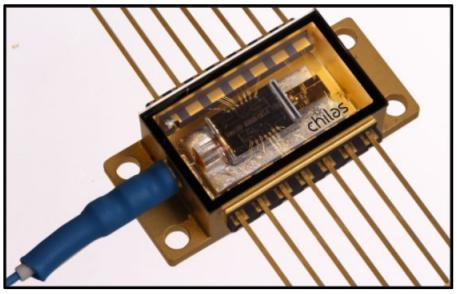
Chilas CT3 ultra-narrow linewidth laser



Center wavelength: 1550 ± 5 nm
Fiber type: PM
Connector type: FC/APC
Package: 14 pins, temperature stabilized, butterfly
USA accession number: 2420422-000

CAUTION: Observe precautions for handling electrostatic discharge sensitive devices

This component complies with the applicable portions of
21 CFR 1002.10 / 21 CRF 1002.11 / 21 CRF 1002.12
21 CRF 1002.13 / 21 CRF 1002.30a / 21 CRF 1002.30b
21 CRF 1040.10 / 21 CRF 1010.2 / 21 CRF 1010.3
Since this is a component, it does not comply with all the requirements contained in 21 CFR 1040.10 and 21 CFR 1040.11 for complete laser products.

1. Introduction

Chilas develops and commercializes semiconductor external cavity lasers based on a state-of-the-art hybrid integration technology. The laser comprises an InP reflective semiconductor optical amplifier (RSOA) as gain medium and a Si_3N_4 waveguide circuit as an external cavity. The RSOA is butt-coupled to the external cavity. The laser is housed in a compact, 14-pin butterfly package, enabling compatibility with any standard 14-pin laser diode mount. The single-frequency laser contains an integrated thermoelectric cooler (TEC), thermistor, and a polarization-maintaining output fibre with an FC/APC connector.

2. Operation of principle

The main concept of the laser is shown in Figure 1. The gain chip, which contains the SOA, has a high-reflective (HR) coating on the left-hand side and an anti-reflective interface on the right-hand side where it is connected to a TriPleX™ silicon nitride waveguide chip. The waveguide circuit contains two micro-ring resonators (MRRs), indicated as R1 and R2 with slightly different free-spectral ranges (FSRs) to ensure stable single frequency operation by using the Vernier effect. There are four heaters positioned, one to control the phase of the light in the cavity, two to control the resonant wavelengths of the ring resonators R1 and R2, and one controls the fraction of the optical power coupled out of the cavity. The laser's frequency can be tuned over a large range by tuning the MRRs.

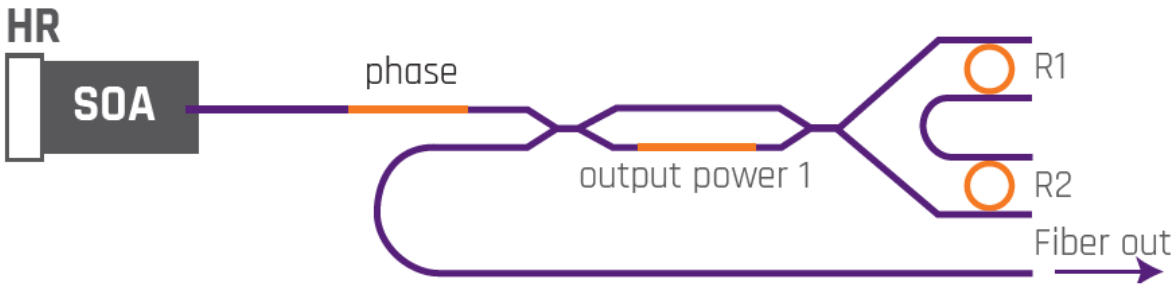


Figure 1 Schematic layout of the laser

3. Optical isolation

Please note, there is no optical isolator added to the package. To avoid affecting the laser performance due to undesired feedback, it is advisable to connect a fiber-optic isolator directly to the output fiber. The isolator should be suitable for the laser's operating wavelength range and should have matching FC/APC connectors.

4. Performance and specifications

	Parameter	Specified values
Optical	Center wavelength	1550 nm ± 5 nm
	Wavelength range	≥ 100 nm
	Wavelength tuning speed	200 µs
	Fiber- coupled output power @ center wavelength	≥ 13 dBm
	Intrinsic linewidth	≤ 1 kHz
	RIN	≤ -150 dBc/Hz @ 1 MHz
	Side-mode suppression ratio	≥ 50 dB
	Polarization extinction ratio	≥ 20 dB

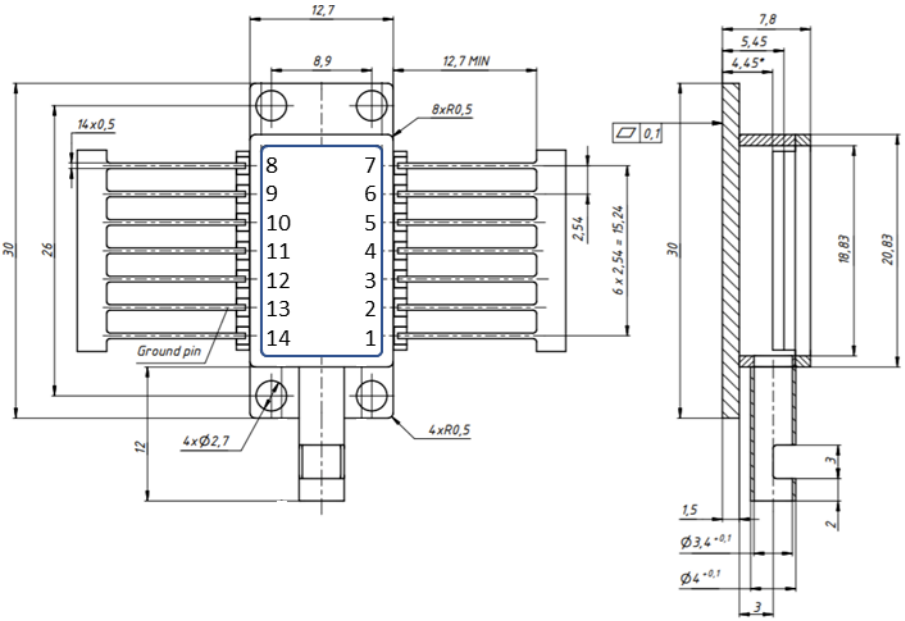
Peltier	ΔT_{max}	71 K
	Q_{max}	6.8 W
	I_{max}	1.8 A
	U_{max}	6.3 V
	R_t	0.06 K/W

Gain section	I_{max}	300 mA
	I_{typ}	250 mA

NTC	B_{value}	3935 K
	Resistance @ 25 °C	10 kΩ

External Cavity	*Heater* V_{max}	14 V
	Number of heaters	3
	Voltage for 2.pi phase shift $V_{2\pi}$	~7 V
	Heater resistance Ring heaters	~150 Ω
	Heater resistance Phase and TC heater	~200 Ω

5. Mechanical structure and Pinout



Pin-out	*1*	Peltier +	*8*	LD Anode
	2	Heater Large Ring	*9*	LD Cathode
	3	Heater Small Ring	*10*	Heater TC
	4	Heater Phase	*11*	Not connected
	5	Heater ground	*12*	Not connected
	6	NTC-	*13*	Housing
	7	NTC+	*14*	Peltier -

Mechanical specifications	*Gold box*	14-pin, butterfly-style package.
	TEC	$Q_{max} = 7.4\ W$ $I_{max} = 1.8\ A$ $U_{max} = 6.3\ V$ $ACR = 2.49\ V$
	Pigtail fiber	50 cm PM fiber with 900 µm loose blue tubing, FC/APC connector, slow-axis alignment.

6. Typical measurements

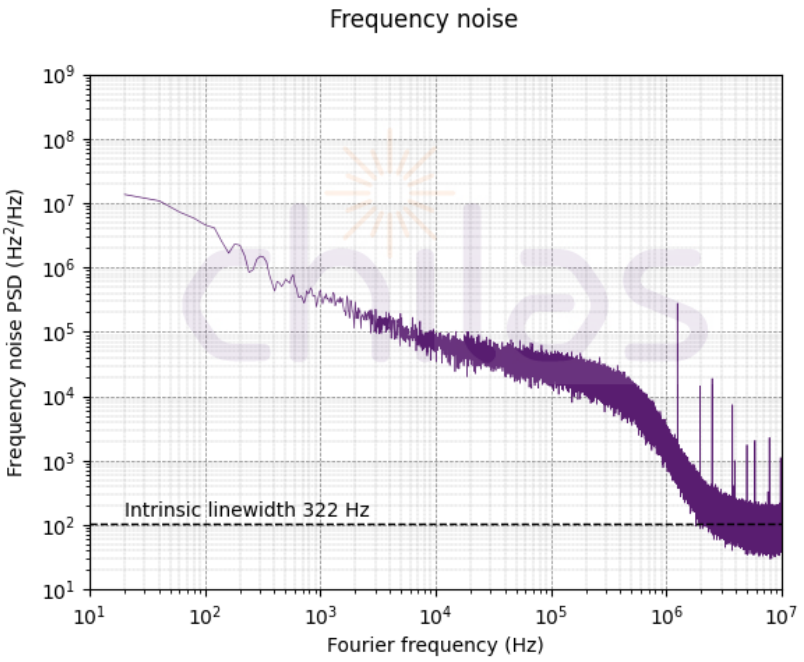


Figure 2 Frequency noise density as a function of frequency.

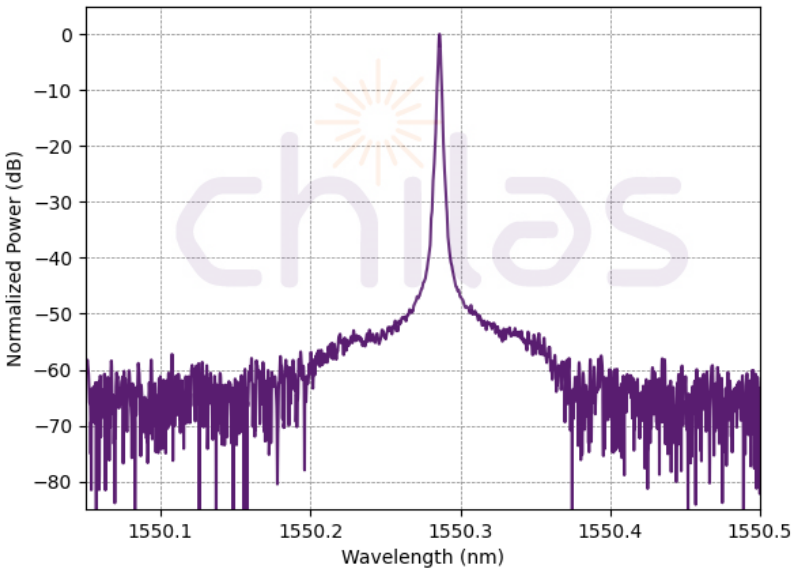


Figure 3 Side-mode suppression ratio