

Fiber Coupled Tunable Laser VCSEL – 1550nm



(10nm tuning range, linewidth 300MHz, 100kHz tuning speed, 8.5GHz modulation rate, up to 1W output power)



The TVCS series of fiber-coupled tunable lasers combines an electrically movable MEMS mirror with a Vertical Cavity Surface Emitting Laser (VCSEL), providing a cost-effective single-mode laser source with fast wavelength tuning capability. The wavelength sweep is mode hopping-free, ensuring smooth operation. The compact design integrates an optical isolator and TEC cooler for enhanced stability. It is available with single-mode, polarization-maintaining (PM), or multimode fiber. This device is ESD-sensitive and requires mounting on a heat sink. A dedicated driver is available, offering stable laser output, 100kHz fast wavelength sweep, and digital laser modulation up to 1GHz. The TVCS can be driven at or beyond resonance, with resonance frequencies ranging from 250 to 320 kHz, depending on the batch.

For higher output power, up to 1W in both single-mode (SM) and polarization-maintaining (PM) configurations, we offer integration with an erbium-doped fiber amplifier (EDFA), which also provides output intensity stability through a precision feedback control loop.

Features

- 10 nm Wavelength Tuning Range
- 0.6 mW CW Single Mode Output
- Isolator Integrated
- Mode Hopping Free Tuning
- 100 kHz Fast Wavelength Scan
- TEC Cooler Integrated
- SM and PM Fiber-Coupled
- 10 Gb/s Direct Modulation

Applications

- Sensor Systems
- OTC
- LIDAR
- Instrument
- Communications

Specifications

Parameter	Min	Typical	Max	Unit
Center Wavelength	1525		1575	nm
Wavelength Tuning Rang		± 4		nm
Tuning Speed	0		200	kHz
Modulation Bandwidth (S21)	DC		8.5	GHz
Spectral Width (-3dB FWHM, CW)			300	MHz
Side-Mode Suppression Ratio (SMSR)	30	40		dB
Polarization Extinction Ratio (PM Fiber)	20		25	dB
Relative Intensity Noise (RIN)			-128	dB/Hz
Output Optical Power *	0.4	0.7	1000	mW
Electrical Return Loss (S22)		-5		dB
RF Input Impedance		50		Ω
Laser Threshold Current		7		mA
Laser Operation Current		18	25	mA
Laser Revere Voltage		3		V
Wavelength Tuning Current		100		μA
Wavelength Tuning Voltage			13	V
TEC Voltage		0.35	1.5	V
TEC Current		0.05	0.55	A
TEC Operating temperature	5		35	°C
Thermistor Resistance		10		kΩ
Operating Temperature	-25		65	°C
Storage Temperature	-45		85	°C

* Higher power is achieved with an integrated optical amplifier

Note: The specifications provided are for general applications with a cost-effective approach. If you need to narrow or expand the tolerance, coverage, limit, or qualifications, please [click this link](#):



CAUTION: Device is highly sensitive to electrostatic discharge. Solder temperature <350°C <10 seconds

Legal notices: All product information is believed to be accurate and is subject to change without notice. Information contained herein shall legally bind Agiltron only if it is specifically incorporated into the terms and conditions of a sales agreement. Some specific combinations of options may not be available. The user assumes all risks and liability whatsoever in connection with the use of a product or its application.

Rev 11/01/24

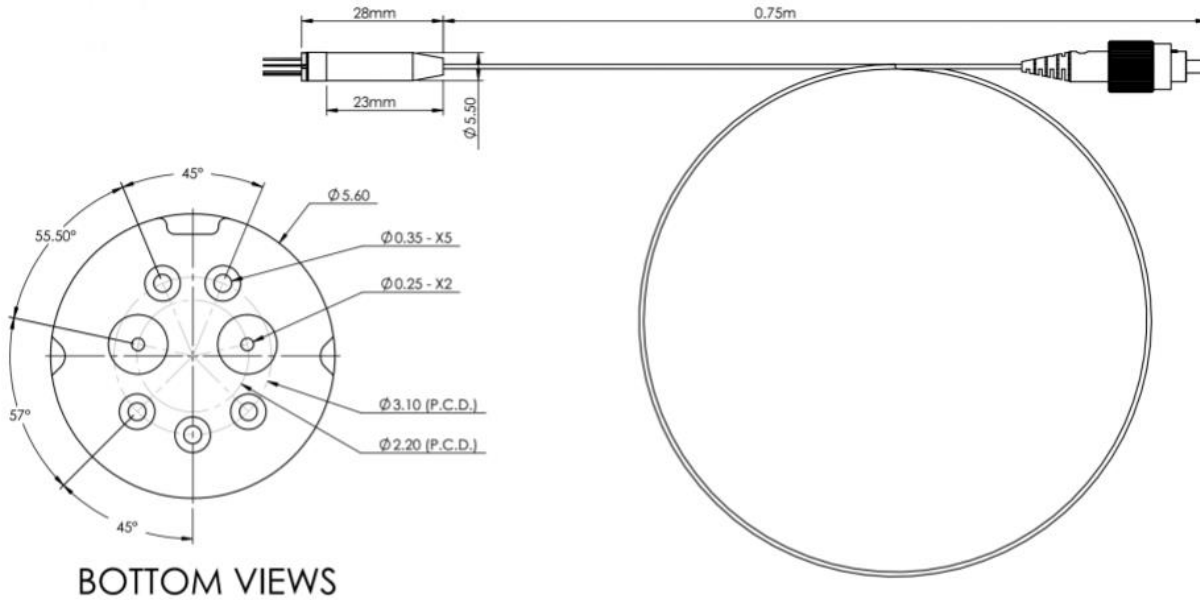
Fiber Coupled Tunable Laser VCSEL – 1550nm



(10nm tuning range, linewidth 300MHz, 100kHz tuning speed, 8.5GHz modulation rate, up to 1W output power)

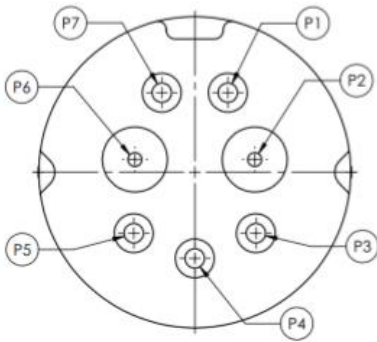
DATASHEET

Mechanical Dimensions (mm)



*Product dimensions may change without notice. This is sometimes required for non-standard specifications.

Electrical Connection



PIN NO.	ASSIGNMENT
P1	TEC +
P2	LD -
P3	TUNING Vt +
P4	THERMISTOR -
P5	THERMISTOR +
P6	LD + / TUNING Vt -
P7	TEC -

CAUTION: The Wavelength Tuning (PIN6) must not share a common ground with the LD Control (PIN2), as this will damage the device.

Fiber Coupled Tunable Laser VCSEL – 1550nm



(10nm tuning range, linewidth 300MHz, 100kHz tuning speed, 8.5GHz modulation rate, up to 1W output power)

DATASHEET

Ordering Information

Prefix	Wavelength	Configure	Optical Power*	Driver	Fiber Type	Fiber Cover	Fiber Length	Connector
TVSE-	1060nm = 60 1550nm = 50 1540nm = 54 1558nm = 58 1566 nm = 66 Special = 0	Standard = 1 Special = 0	Standard = 1 10mW = 2 100mW = 3 500mW = 5 1W = 9 Special = 0	No = 0 Yes = 1	SM28 = 1 PM1550 = 2 50/125 = 3 62.5/125 = 4 105/125 = 5 Hi1060 = 7 PM980 = 9 Special = 0	0.9mm tube = 3 Special = 0	1m = 1 Special = 0	FC/APC = 3 FC/PC = 2 SC/PC = 4 SC/APC = 5 ST/PC = 6 LC/PC = 7 LC/APC = A LC/UPC = U Special = 0

* Power >1 mw is packaged in a plug-play benchtop

Marked in red on special order

Application Notes

Fiber Core Alignment

Note that the minimum attenuation for these devices depends on excellent core-to-core alignment when the connectors are mated. This is crucial for shorter wavelengths with smaller fiber core diameters that can increase the loss of many decibels above the specification if they are not perfectly aligned. Different vendors' connectors may not mate well with each other, especially for angled APC.

Fiber Cleanliness

Fibers with smaller core diameters (<5 μm) must be kept extremely clean, contamination at fiber-fiber interfaces, combined with the high optical power density, can lead to significant optical damage. This type of damage usually requires re-polishing or replacement of the connector.

Maximum Optical Input Power

Due to their small fiber core diameters for short wavelength and high photon energies, the damage thresholds for device is substantially reduced than the common 1550nm fiber. To avoid damage to the exposed fiber end faces and internal components, the optical input power should never exceed 20 mW for wavelengths shorter 650nm. We produce a special version to increase the handling by expanding the core side at the fiber ends.

Fiber Coupled Tunable Laser VCSEL – 1550nm

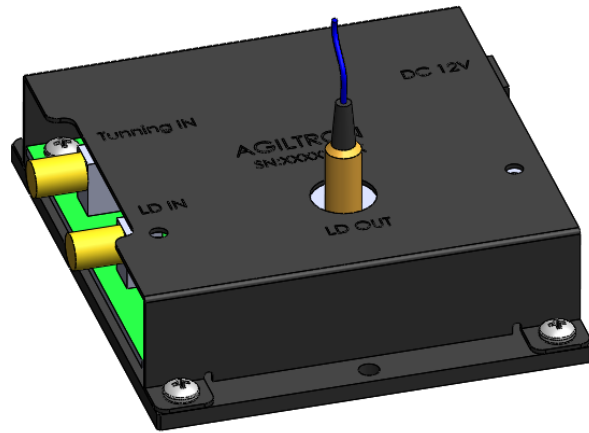
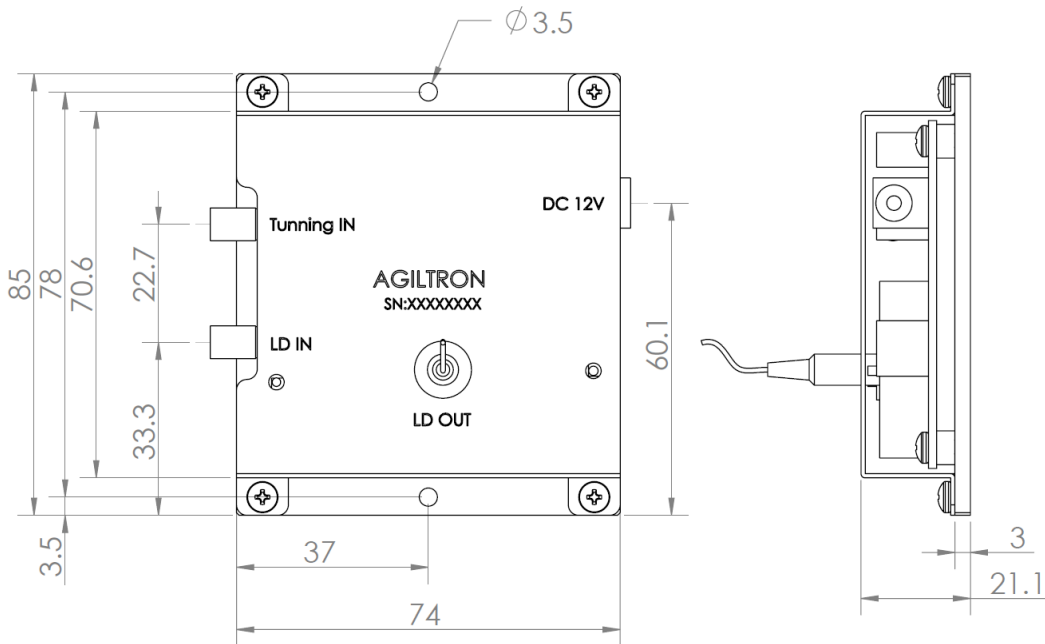


(10nm tuning range, linewidth 300MHz, 100kHz tuning speed, 8.5GHz modulation rate, up to 1W output power)

DATASHEET

Driver Description

- TEC Cooling: Integrated thermoelectric cooler (TEC) with adjustable temperature settings (preset to 10°C).
- Laser Current Control: Constant current control, with user-settable 0-5V, SMA input with impedance >1K
- Direct Laser Modulation: The same SMA can be used to directly modulate laser at speeds up to 1 Gb/s.
- Fast Wavelength Scan: Capable of performing fast wavelength scanning at 100 kHz. 0-5V, SMA input with impedance >1K
- Constant Output Power Control: Optional external feedback tap available for maintaining stable laser output power.
- High Output Power: A cost effective optical amplifier can be integrated to increase the output power up to 100mW (\$550).



Information contained herein is deemed to be reliable and accurate as of the issue date. Photonwares reserves the right to change the design or specifications at any time without notice. Agiltron is a registered trademark of Photonwares Corporation in the U.S. and other countries.

Fiber Coupled Tunable Laser VCSEL – 1550nm



(10nm tuning range, linewidth 300MHz, 100kHz tuning speed, 8.5GHz modulation rate, up to 1W output power)

DATASHEET

Driver Operation Manual

The TVCS driver integrates a low-noise laser driver with a modulation speed of up to 200MHz, a TEC cooler, and MEMS wavelength tuning circuitry. The TEC temperature is preset at factory to 15°C

Operation Instructions:

- Power Up:** Connect the included 12V DC power supply (5.5 x 2.1mm connector).
- Laser Diode Power/Modulation Control:** Apply a 0-5V control signal to the SMA connector labeled "LD IN." Ensure no negative voltage is applied.
- Wavelength Tuning:** Apply a 0-5V control signal to the SMA connector labeled "TUNING IN." Ensure no negative voltage is applied.
- Laser Output:** The laser output is available through the FC/APC connector labeled "LD OUT."
- Driven at Resonance or Beyond:** The resonance is between 250 and 320KHz, depends on the batch. Driving with sinusoidal signal at resonance achieve widest tuning. One can increase the sweep rate and adjust min and max tuning voltage for optimizing the optical spectrum. Do not exceed the max / min tuning voltage. When driving beyond resonance the optical spectrum is decreased. At 1MHz sinusoidal the tuning range is about 1nm.