

# Fiber Coupled Tunable Laser VCSEL – 1060nm

(30nm tuning range, linewidth 470MHz, 100kHz tuning speed)



DATASHEET

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The TVCS series of fiber-coupled tunable lasers integrates an electrically movable MEMS mirror with a Vertical Cavity Surface Emitting Laser (VCSEL), offering a cost-effective single-mode laser source with fast emitting wavelength tuning capability. The wavelength sweep is mode hopping-free. The compact tunable laser integrated an optical isolator and a TEC cooler for stable operation. It is available with single-mode fiber, polarization-maintaining fiber, and multimode fiber. The device is ESD-sensitive and requires mounting on a heat sink. We provide a driver that provides stable laser output power and 100kHz fast wavelength sweep.

We offer higher output optical power of up to 1W in both SM and PM by integrating with an EDFA, which also provides output intensity stability via a precision feedback control loop.

## Features

- 40 nm Wavelength Tuning Range
- 0.1 mW CW Single Mode Output
- Isolator Integrated
- Mode Hopping Free Tuning
- 100 kHz Fast Wavelength Scan
- TEC Cooler Integrated
- SM and PM Fiber-Coupled

## Applications

- Sensor Systems
- OTC
- LIDAR
- Instrument
- Communications

## Specifications

Parameter	Min	Typical	Max	Unit
Center Wavelength	1030		1070	nm
Wavelength Tuning Rang		30	40	nm
Tuning Speed	0		200	kHz
Spectral Width (-3dB FWHM, CW)		470		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 *	0.1		0.5	mW
Threshold Current Over Tuning Range		1	4.5	mA
Output Laser Power Difference			10	dB
Laser Operation Current		3	4.5	mA
Laser Driving Voltage		3	6	V
Wavelength Tuning Current		0.1		mA
Wavelength Tuning Voltage			9	V
TEC Voltage			0.9	V
TEC Current		0.35	0.5	A
TEC Operating temperature	5	23	30	°C
Thermistor Resistance		10		kΩ
Operating Temperature	-25		65	°C
Storage Temperature	-45		85	°C

\* Higher power is available with integrated optical amplifier



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

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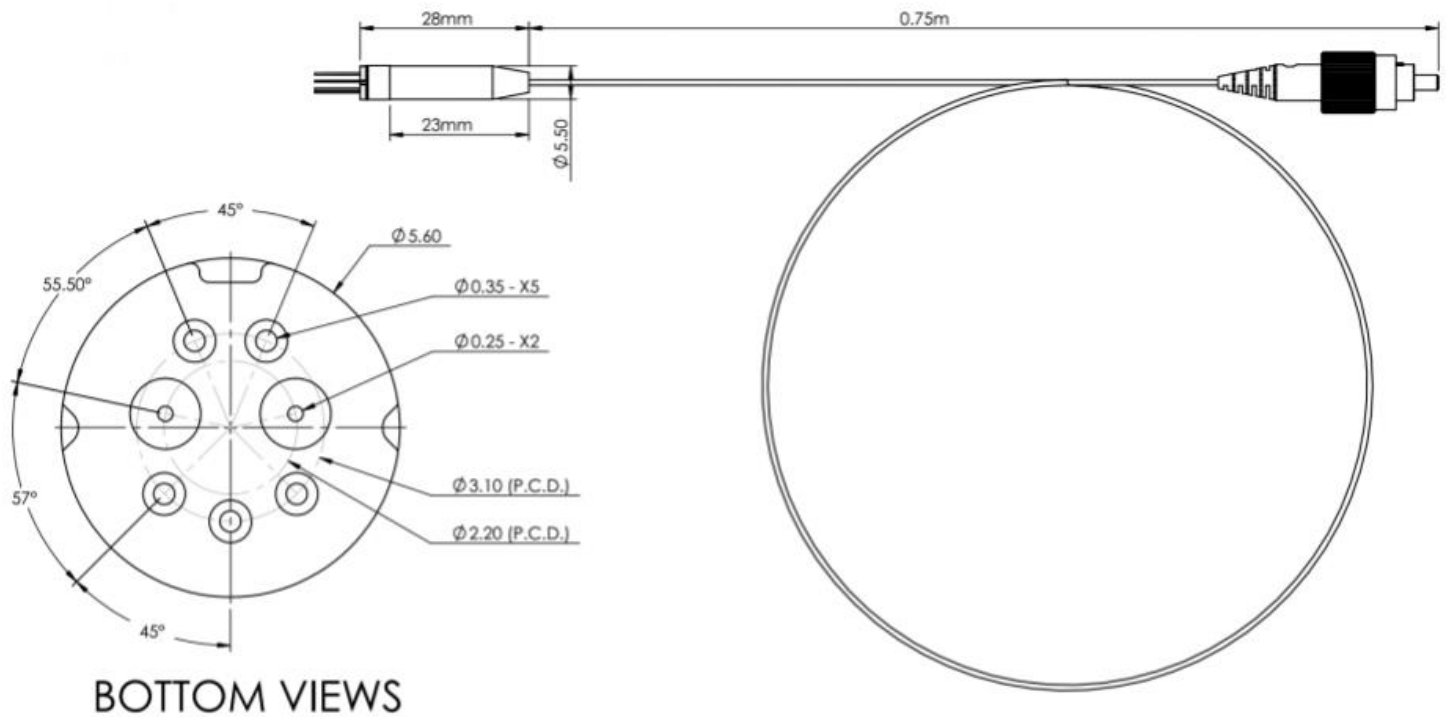
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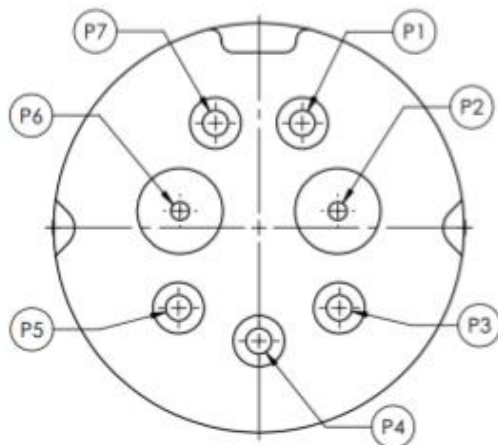
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### Mechanical Dimensions (mm)



### Electrical Connection



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

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

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### Ordering Information

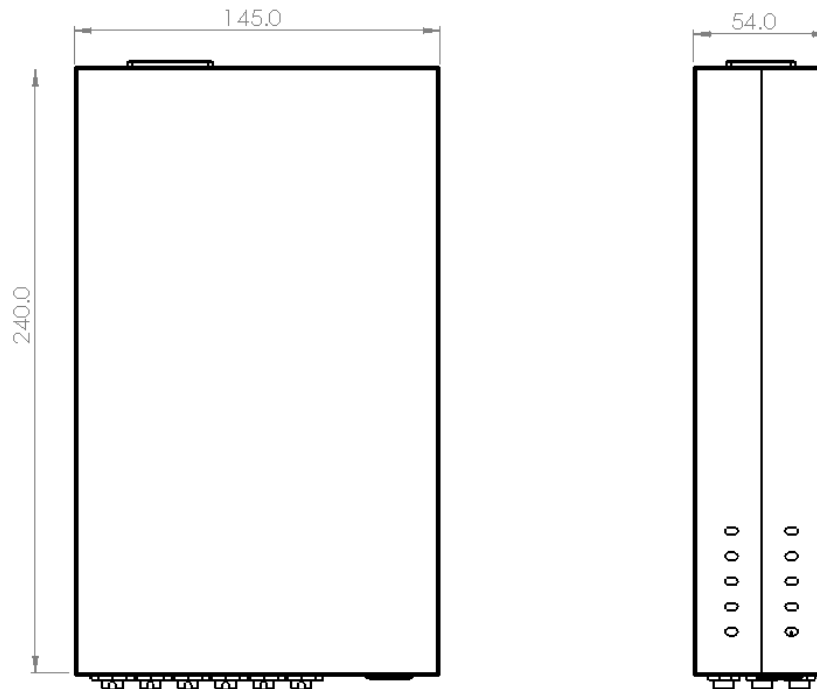
Prefix	Wavelength	Tuning Range	Optical Power <sup>[1]</sup>	Driver	Fiber Type	Fiber Cover	Fiber Length	Connector	Benchtop <sup>[2]</sup>
TVSE-	1060nm = 60 Special = 0	30nm = 1 40nm = 2 50nm = 3 Special = 0	0.1mW = 1 10mW = 2 100mW = 3 500mW = 5 Special = 0	No = 0 Yes = 1	Hi1060 = 6 PM980 = 9 Special = 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	Non = 1 Yes = 2

[1]. Red indicate incorporated with a fiber amplifier. The unit is turkey box with controller

[2]. The benchtop unit integrates a power supply compatible with 100-240 VAC, features an optical output connector on the front panel, and power/ control interfaces on the rear panel.

Marked in red on special order

### Benchtop Box Mechanical Dimension



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### ESD Test

ESD - Discharge to housing	IEC 61000-4-2 Performance class B contact 4kV, air 8kV	ESD test setup	3	Link test during exposure	9/9/20	10/9/20	Pass	Class A 4kV (contact) Class B 8kV (contact) Class A 15kV (air)
ESD - Discharge to electrical pins - Trx	JEDEC/EIA JESD22-A114-B HBM class 1C ± 1kV	ESD test setup	3	E/O test	9/10/20	9/10/20	Pass	

### 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.

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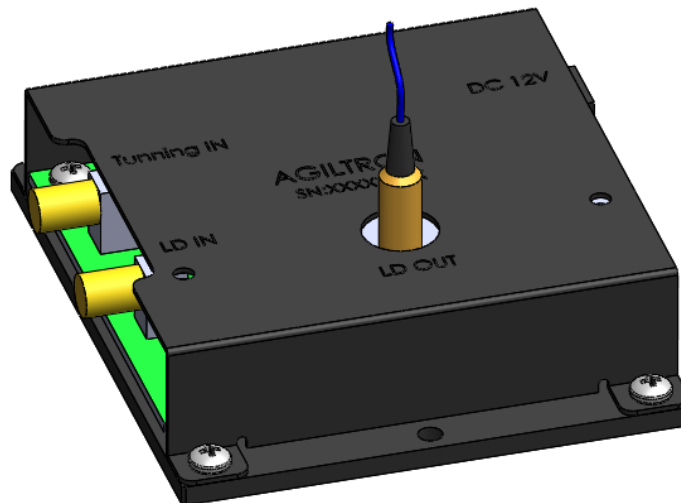
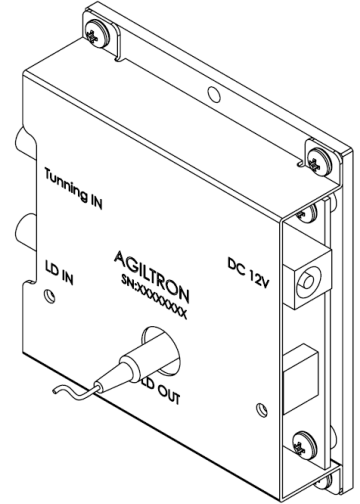
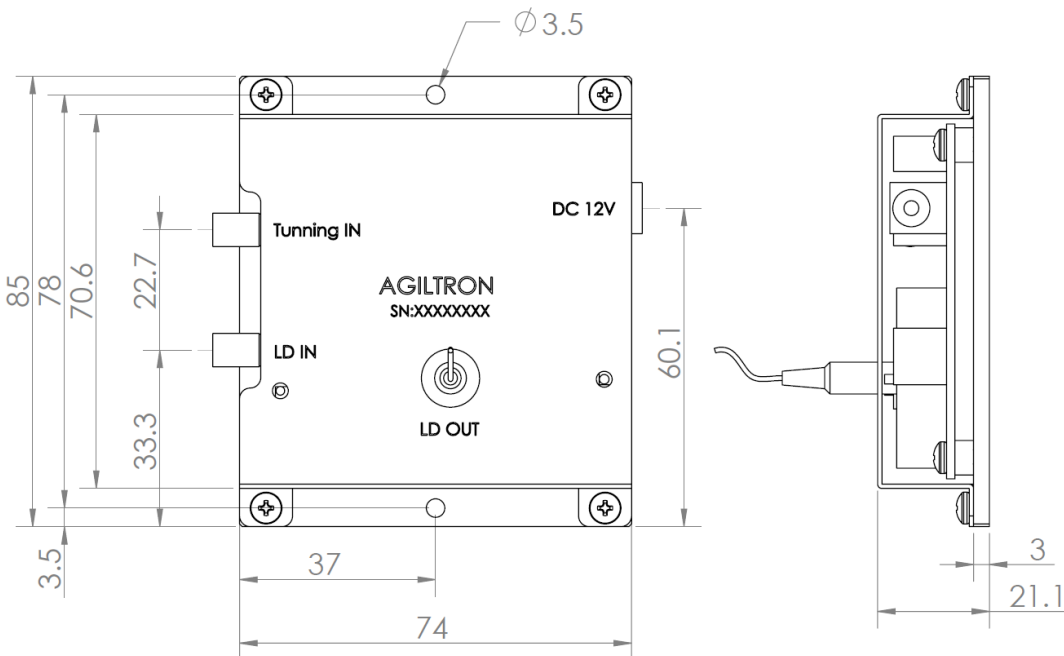
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### Driver – Mechanical Dimensions (mm)

- TEC Cooling – with temperature setting
- Laser Current Control – constant current that is settable
- Constant Output Power Control – add an external tap detector to perform feedback
- 100 kHz Fast Wavelength Scan
- TEC Cooler Integrated



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## Driver Operation Manual

The TVCS driver contains a low noise laser driver with modulation speed up to 200MHz, a TEC laser chip cooler, and a MEMS wavelength tuning circuitry.

### Operation Instruction

1. **Power Up** – Plug in the accompanied wall pluggable DC 12V having connector size 5.5 x 2.1mm.
2. **Laser Diode Power Control** – Applying 0-5v control signal into the SMA connector marked (**LD IN**). Do not input a negative voltage.
3. **Tune Output Wavelength** – Applying 0-5v control signal into the SMA connector marked (**TUNING IN**). Do not input a negative voltage.
4. **Laser Output** – LD OUT: FC/APC connector