SureLock™

CP Stabilized Laser Diodes

Attalon's CP Stabilized Laser Diode is a collimated wavelength stabilized diode housed in a standard 9 mm TO-can form factor, facilitating easy integration into instrumentation-grade devices. CP stabilized diodes are available in both spatial multi and single transverse mode optical beam configurations, catering to diverse application needs. These diodes ensure consistent wavelength stability, offering either spectrum-narrowed or single longitudinal mode spectral output. They are locked from threshold to full power, enabling versatile usage modes. This cost-effective laser features a standard package design, extremely narrow linewidth, broad temperature operating range, and low power consumption, making it ideal for a wide array of analytical instrumentation and metrology applications.

All SureLock™ Series lasers are stabilized using the Attalon PowerLocker™ Volume Holographic Grating (VHG), ensuring precise, ultra-stable center wavelengths, low temperature dependence, and consistent spectral performance over the stabilized temperature region.

FEATURES

- Collimated optical output beam
- Consistent spectral characteristics from threshold to maximum optical power
- Cost-effective, instrumentation-grade performance for measurement systems
- Low power consumption
- Stable wavelength across a broad temperature range
- Widely recognized standard 9mm TO-can form factor for ease of integration
- Narrow spectral linewidth – single frequency for single spatial mode diodes and narrow spectral bandwidth for multimode diodes.
- Wavelength stability across operating range <0.01 nm/°C
- Customizable power, wavelength and tolerances available

APPLICATIONS

- HeNe Replacement
- Raman Spectroscopy
- Metrology
- Holography
- Interferometry
- Bio-instrumentation
- Particle Counting
- Fluorescence
- Sensing
- Analytical Instrumentation

Attalon

Specifications	CP-405 nm 25 mW	CP-405 nm 40 mW	CP-633 nm 40 mW	CP-633 nm 70 mW	CP-638 nm 120 mW
SKU	116-ER432-004	116-ER432-001	116-ER371-007	116-ER371-004	116-ER371-014
Spatial Mode	Single Mode				
Output Power (mW), Typical	25	40	40	70	120
Center Wavelength[1] (nm)					
Minimum	404.5	404.5	632.75	632.75	637.5
Typical	405	405	633	633	638
Maximum	405.5	405.5	633.25	633.25	638.8
Typical Linewidth (MHz)	160	160	20	20	20
Central Stabilized Temperature (°C)					
Minimum	15	15	15	15	15
Typical	25	25	25	25	25
Maximum	35	35	35	35	35
Stabilized Temperature Range (°C)					
Minimum	10	10	10	10	10
Typical	14	14	14	14	14
Threshold Current (mA)					
Typical	42	42	60	60	60
Maximum	50	50	80	80	80
Operating Current (mA)					
Typical	60	82	120	160	220
Maximum	90	100	210	210	270
Operating Voltage (V)					
Typical	4.4	4.4	2.7	2.7	2.8
Maximum	5	5	3	3	3.3
Monitoring Output Current (mA)					
Minimum	-	-	-	-	0.3
Typical	-	-	-	-	0.6
Maximum	-	-	-	-	1.3
Photodiode Reverse Voltage (V) Maximum	-	-	-	-	30
Laser Reverse Voltage (V) Maximum	2	2	2	2	2
Beam Divergence, Perpendicular (mrad)					
Typical	0.9	0.9	1	1	1.3
Maximum	2	2	1.6	1.6	1.7
Beam Divergence, Parallel (mrad)					
Typical	1.4	1.4	1.7	1.7	1.9
Maximum	2	2	2.1	2.1	2.3

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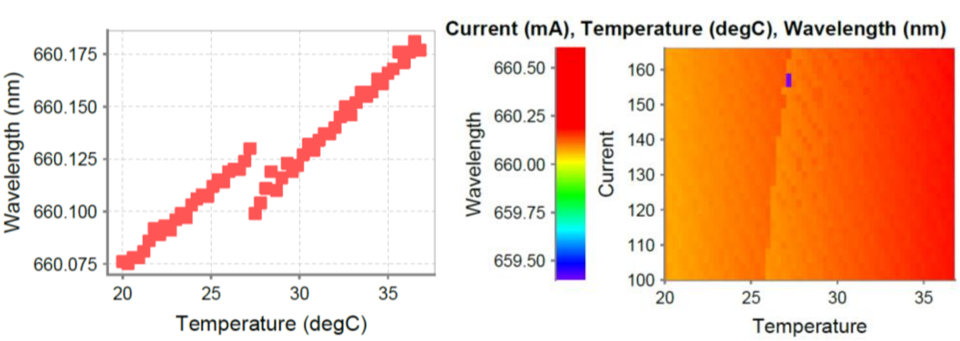
Off Axis Angle, Perpendicular (Degree) Maximum	1	1	1	1	1
Off Axis Angle, Parallel (Degree) Maximum	1	1	1	1	1
Differential Efficiency (mW/mA)	1	1	0.8	0.8	1.1
Polarization Typical	50:1	50:1	100:1	100:1	100:1
Polarization Orientation	TE	TE	TE	TE	TE
Pin out (Pin 1, Case-Pin 2, Pin 3)	LA, - ,LC	LA, - ,LC	LA, - ,LC	LA, - ,LC	PC,PA-LC,LA
Collimated Beam Size (mm) Typical	0.45 x 0.75	0.45 x 0.75	0.5x0.9	0.5x0.9	0.5x0.75
Dimension	C	C	D	D	D
Operating Temperature[2] (°C) Minimum Maximum	 0 40	 0 40	 0 40	 0 40	 0 40
Storage Temperature[2] (°C) Minimum Maximum	 -10 60	 -10 60	 -10 60	 -10 60	 -10 60

All specifications are at rated power with a case temperature within stabilized temperature range unless otherwise noted.

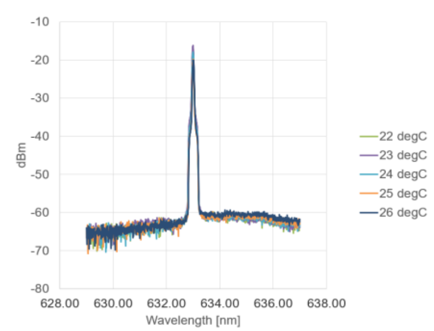
[1] Wavelengths specified are vacuum referenced. Ex: 632.991nm vacuum referenced is equivalent to 632.816nm standard air referenced for HeNe

[2] Non-condensing.

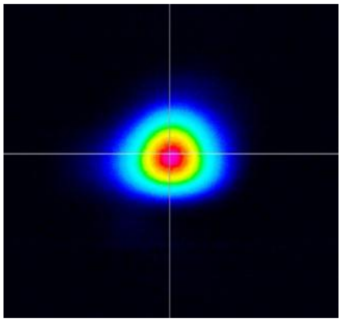
Wavelength vs Temperature vs Current Dependency Example



Optical Spectrum Example

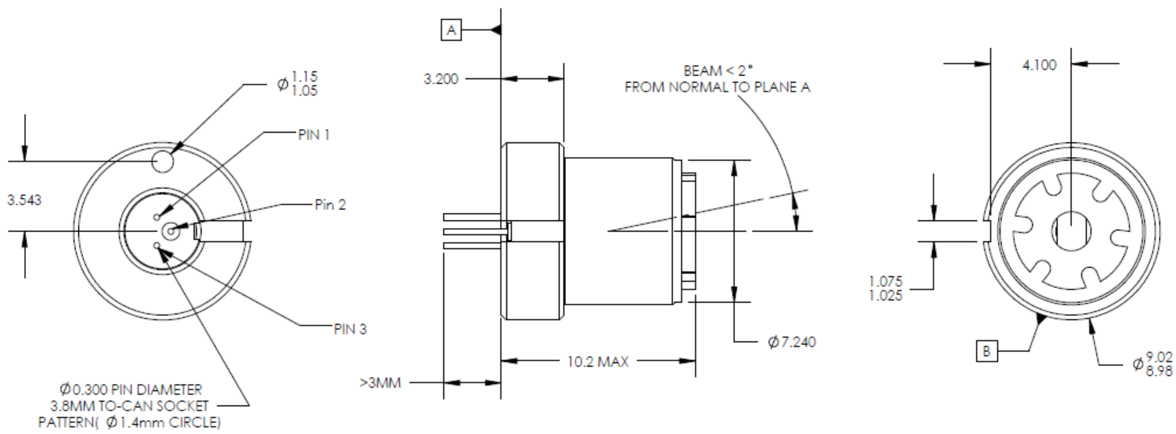


Example Beam Profile for Single Transverse Mode Diodes

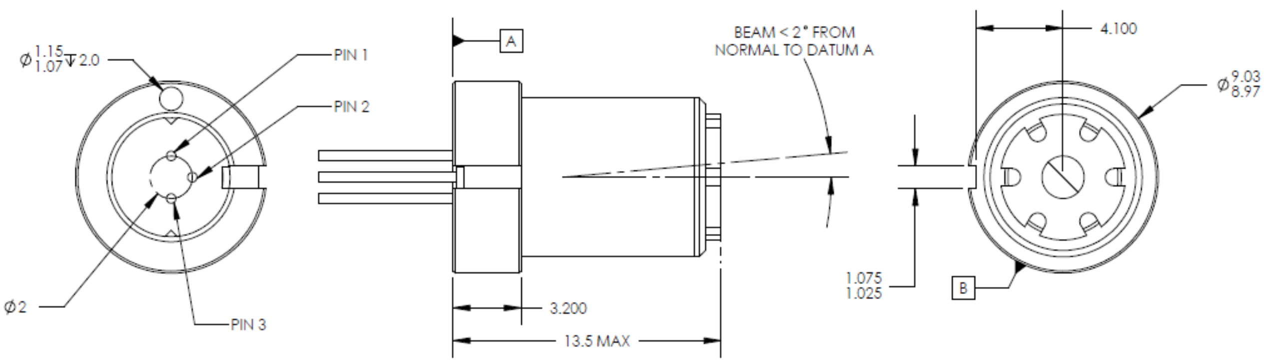


Outline Drawing (all dimensions in mm)

Size C

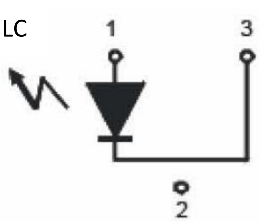


Size D

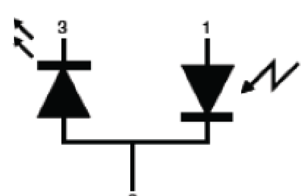


Pinout

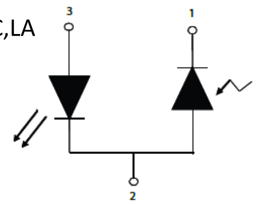
-001 : LA,-,LC



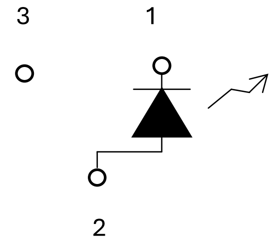
-002 : PA,PC-LA,LC



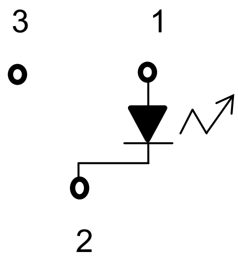
-003 : PC,PA-LC,LA

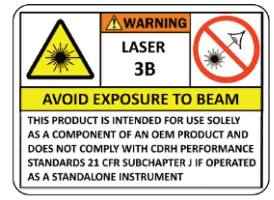


-004 : -,LA,LC



-005 : -,LC,LA





Warnings:

Electrostatic Discharge (ESD): Laser diodes are highly sensitive to electrostatic discharge (ESD) and voltage transients. Proper ESD procedures must be followed when handling laser diodes. Laser diodes are delivered in a conductive protective bag. When not in use, the laser anode and cathode electrical contacts should be shorted together to prevent ESD damage. Create a static free work environment. All personnel and tools that come into contact with the laser are continuously grounded, such as by using a grounding wrist strap. Electrostatic discharges could create latent damage that shorten lifetime of a diode.

Optical Feedback: Semiconductor laser diodes are highly sensitive to optical feedback, which can cause latent damage that may not be immediately apparent. Wavelength-stabilized laser diodes are particularly vulnerable and may lose their spectral characteristics, such as center wavelength and linewidth, when exposed to sufficient optical feedback. To prevent these issues, optical isolators must be used in applications where optical feedback is intrinsic. Avoid focusing the light output on highly reflective surfaces, as this generates optical feedback to the laser diode. For fiber-coupled applications, angled and anti-reflective (AR) coated fiber tips are recommended. All reflective surfaces in the optical path should be angled to prevent reflections from being directed back to the laser diode. During optical alignments near normal incidence, use an optical isolator or optical density (OD) filter to eliminate the risk of brief high-intensity optical feedback. Be cautious with wavelength-sensitive elements such as narrow bandpass filters. Angularly sweeping the alignment of such elements can cause sufficient feedback to briefly unlock the diodes which would generate high-intensity reflected off-wavelength light, significantly increasing the risk of damage to the laser diode.

Laser Eye Safety: These diodes are intended for use in OEM applications. Use protective eyewear and follow local regulatory requirements for use of laser diodes.

Environmental Conditions: For some highly sensitive wavelength reference applications, environment and ambient conditions need to be considered. Air movement and rapid ambient temperature swings may affect performance in those applications.

Mounting Considerations: Avoid applying stress to the laser diode component. Highly alignment sensitive components are mounted inside the protective cap. Avoid clamping the laser diode along the axis of the beam. Suggested mounting is clamping or bonding on the ring denoted by datum B.

Mode Hops for Single Mode Laser Models: To minimize mode hops in single-frequency lasers, it is crucial to control environmental conditions and eliminate optical feedback as these factors can induce mode hops, a sudden change in power and wavelength. However, even with these precautions, mode hops may still occur, especially as the diode ages and its characteristics change over time. Suitable solutions are dependent on application and may involve calibration routines or integration of appropriate sensors.