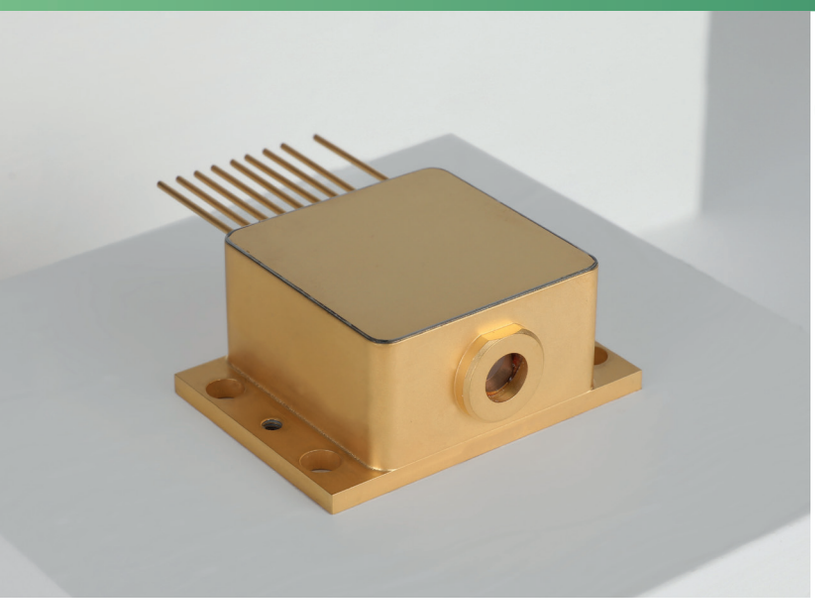
FRANKFURT LASER COMPANY

UNIMIR by mirSense

Single mode DFB CW QCL laser

UN0746C005HNA

Rev. 01-2021



Benefits:

- Very tight linewidth that drives the very high sensitivity of gas sensing
- CW operation delivering mW levels of output power at room temperature
- Low power consumption for integration in portable gas analysers
- Very stable over time with good Allan deviation results when integrated inside a gas analyser

Single Mode Distributed Feedback Quantum Cascade laser at ~746 cm-1

Note: 727 cm^{-1}, 767 cm^{-1} or 795 cm^{-1} are also available

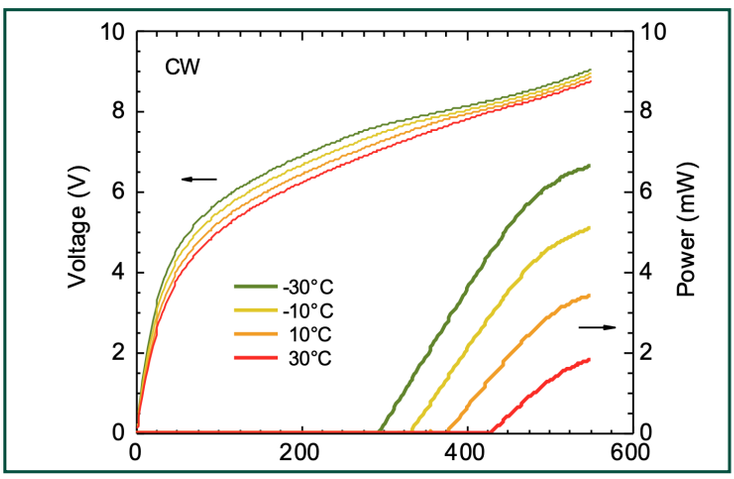
To monitor Xylenes and Propane ~746 cm-1 wavelength.

The UniMir products are Distributed Feedback (DFB) Quantum Cascade lasers (QCL) that emit CW (continuous wavelength) infrared light at room temperature. The laser is mounted on a thermoelectric cooler inside a hermetically sealed High Heat Load (HHL) package integrating a collimation lens and a thermistor to readout the laser chip temperature.

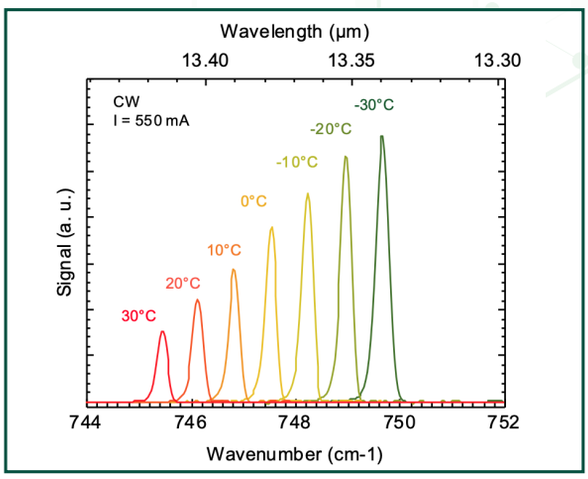
By controlling the chip's operating temperature through the Peltier element inside the laser's package, customers tune the emission wavelength without mode hopping while keeping a single-mode operation.

Laser characteristics

1 The curves[1] on the left indicate the voltage of the laser as a function of the applied DC current and for different laser chip temperatures. The curves on the right indicate the output power as a function of the applied DC current and for different laser chip temperatures.



2 The curves[1] indicate the emission spectra as a function of the temperature of the laser chip. Lasers with slightly shifted wavelength are also available. Please note that mirSense can also manufacture chips at 727 cm-1, 767 cm-1 or 795 cm-1"



1. These curves are a typical generic example and are not necessarily the curves of the manufactured laser that the customer will get.

TECHNICAL DATA

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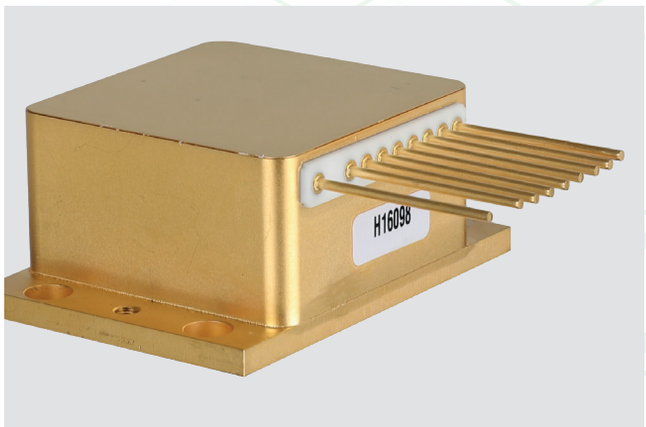

Optical features

Laser type	QCL single mode DFB
Mode of operation	CW
Guaranteed minium optical power at 746 cm-1	5 mW (with the base plate of the HHL-package at +20°C)
Full accessible wavelength range	~3cm^{-1}
Continuous tuning range	> 0.5 cm^{-1}
Side mode suppression ratio	SMSR > 25 dB
Linewidth (FWHM)	< 100 MHz (free-running with suitable electronics)
Divergence	< 10mrad
Beam quality	TM00
Output beam diameter (window output)	Typically 4 mm
Polarization	Linear vertically polarized

TECHNICAL DATA

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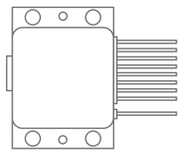
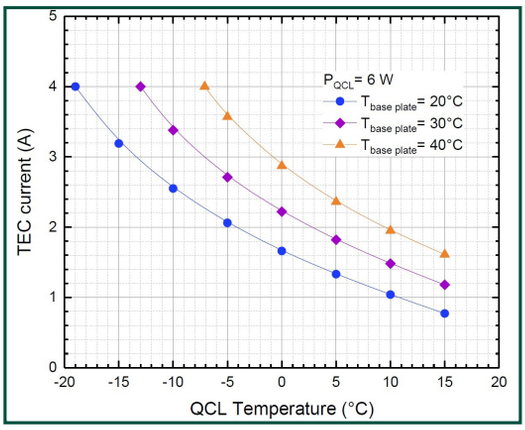


Mechanical and electrical features

Packaging	Sealed 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 of 20°C)	-10°C to +10°C(2)
Storage temperature	+10°C to +50°C
Built-in temperature sensor thermistor	Resistance @ 25°C: 10 kΩ 0/50 °C Beta value: ß =3892 K

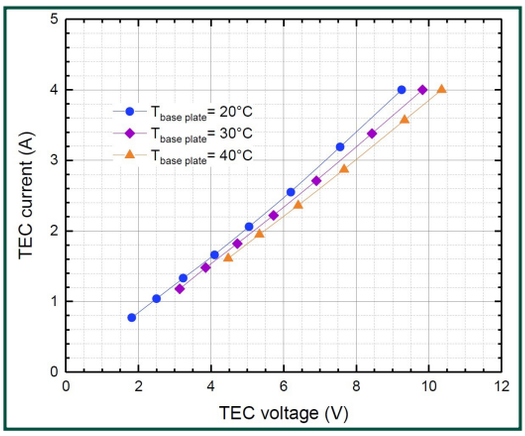
(1) Avoid water condensation
(2) The temperature of the QC-laser when operated is monitored by the built-in thermistor

Data about the built-in TEC



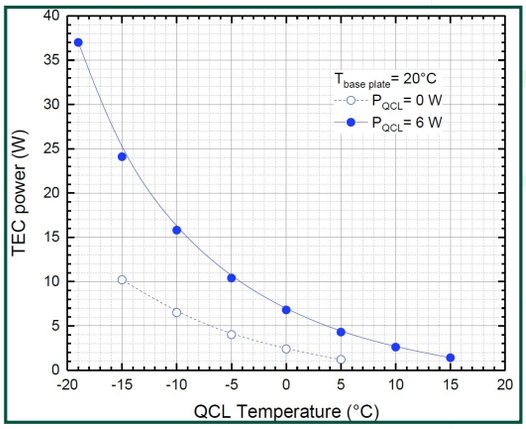
1

TEC current consumption as a function of the wanted QCL chip temperature for different base plate temperatures and for a QCL thermal load of 6 W.



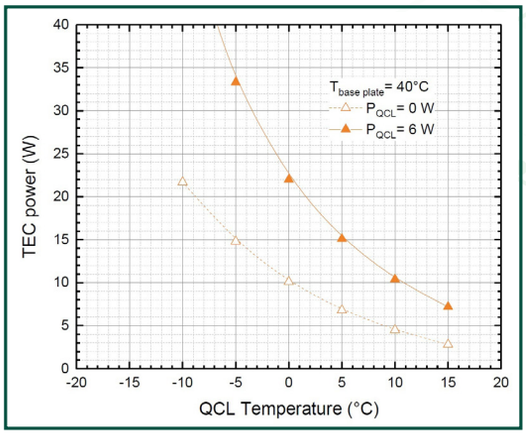
2

Current-voltage characteristics of the built-in TEC for different temperatures of the base plate.



3

Power consumption of the built-in TEC[1] as a function of the QCL chip temperature for a base plate temperature of +20°C, with and without a thermal load in the QCL.



4

Power consumption of the built-in TEC[1] as a function of the QCL chip temperature for a base plate temperature of +40°C, with and without a thermal load in the QCL.

1) The power of the TEC needs to be extracted through the base plate of the HHL, along with the power of the QCL. Typically, one needs to sum the power of the TEC and the power of the QCL to know how much thermal power must be dissipated in the heatsink.

TECHNICAL DATA

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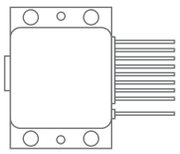


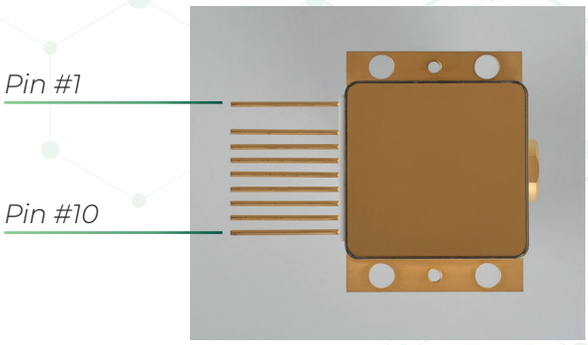
Electrical connections (pinout)

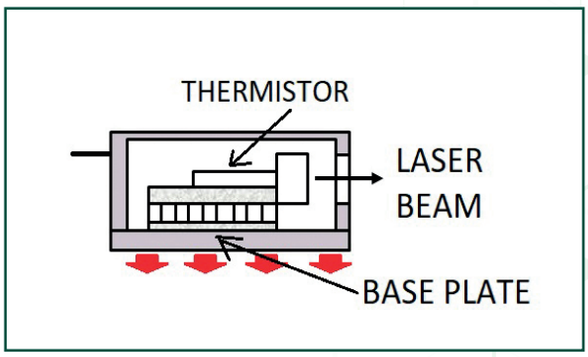
1	TEC (-)
2	no pin
3	Not connected
4	Thermistor (10kΩ)
5	Thermistor (10kΩ)
6	QCL (+)
7	QCL (-)
8	Not connected
9	Not connected
10	TEC (+)

If you are looking for a driver to control this laser (temperature and current), mirSense recommends the Arroyo Instruments and Wavelength Electronics brands.

The part numbers for Wavelength Electronics drivers are : QCL1000 OEM (for OEM chassis mount use) and QCL1000 LAB (for benchtop laboratory use).

The part numbers for Arroyo Instruments are the 6310-QCL controller and 262-06-06-DB9 mount for plug and play operation. Higher thermal capacity systems are available, please contact Arroyo Instruments for more details.





The above HHL-package diagram shows the built-in thermistor that monitors the laser chip temperature. The diagram also shows the base plate that dissipates the heat generated by the TEC and the laser chip.

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