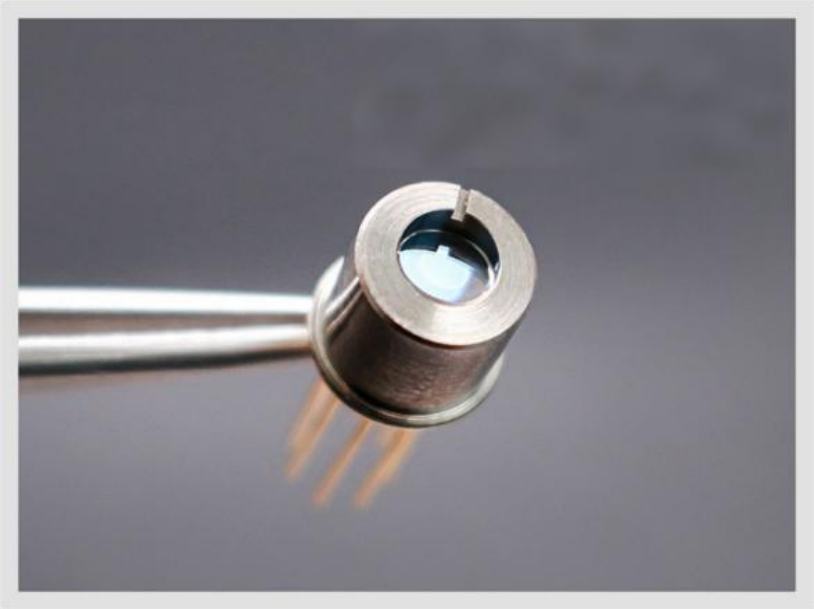
794.7nm 0.5mW SM VCSEL laser diode with TEC



Product Description

The 794.7 nm vertical-cavity surface-emitting laser is a vertically light-emitting GaAsP/AlGaAs single-mode semiconductor laser grown via Metal-Organic Vapor Phase Epitaxy (MOVPE) process, with TO5 package.It achieves wavelength tuning by adjusting laser drive current and operating temperature. Integrated with built-in Thermoelectric Cooler (TEC) and monitoring Photodetector (PD), this laser is specially designed for Tunable Diode Laser Absorption Spectroscopy (TDLAS) applications. Featuring

ultra-narrow linewidth and wide tuning range enabled by TEC temperature control, it is a cost-effective option for rubidium atomic spectrum D1 transition research.

Product features

Vertical-cavity surface-emitting laser architecture； Built-in Thermoelectric Cooler (TEC) and thermistor； Integrated electrostatic discharge protection function ； Ultra-narrow spectral linewidth 2 nm continuous wavelength tuning range supported by TEC temperature control Optimized for rubidium atomic D1 transition research scenarios

Part Number

MP-VCS-794.7-0.5-A81-TO5-SM-TEC

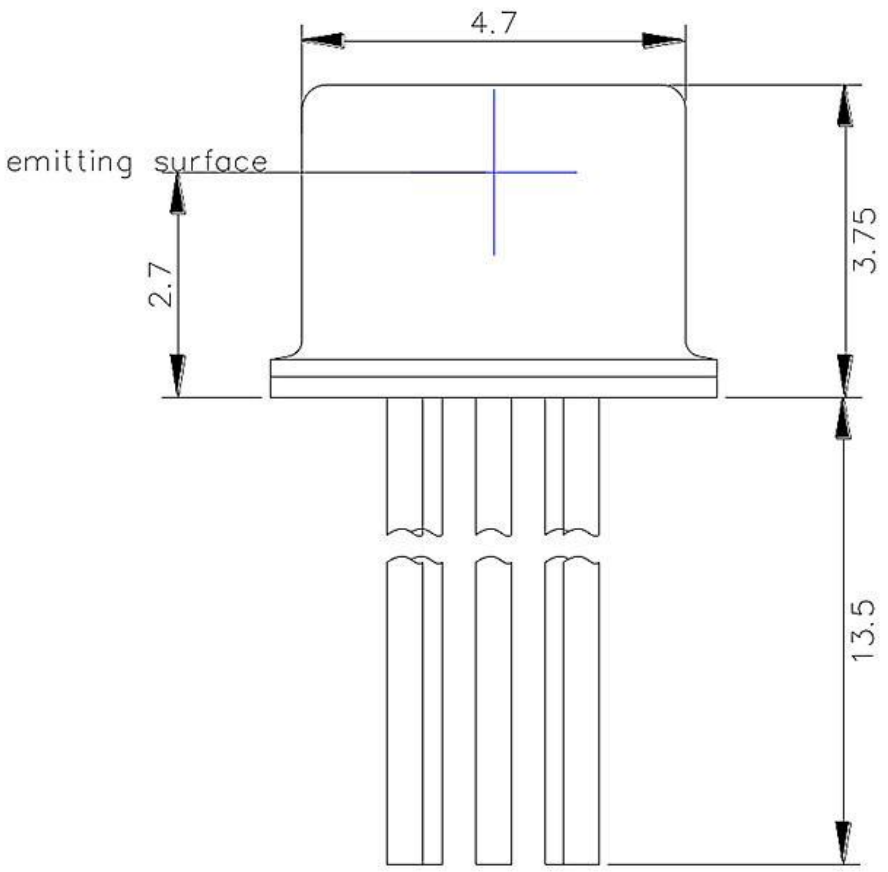
Application area

Tunable Diode Laser Absorption Spectroscopy (TDLAS) | Rubidium Atomic Spectroscopy | Optical Clock (Rubidium Atomic Clock)

Core parameters

Center Wavelength
794.7nm

Dimension Drawing



General Parameters

Detailed parameters

Laser specifications

Condition: Back-of-chip temperature (TO P) of 20°C and operating current (IO P) of 2.0mA unless otherwise noted

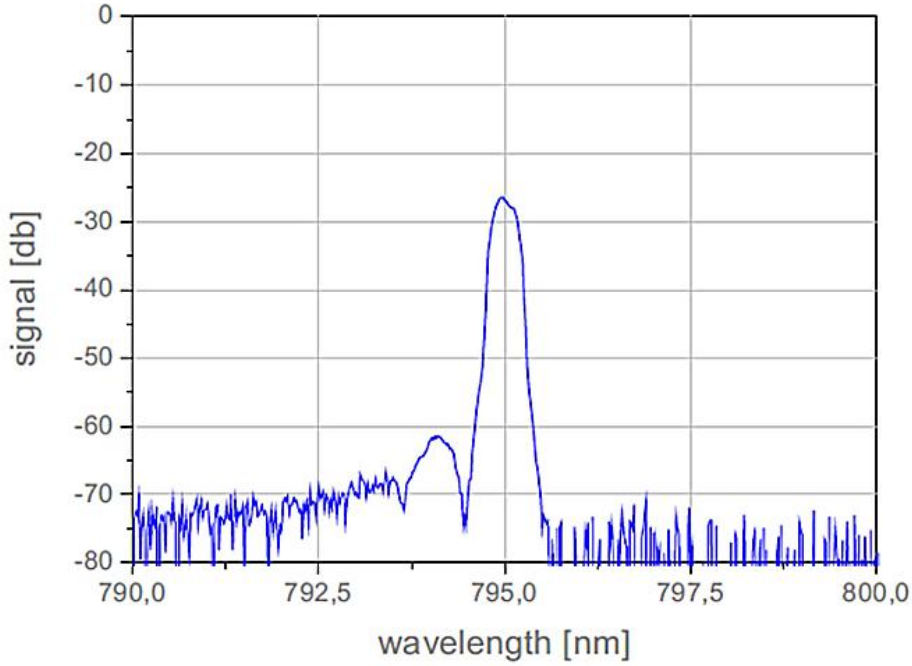
(TO P = Chip Back Temperature, controlled by Semiconductor Refrigerator (TEC)).

Parameters	symbol	Minimum	Typical values	Maximum	unit	Note:
Emission wavelength	λR	794.7				
Threshold current	ITH		0.5		mA	
Output power	Popt	0.25			mW	
Threshold voltage	UTH		1.8		V	
Drive current	IOP			2	mA	Popt = 0.3 mW
Laser voltage	UOP		2		V	Popt = 0.3 mW
Electro-optical conversion efficiency	ηWP		12		%	Popt = 0.3 mW
Slope efficiency	ηS		0.3		W/A	
Differential series resistors	RS		250		Ω	Popt = 0.3 mW
3dB bandwidth	V3dB	0.10			GHz	Popt = 0.3 mW Due to ESD protection diode
Relative intensity noise	RIN		-130	-120	dB/Hz	Popt = 0.3 mW @ 1 GHz
Current tuning wavelength range			0.6		nm/mA	
Temperature-tuned wavelength range			0.06		nm/K	

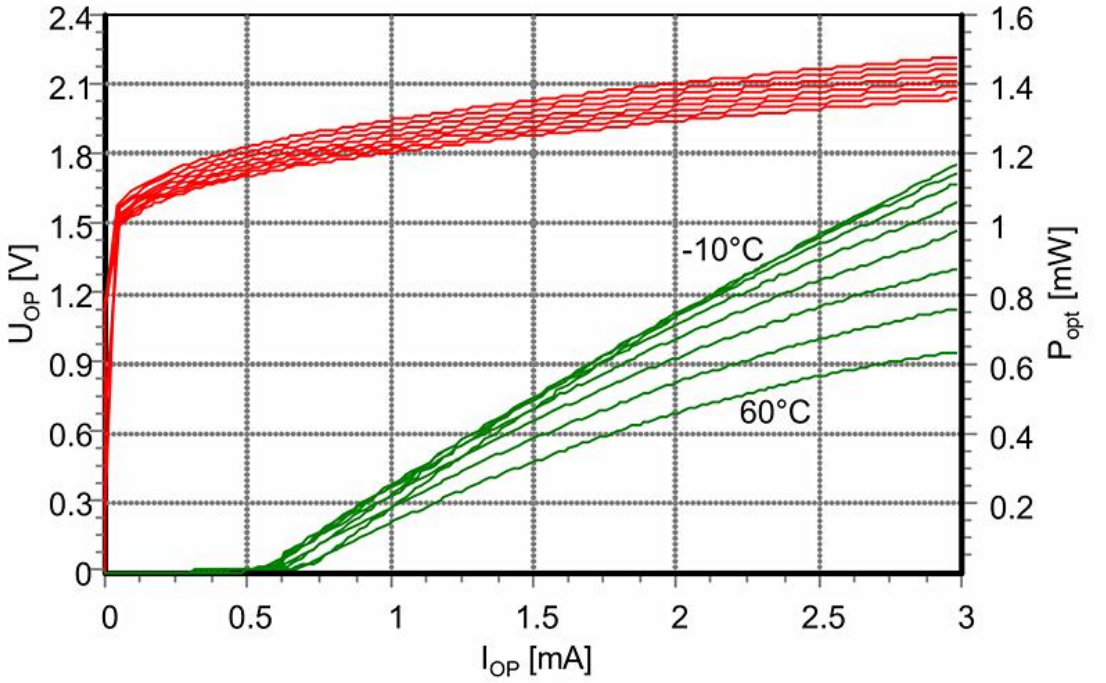
Thermal resistance (VCSEL chip).	Rthermal	3		5	K/mW	
Edge mold suppression ratio		25			dB	I = 2 mA
Beam divergence angle	θ	10		25	°	Popt = 0.3 mW, full width 1/e2
Spectral line width			100		MHz	Popt = 0.3 mW

Thermoelectric chiller (TEC) characteristics	unit	Minimum	Typical values	Maximum	Note:
thermoelectric chiller current	mA	-150(Heating)		+300 (Cooling)	Proper Heart Sink Required
NTC thermistor resistance value	KΩ	9.5	10.0	10.5	T=25°C @10 KΩ
NTC Thermistor Resistance Value (Formula)	KΩ	10/exp{3892-(1/289K-I/TOP)}			

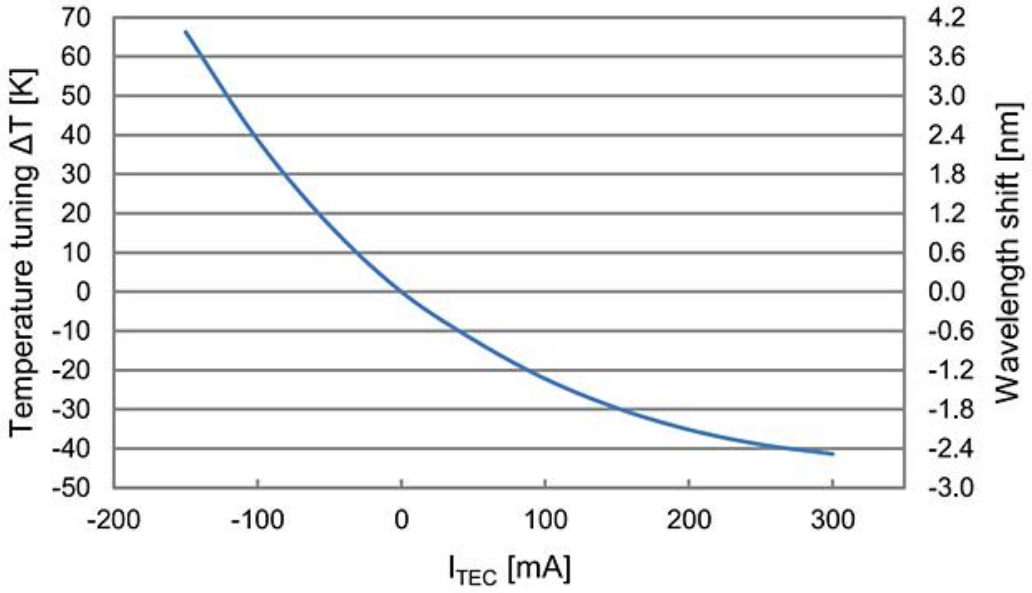
Spectrum



Optical power - current curve (at 25°C).

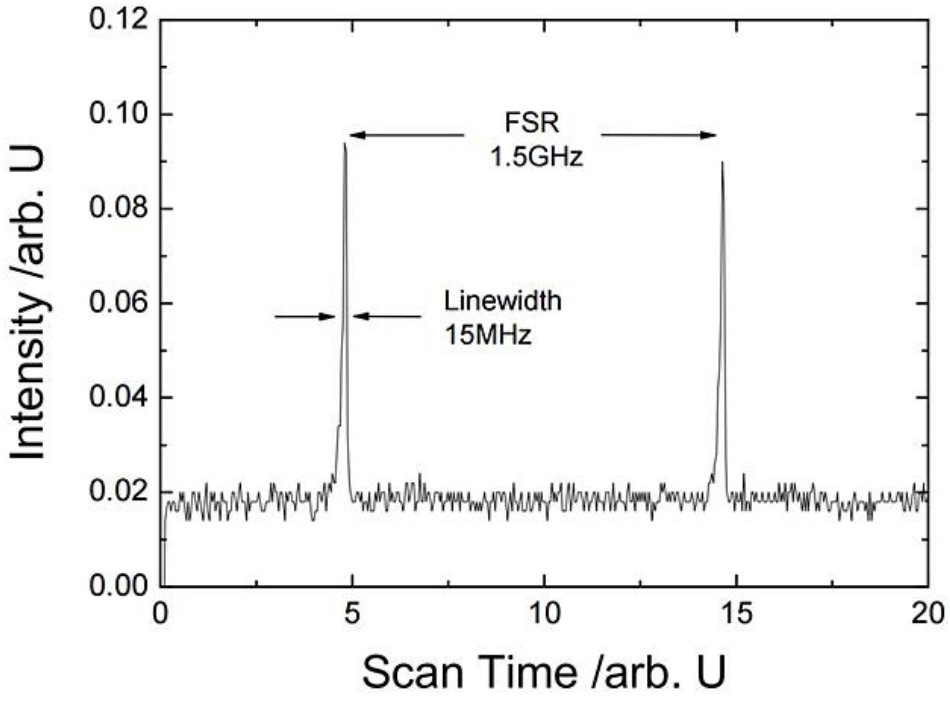


Temperature/wavelength tuning characteristics with semiconductor refrigerator (TEC) current

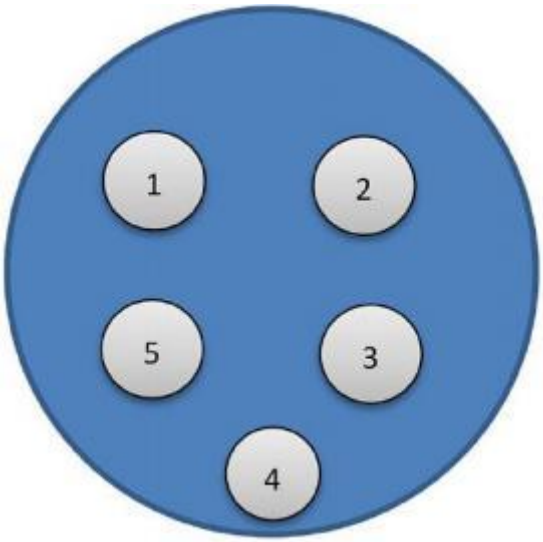


* TEC performance is dependent on heat load, ambient temperature and heatsink properties

Fabry-Perot spectrum



Pin definition



Absolute maximum rating

Item	unit	Minimum	Typical values	Maximum
Storage temperature	℃	-40	25	125
Chip temperature	℃	+10	25	40
Operating current	mA	0	2	2.5
Forward voltage	V	0.8	1.2	1.8
Semiconductor Refrigerator (TEC) Current	mA	-150	-	+300
Welding temperature *	℃	100	130	270
Power consumption	mW	-	-	5

(* The temperature of the semiconductor cooling device (TEC) must be below 150°C).

Ordering information

MP-VCS-□□□□-☆-A8▽-XX

□□□□： Wavelength

0760:760nm

0795:794.7nm

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1653.7：1653.7nm

☆ ： TEC

0：Without TEC 1：With TEC

▽：Wavelength Tolerance 1：±0.5nm

2：±1.5nm

XX: Package TO46

Safety and Operational Precautions

The device operates at a reverse bias voltage and must not be reversed. If the photodiode operates beyond its maximum rating, it may cause damage to the device or pose a safety hazard. The power supply used for this component must not exceed the maximum peak optical power.

Electrostatic protection – Electrostatic discharge (ESD) is the leading cause of unexpected laser diode failure. When operating photodiodes, strict anti-static measures must be taken: use anti-static wristbands, grounding work surfaces, and strictly follow anti-static operating specifications