports performance data of nanoplus DFB lasers at this wavelength. Similar performance data are obtained in the entire wavelength range from 2800 nm to 4000 nm. For examples of performance data of nanoplus lasers in other wavelength ranges, please see www.nanoplus.com or contact sales@nanoplus.com.

**Fig. 1**
Room temperature cw spectrum of a nanoplus interband cascade DFB laser operating at 3270 nm

In many applications, temperature and/or current variations are used to adjust the laser emission precisely to the target wavelength.

**Fig. 2**
Mode hop free tuning of a nanoplus 3270 nm DFB laser by current variation at different temperatures

<table>
<thead>
<tr>
<th>electro-optical characteristics</th>
<th>symbol</th>
<th>unit</th>
<th>typ</th>
</tr>
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<tbody>
<tr>
<td>peak wavelength</td>
<td>(\lambda)</td>
<td>nm</td>
<td>3270</td>
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<tr>
<td>threshold current</td>
<td>(I_{th})</td>
<td>mA</td>
<td>30</td>
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<tr>
<td>temperature tuning coefficient</td>
<td>(C_T)</td>
<td>nm / K</td>
<td>0.35</td>
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<tr>
<td>current tuning coefficient</td>
<td>(C_I)</td>
<td>nm / mA</td>
<td>0.10</td>
</tr>
<tr>
<td>slow axis (FWHM)</td>
<td></td>
<td>degrees</td>
<td>35</td>
</tr>
<tr>
<td>fast axis (FWHM)</td>
<td></td>
<td>degrees</td>
<td>55</td>
</tr>
<tr>
<td>storage temperatures</td>
<td>(T_S)</td>
<td>°C</td>
<td>+20</td>
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<tr>
<td>operational temperature at case</td>
<td>(T_c)</td>
<td>°C</td>
<td>+20</td>
</tr>
<tr>
<td>chip operation temperature</td>
<td>(T_{op})</td>
<td>°C</td>
<td>+15</td>
</tr>
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</table>

We will be happy to answer further questions. Please contact us at sales@nanoplus.com