

External Cavity Laser Kit

Alpes Lasers introduces the External Cavity Laser Kit. The kit contains a mount for a QCL chip and a grating on a rotation mount to allow for wavelength selection, a driver and a temperature controller. The optical output is a single-beam of light whose wavelength can be selected within a typical range of $\sim 200 \text{ cm}^{-1}$, a considerable advantage over the typical DFB range of 10 cm^{-1} .

The kit can be fitted with any FP or broad gain laser available from Alpes lasers, see on the table on the other side

Electro-optical Characteristics

SPECIFICATIONS	ACRONYM	MIN	TYP.	MAX	UNIT	NOTE
Spectral Linewidth	SL	–	1	2	cm^{-1}	1
Gapless tuning range	GTR	50	200	300	cm^{-1}	2
Grating period	GP	100	–	300	mm^{-1}	3
Sweep rate	SR	≤ 0.3	–	≥ 2700	cm^{-1}/s	4
Spectral Accuracy / Repeatability	SA	0	0.5	2	cm^{-1}	5
Maximum peak power	MPP	40	100	400	mW	6
Average power	P	1	5	20	mW	7
Power stability	PS	–	–	5	%	
Pulse width	PW	20	300	CW	ns	8
Pulse repetition frequency	PRF	–	0.17	1	MHz	9
Duty cycle	DC	0.1	5	100	%	10
Beam quality	M^2	1.2	1.5	2.0	–	
Beam diameter	D	–	–	4	mm	
Beam divergence	Div	–	–	6	mrad	
Pointing stability	PS	–	–	6	mrad	
Operation temperature	Top	0	20	30	$^{\circ}\text{C}$	11
Cooling	–	Passive	Water	–	–	12
TEC current	TECI	–	–	5	A	
TEC voltage	TECV	–	–	6	V	
Dimensions	LxWxH	308	220	100	mm^3	13
Delivery time				12	weeks	

Key Features

- Large scanning range
- Pulsed operation (CW in some cases)
- Modular
- Highly Customizable
- Graphical interface
- REST API (Web)
- Direct access to all systems possible

Key Applications

- System development
- Teaching
- Gain material validation



CLASS 3B LASER PRODUCT

These specifications may be changed without further notice.

1. May be degraded in case of sub-optimal alignment.
2. These values may not be achieved by all gain media, the actual values for tuning range, peak power and average power are dependent on the selected gain medium.
3. The optimal grating for the selected chip will be included in the ECLK. If the user needs to operate the kit with chips of incompatible wavelength ranges it is possible to purchase additional gratings.
4. The values for a specific configuration will depend on wavelength and grating selected.
5. As the system does not contain a wavelength reference, the accuracy is fixed by the calibration that must be obtained from an external reference such as an FTIR or a Wavemeter. The numbers given take only into account the repeatability.
6. Tuning range, peak power and average power are dependent on the selected gain chip, the values given here are typical for most chips.
7. Tuning range, peak power and average power are dependent on the selected gain chip, the values given here are typical for most chips.
8. Not all chips are capable of CW operation. 300 ns is the typical test pulse length used when qualifying the kit.
9. 170 kHz is the typical prf used for qualification tests of the kit.
10. Not all chips are capable of CW operation. 5% is the typical duty cycle used for qualification tests of the kit.
11. Cold temperatures require water cooling. Temperatures below the dew point require a purging of the cavity.
12. Performances will depend on cooling options chosen. At low duty cycle typically passive cooling is sufficient. Beware that when operating below the dew point, purging is necessary.
13. This comprises only the Optical engine. The electronics comes additional.

Available FP and Broad gain lasers

LASER	TUNING FROM	TUNING TO	AVG. POWER AT OPTIMUM FREQUENCY
BG-4.3-5	< 1970 cm^{-1}	> 2270 cm^{-1}	> 2 mW
BG-5-6	< 1655 cm^{-1}	> 1860 cm^{-1}	> 10 mW
BG-6-7	< 1380 cm^{-1}	> 1540 cm^{-1}	> 1 mW
BG-7-9	< 1155 cm^{-1}	> 1380 cm^{-1}	> 12 mW
BG-7.7-10.2	< 1030 cm^{-1}	> 1300 cm^{-1}	> 12 mW
BG-10-12	< 880 cm^{-1}	> 1005 cm^{-1}	> 1 mW
BG-11-14	< 800 cm^{-1}	> 885 cm^{-1}	> 1 mW
P-FP-6	< 1610 cm^{-1}	> 1650 cm^{-1}	> 8 mW
P-FP-9	< 1069 cm^{-1}	> 1141 cm^{-1}	> 5 mW
CW-FP-9	< 1070 cm^{-1}	> 1120 cm^{-1}	> 7 mW

Alpes Laser's line of External Cavity Laser Kit (ECLK) is designed for single-mode operation with wide spectral tunability. The ECLK consists of a quantum cascade laser (QCL) gain chip, a grating-tuned extended optical cavity in Littrow configuration, driver electronics and control software. The kit is delivered assembled and may require alignment before use. Alignment documentation and training course are available. Additional gain chips with different wavelength coverage and/or output power can be purchased from Alpes Lasers and installed in the instrument by the user. The ECLK is compatible with the Alpes Lasers line of Broad Gain QCLs which tune over up to 25% of their center wavelength.

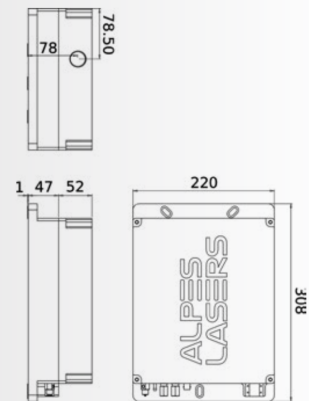
The system is entirely documented and open. It can easily be modified and customized for a specific purpose. The system comes with a controller providing a Web based graphical user interface allowing to access all the functionalities of the system. In addition for automation, or integration into a broader experiment control program, a REST API is made available to instruct the controller of the tasks to execute. It is also possible to operate without the controller and send commands directly to the various elements of the ECLK such as the rotation motor or the laser driver or the temperature controller.



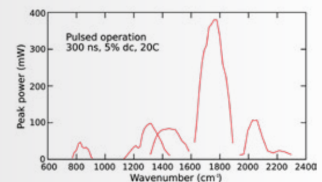
ECLK outside



ECLK inside



ECLK Main Dimensions



Tuning of available BG chips in ECLK