

Fiber Coupled VCSEL

(Multimode Fiber)



DATASHEET

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Features

- Low Operating Current
- High Speed
- Hermetical Seal
- PD Available
- Low Cost

Applications

- Medical and Dermatology
- Holography
- Metal Cutting/Engraving
- Microfabrication



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Rev 03/13/26

Agiltron offers a variety of fiber pigtailed VCSELs (Vertical Cavity Surface Emitting Laser) in ready to use fiber pigtail coupled packages. Packaging options are fully customizable, including integrated isolator, MEMS attenuator, and wavelength tunable VCSELs in a fiber coupled co-axial assemblies.

VCSEL devices may also be specified with or without internal monitoring function.

Due to their high sensitivity to electrostatic discharge, warranty coverage applies only to fully metal covered modules the benchtops, which include proper protection. Other versions of the lasers and photodetectors are not covered by any warranty. Please use them with great caution.

Specifications

Parameter	Min	Typical	Max	Unit
Wavelength	600	850	1550	nm
FWHM		0.85		nm
Operating Current	2	6		mA
Output power		1		mW
Response time		100		ps
Laser Continuous Average Current		6		mA
Laser Peak Forward Current		10		mA
Laser Reverse Voltage			8	V
Operating Temperature	0		75	°C
Storage Temperature	-40		85	°C
Lead solder temperature			260	°C

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](#):

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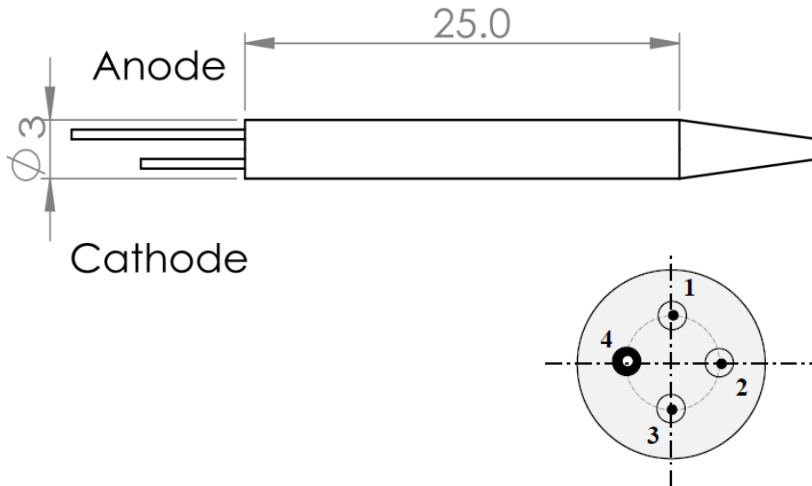
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Packaging Information

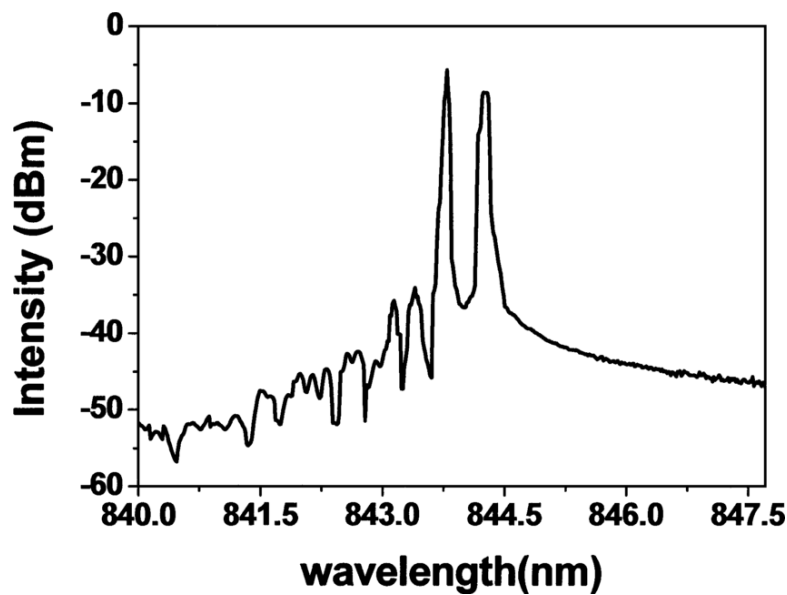


PIN Layout:

1. VCSEL Cathode / PD Cathode
2. PD Anode
3. VCSEL Anode
4. Case

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

Typical Emission Spectrum



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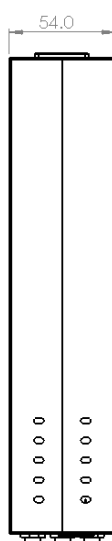
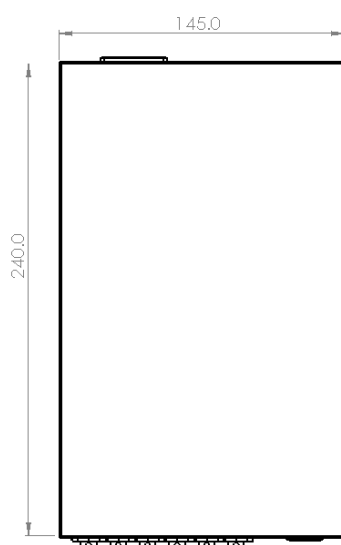
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Ordering Information (Part Number)

Prefix	Wavelength	PD Integrated	Package	Driver ^[1]	Fiber Type	Fiber Cover	Fiber Length	Connector ^[2]
FCVL-	850nm = 85 1550nm = 15	PD = 1 No PD = 0	Standard = 10 Isolator = 20 VOA = 02 Special = 00	Non = 0 PCB = 1 Benchtop = 2	50/125 = 2 62.5/125 = 3 Special = 0	Bare fiber = 1 900um tube = 2 Special = 0	0.25m = 1 0.5m = 2 1m = 3 Special = 0	None = 1 FC/PC = 2 FC/APC = 3 SC/PC = 4 SC/APC = 5 LC/PC = 7 LC/APC = A LC/UPC = U Special = 0

- [1]. PCB (with power supply) is ESD unprotected for OEM application. The benchtop is ESD protected plug-play unit that 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.
- [2]. The default connector configuration uses fiber with 0.9 mm buffer protection. The connector cannot be installed directly onto bare fiber because the bare fiber is prone to damage during shipping. However, the connector can be assembled on bare fiber if a 3 cm protective loose tube is added for reinforcement. The customer may remove this protective tube after testing. The optical power handling of a standard connector is less than 0.5 W for SMF-28 fiber and decreases further for smaller-core fibers.

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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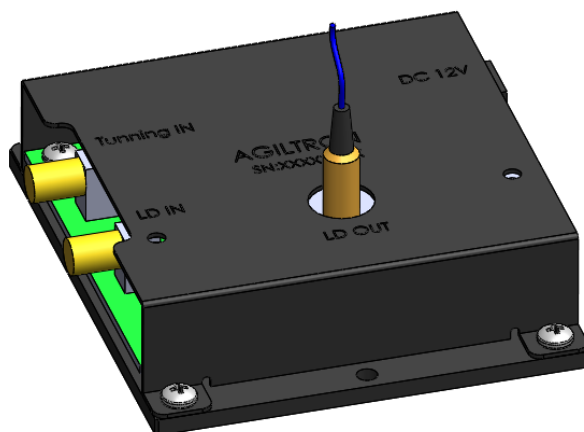
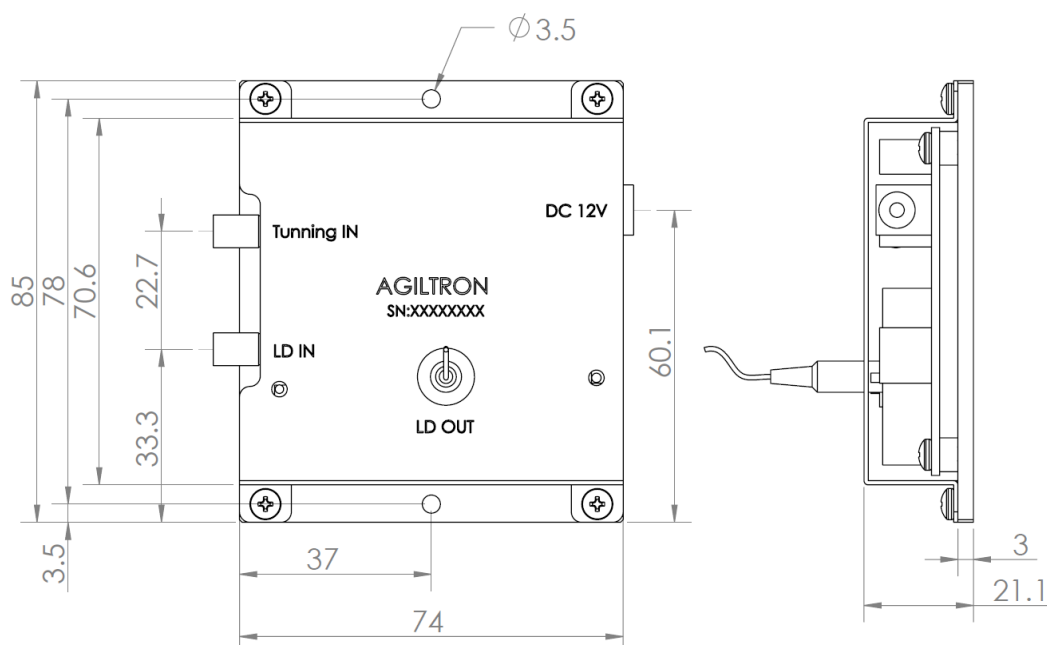
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Driver Description

- 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).



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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:

1. **Power Up:** Connect the included 12V DC power supply (5.5 x 2.1mm connector).
2. **Laser Diode Power/Modulation Control:** Apply a 0-5V control signal to the SMA connector labeled "LD IN." Ensure no negative voltage is applied.
3. **Wavelength Tuning:** Apply a 0-5V control signal to the SMA connector labeled "TUNING IN." Ensure no negative voltage is applied.
4. **Laser Output:** The laser output is available through the FC/APC connector labeled "LD OUT."
5. **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.

Caution: Do not share the ground between the laser power control input and the laser tuning input. Doing so can cause permanent damage to the laser.

Benchtop



Agiltron cost-effective LDCB series benchtop control kit is designed for easy laser diode mounting and precise control. It incorporates a high-precision, low-noise auto-feedback drive electronics to ensure constant output power or a constant driving current and an integrated temperature control unit maintains optimal operating conditions. The system provides up to 1A driving current and up to 2A TEC cooling current. Each system features a front fiber output connector. The user interface includes an intuitive LCD display for independent control of output power and temperature via two front rotating knobs. The LDCB also includes a universal power supply compatible with 100 to 240 VAC. The LDCB has a built-in isolator option to prevent reflection-induced laser emissions instability. The LDCB is designed as a laser diode and TEC controller kit for customer to install laser diode.