



**Laser System Model 1101-46-HP-YYYY  
Pulsed High Power Room Temperature QCL System**



Model 1101-46-HP-YYYY is a mid-infrared quantum cascade laser system that provides high peak power, fast rise and fall time optical pulses at the wavelength of 4.6  $\mu\text{m}$ . It is supplied as a complete system consisting of the laser head with its matched power supply, ready to be turned on in a customer's location. The standard version of the system consists of the quantum cascade laser and its collimating optics, located in a hermetically sealed package for trouble free operation in harsh physical environments. The MWIR laser radiation emerges in a  $\sim 4$  mm diameter nearly collimated beam. For special applications, the system is available (at optional extra cost) with an external bayonet mount infrared beam expanding lens for projection of the MWIR beam over kilometer distances (the photograph above shows a Janos ASIO 50 mm F/2.3 objective integrated with the laser head). The bayonet mount accepts other lenses for customer specific applications. Beam circularization option is available. Other wavelengths between 4 and 12  $\mu\text{m}$  are also available. Peak power output depends on the wavelength. Contact the Pranalytica for more details.

Output pulses are of fixed duration, user-specified between 50 ns and 500 ns, with frequency from single pulses up to 1 MHz. The system features very fast pulse rise and fall times of less than 5 ns. Various internal and external triggering options are provided.

The laser is offered in three pulsed power output versions:

Model 1101-46-HP-1000: Peak pulse power output of > 1.0 W in an ambient environment with laser head at room temperature

Model 1101-46-HP-2000: Peak pulse power output of > 2.0 W in an ambient environment with laser head at room temperature

Model 1101-46-HP-4000: Peak pulse power output of > 4.0 W in an ambient environment with laser head at room temperature

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## Specifications

### Pulsed High Power Quantum Cascade Laser Head

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|--------------------------------------|---|
| <b>Operation</b>                     | <ul style="list-style-type: none"><li>• Pulsed operation with the laser head at room temperature</li></ul>  |
| <b>Wavelength</b>                    | <ul style="list-style-type: none"><li>• 4.6 <math>\mu\text{m}</math> (other wavelengths between 4 and 12 <math>\mu\text{m}</math> available)</li></ul>  |
| <b>Output spectrum</b>               | <ul style="list-style-type: none"><li>• Broadband power centered <math>\sim</math>4.6 <math>\mu\text{m}</math>; spectral width <math>\sim</math> 150 nm</li></ul>   |
| <b>Pulse length</b>                  | <ul style="list-style-type: none"><li>• 50 ns to 500 ns (specified by the customer)</li></ul>   |
| <b>Pulse rise/fall time</b>          | <ul style="list-style-type: none"><li>• <math>\sim</math>10 ns (<math>\sim</math>5 ns rise/fall time available as an option)</li></ul>  |
| <b>Maximum pulse repetition rate</b> | <ul style="list-style-type: none"><li>• 2 MHz</li></ul>   |
| <b>Operating mode</b>                | <ul style="list-style-type: none"><li>• Internally triggered at 3 discrete user-specified frequencies</li><li>• Synchronized with externally supplied pulse sequences</li></ul>   |
| <b>Output beam</b>                   | <ul style="list-style-type: none"><li>• Nearly collimated; Optional modification permits attachment of external beam expanding infrared lens assembly for projection of the laser radiation over kilometer distances.</li><li>• Beam circularization optics available</li></ul> |
| <b>Output beam quality</b>           | <ul style="list-style-type: none"><li>• Nearly diffraction limited (please call for details)</li></ul>  |
| <b>Reliability</b>                   | <ul style="list-style-type: none"><li>• Measured lifetime data for &gt;3,000 hours with no power degradation at full power and periodic thermal cycling from full power to off and vice versa</li></ul>   |
| <b>Ambient operating temperature</b> | <ul style="list-style-type: none"><li>• &lt; 45°C</li></ul>   |
| <b>Physical details</b>              | <ul style="list-style-type: none"><li>• Size: 13 cm (W), 17 cm (H), 15 cm (D) (w/o optional external lens)</li><li>• Weight: 1.9 kg (w/o optional external lens)</li></ul>  |

### Pulsed High Power Quantum Cascade Laser Power Supply

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|--------------------------------------|--|
| <b>Operation</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><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>Pulse repetition rate</b>         | <ul style="list-style-type: none"><li>• Internal free running; adjustable in 3 user-specified steps</li><li>• Synchronized with externally determined pulse sequences (TTL, maximum rate from single pulses to 2 MHz)</li></ul>  |
| <b>Synchronization output</b>        | <ul style="list-style-type: none"><li>• TTL</li></ul>  |
| <b>Ambient operating temperature</b> | <ul style="list-style-type: none"><li>• &lt; 45°C</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: 7.3 kg</li></ul>   |
| <b>Electrical details</b>            | <ul style="list-style-type: none"><li>• 110/220 V, 3 A (max)</li><li>• Can be modified to operate from a single DC supply at 28V with somewhat lower power consumption</li></ul>   |

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