



**Laser System Model 1101-XX-CW-YYYY**

**Continuous Wave Room Temperature High Power QCL System**



Model 1101-XX-CW-YYYY is a high power, continuous wave, air-cooled mid wave or long wave infrared laser system. It provides up to > 4.0 W of continuous wave, room temperature (CW/RT) optical power depending on wavelengths from 3.7  $\mu\text{m}$  to >12  $\mu\text{m}$ . The system operates at room temperature, requiring no external chillers. It is available as a complete system consisting of the laser head (air-cooled) and matched power supply, ready to be turned on in customer's location. The quantum cascade laser, its thermoelectric cooler and collimating optics are located in a hermetically sealed package for trouble free operation in real environments.

The quantum cascade laser incorporates Pranalytica's unique patented quantum cascade laser structure designs, which permit continuous wave high power, high wall plug efficiency operation of the laser at room temperature without the need for external chillers. Model 1101-XX-CW-YYYY uses Pranalytica's patented composite submount materials for improved thermal management. The quantum cascade laser also incorporates Pranalytica's proprietary high reflectivity facet coating technology for high reliability operation of the laser at high CW power levels.

The laser is offered in several power output versions. Typical wavelength and power levels are listed below. Laser nomenclature: Model 1101-40-CW-1000 describes a CW/RT QCL system at a center wavelength of 4.0  $\mu\text{m}$  and a power output of 1.0W. Other wavelengths are available.

Center Wavelength (XX)	CW/RT Power Available (YYYY)
4.0 $\mu\text{m}$	0.5 W, 0.75W, 1.0 W, 1.5 W, 2.0 W and 2.5 W
4.6 $\mu\text{m}$	0.5 W, 0.75W, 1.0 W, 1.5 W, 2.0 W, 2.5 W, 3.0 W, 3.5 W and 4.0 W
7.1 $\mu\text{m}$	0.5 W, 0.75W, 1.0 W and 1.5 W
9.5 $\mu\text{m}$	0.5 W, 0.75W, 1.0 W, 1.5 W and 2.0 W



**Quantum cascade laser (laser head): Model 1101-XX-CW-YYYY-LH**

<b>Laser</b>	<ul style="list-style-type: none"><li>• Single emitter quantum cascade laser</li></ul>
<b>Operation</b>	<ul style="list-style-type: none"><li>• CW operation with the laser head at room temperature</li></ul>
<b>Wavelength</b>	<ul style="list-style-type: none"><li>• Wavelengths between 3.7 <math>\mu\text{m}</math> and 12 <math>\mu\text{m}</math></li></ul>
<b>Output spectrum</b>	<ul style="list-style-type: none"><li>• Broadband power centered at the nominal wavelength; spectral width <math>\sim</math> 150 nm</li></ul>
<b>Power output</b>	<ul style="list-style-type: none"><li>• From 0.5 W to 3.5 W (wavelength dependent)</li></ul>
<b>Output beam</b>	<ul style="list-style-type: none"><li>• Nearly collimated, spot size <math>\sim</math> 5 mm at the exit from the laser head</li></ul>
<b>Output beam divergence</b>	<ul style="list-style-type: none"><li>• <math>&lt;5</math> mrad</li></ul>
<b>Output beam pointing stability</b>	<ul style="list-style-type: none"><li>• <math>&lt;500</math> <math>\mu\text{radian}</math></li></ul>
<b>Output beam height</b>	<ul style="list-style-type: none"><li>• 7.5" (<math>\pm</math> 0.02") from the bottom of the mounting plate</li></ul>
<b>Output beam quality</b>	<ul style="list-style-type: none"><li>• Nearly diffraction limited (please call for details)</li></ul>
<b>Output polarization</b>	<ul style="list-style-type: none"><li>• Linearly polarized (vertical, extinction ratio <math>&gt;</math> 500:1)</li></ul>
<b>Output level control</b>	<ul style="list-style-type: none"><li>• Controllable from 0% to 100% of rated output</li></ul>
<b>Cooling</b>	<ul style="list-style-type: none"><li>• Air cooled with internal fan</li></ul>
<b>Reliability</b>	<ul style="list-style-type: none"><li>• Measured lifetime data for <math>&gt;3,000</math> hours with no power degradation at full power and periodic thermal cycling from full power to off and vice versa</li></ul>
<b>Physical Details</b>	<ul style="list-style-type: none"><li>• Size: 147 mm (W), 214 mm (H), 140 mm (D)</li><li>• Weight: 1.9 kg</li></ul>

**Quantum cascade laser power supply: Model 1101-XX-CW-YYYY-PS**

<b>Laser</b>	<ul style="list-style-type: none"><li>• Provides the necessary laser drive current for the quantum cascade laser (factory adjusted to deliver the specified laser output power)</li></ul>
<b>Thermoelectric coolers</b>	<ul style="list-style-type: none"><li>• Provides the necessary drive current for the associated thermoelectric coolers (factory adjusted to provide the needed cooling at the optimum operating point)</li></ul>
<b>Laser output level control</b>	<ul style="list-style-type: none"><li>• Controllable from 0% to 100% of rated output via 0-5V DC (optional)</li></ul>
<b>CW operation</b>	<ul style="list-style-type: none"><li>• Model 1101-XX-CW-YYYY may be operated in true CW mode by applying +5V DC to the modulation input connector (front panel)</li></ul>
<b>Modulated operation</b>	<ul style="list-style-type: none"><li>• Model 1101-XX-CW-YYYY may be modulated at frequencies up to 100 kHz by applying TTL modulation to input connector (front panel).</li></ul>
<b>QCL temperature control</b>	<ul style="list-style-type: none"><li>• Feedback control system for maintaining a constant preset QCL temperature</li></ul>
<b>Protection</b>	<ul style="list-style-type: none"><li>• Laser power supply equipped with multiple levels of protection for trouble free operation of the QCL</li><li>• 5 second startup delay time</li><li>• Laser activated by a separate switch</li><li>• Compliant with U.S. FDA Performance Standards for Light-emitting Products / Laser Products (21 CFR 1040.10 and 1040.11)</li></ul>
<b>Display</b>	<ul style="list-style-type: none"><li>• Monitors and displays operating parameters of the QCL<ul style="list-style-type: none"><li>– QCL current, voltage and temperature</li><li>– TEC current and voltage</li><li>– Laser operation time</li></ul></li></ul>
<b>Monitoring outputs</b>	<ul style="list-style-type: none"><li>• Multiple operating parameters optionally available as analog voltages on a DB9 connector</li></ul>
<b>Physical details</b>	<ul style="list-style-type: none"><li>• Size: 28 cm (W), 18 cm (H), 37 cm (D)</li><li>• Weight: 10 kg</li></ul>
<b>Electrical details</b>	<ul style="list-style-type: none"><li>• 110/220 V, 4 A (max).</li><li>• Optional modification available for operation from a single 28V DC with somewhat lower power consumption.</li></ul>