



CW Single Mode Laser

Alpes Lasers flagship product, the Continuous Wave, Distributed Feedback Grating Quantum Cascade Laser has been the most versatile mid-IR light source since 2005. These lasers are able to emit a single wavelength at a time. They can be tuned within a range that can reach up to 10 cm^{-1} ; there exists a variety of modulation schemes which can be used for different purposes.

Specifications

QUANTITY	MIN	TYP	MAX	UNIT	NOTE
Wavelength Range	4.25	–	12.5	μm	1
Frequency Range	2350	–	800	cm^{-1}	2
Operation Temperature	-30	+20	+50	$^{\circ}\text{C}$	3
Linewidth	–	3	–	MHz	4
Threshold Current	30	200	800	mA	
Operation Current	–	400	1200	mA	
Average Output Power	1	20	150	mW	5
Tuning Range	4	6	10	cm^{-1}	6

Key Features

- Continuous Wave
- Single-Mode Spectrum
- Tunable source
- Low Dissipation
- High Beam Quality
- Narrow Linewidth

Key Applications

- Gas Spectroscopy
- Photoacoustic Sensing
- Metrology

These specifications may be changed without further notice.

- Each laser is specified with a single wavelength within the available range.
- Each laser is specified with a single frequency within the available range.
- For lasers in a LLH, HHL or TO3 housing, the chip operation temperature is guaranteed to be reachable with the housing at room temperature ($+20^{\circ}\text{C}$). For lasers delivered as CoC a method of temperature control is required to operate the laser.

- In theory the instantaneous linewidth of a QCL can be extremely low, of the order of kHz. In practice however, the total noise of a system will almost always be given by the noise of the current driver and/or the temperature noise, and when that noise is much higher than the intrinsic noise you can consider the QCL as a perfect transducer and compute the effective amplitude or spectral noise from the datasheet. For typical commercial drivers the effective noise is on the order of MHz.

- Lasers with output power lower than 20 mW are less expensive.
- Lasers tune with the operation temperature and current. A minimum tuning range can be specified.

Quantum Cascade Lasers are mid-infrared light sources covering the mid-infrared (4 to 20 μm) and terahertz waves (1 to 6 THz).

Unlike the standard bipolar laser diodes, the wavelength emitted by QCL depends on the geometry of a heterostructure and not on band structure properties of the semiconductor material. This allows a precise tailoring of the wavelength emitted by the design of the band structure.

In a Distributed Feedback Laser, a grating is etched into the active region to force the operation of the laser at very specific wavelength determined by the grating periodicity. As a result, the laser emits on a single spectral setting which may be adjusted slightly by changing the temperature of the active region.

HHL package suitable for higher dissipation CW-DFB



TO3 package suitable for lower dissipation CW-DFB



LLH Box suitable for any CW-DFB and providing the possibility of exchanging the laser by the customer.