

Quantum Cascade Lasers from 10 μm to 17 μm



These lasers are DFB Quantum Cascade lasers (QCL) that emit continuous wave (CW) infrared light at room temperature with wavelengths ranging from 10 microns to 17 microns. The lasers are mounted on a thermoelectric cooler inside a sealed High Heat Load (HHL) package integrating a collimation lens and a thermistor to readout the laser chip temperature.

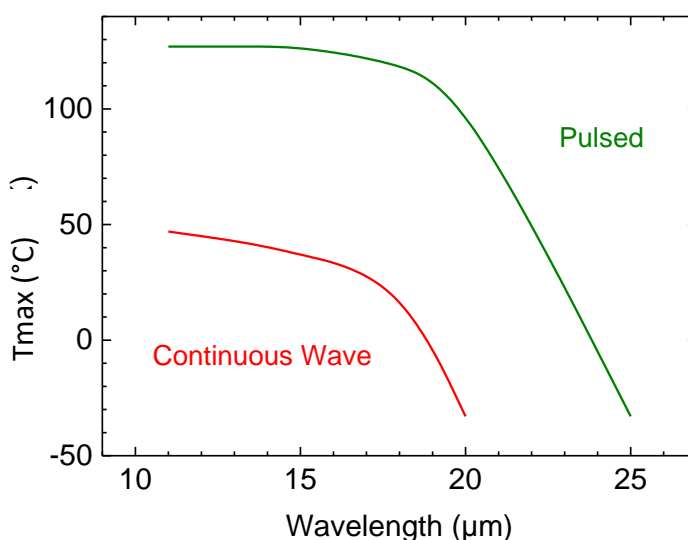
By controlling the chip's operating temperature through the Peltier element inside the laser's package, customers tune the emission wavelength without mode hopping while keeping a longitudinal single-mode operation.



Typical laser characteristics

Laser type	QCL single mode Distributed Feedback lasers (DFB) ⁽¹⁾
Mode of operation	CW or pulsed
Typical Optical Power	5-10mW typical for wavelength under 15 microns 1-5mW typical for wavelength above 15 microns
Full accessible wavelength range	$\sim 3 \text{ cm}^{-1}$ typically
Continuous tuning range	$> 1 \text{ cm}^{-1}$ typically
Side mode suppression ratio	SMSR $> 25 \text{ dB}$
Linewidth (FWHM)	$< 100 \text{ Mhz}$ (free-running with suitable electronics, for CW lasers)
Divergence	$< 10 \text{ mrad}$
Beam quality	TM00
Output beam diameter (window output)	Typically 4 mm
Polarization	Linear vertically polarized

⁽¹⁾ : Fabry-Perot lasers are also available



The red curve indicates the maximum chip temperature as a function of the wavelength for CW lasers and the green curve indicates the maximum chip temperature as a function of the wavelength for the pulsed laser.

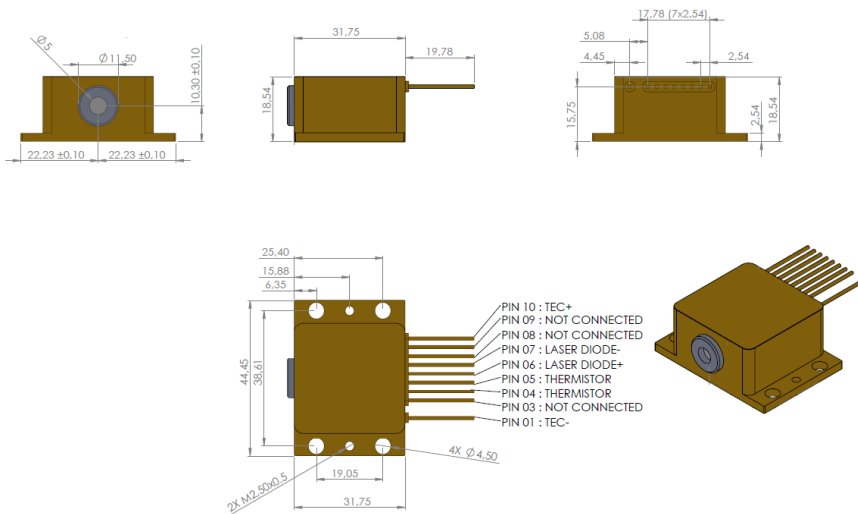
Mechanical and electrical features

Packaging	Sealed with nitrogen gas fill inside a High-Heat Load (HHL) package.
Operating temperature of the laser HHL casing	+10°C to +50°C ⁽¹⁾
Operating temperature of the QCL chip (for casing temperature < 20°C)	-20°C to +20°C ⁽²⁾
Operating temperature of the QCL chip (for casing temperature equal to +45°C)	0°C to +20°C ⁽²⁾
Storage temperature	+10°C to +50°C
Built-in temperature sensor	Thermistor $R_0 = 12 \text{ k}\Omega$, @ 25°C, $\beta = 3740 \text{ K}^{-1}$

⁽¹⁾Avoid water condensation

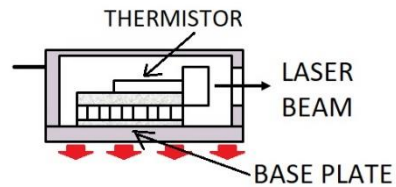
⁽²⁾The temperature of the QC-laser when operated is monitored by the built-in thermistor

Drawings and pinout (dimensions in mm)



Electrical connections (pinout MPL):

pin #	
1	TEC (-)
2	no pin
3	NC
4	Thermistor (12kΩ)
5	Thermistor (12kΩ)
6	QCL (+)
7	QCL (-)
8	NC
9	NC
10	TEC (+)



The above HHL-package diagram shows the built-in thermistor that indicates the laser chip temperature. The diagram also shows the base plate that dissipates the heat (because typically the built-in TEC will cool down the laser chip).