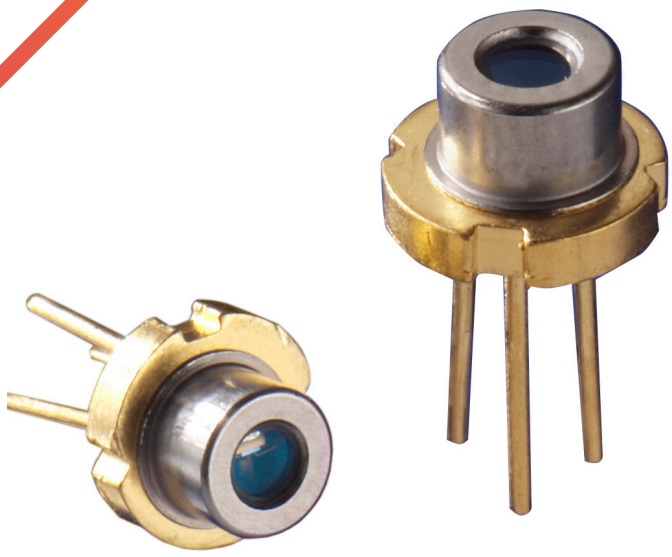
LUMENTUM

Diode Lasers, Single-Mode 50 to 200 mW, 830/852 nm

54xx Series



High-resolution applications including optical data storage, image recording, spectral analysis, printing, point-to-point free-space communications, and frequency doubling all require diffraction-limited sources. You can achieve faster writing, wider dynamic range, and better signal-to-noise ratio with the Lumentum high-reliability 5400-Series single-mode diode lasers.

Available in power levels up to 200 mW kink-free, this advanced diode laser combines a quantum well structure and a real-refractive index-guided single-mode waveguide to provide high power, low astigmatism, narrow spectral width and a single spatial mode Gaussian far field. Our 5400-Series diode lasers are among the most reliable high-power diode lasers available in the industry today.

The 5400-Series diode lasers operate in single longitudinal mode under some conditions. Like in all Fabry-Perot index-guided diode lasers, spectral broadening, mode hopping and longitudinal mode instability may occur due to small drive current, diode-junction temperature, or optical feedback changes.

The unique diode structure features high reliability with long operating life and very low early failure rate. The 5430 laser provides the highest brightness (20 MW/cm^2 steradian).

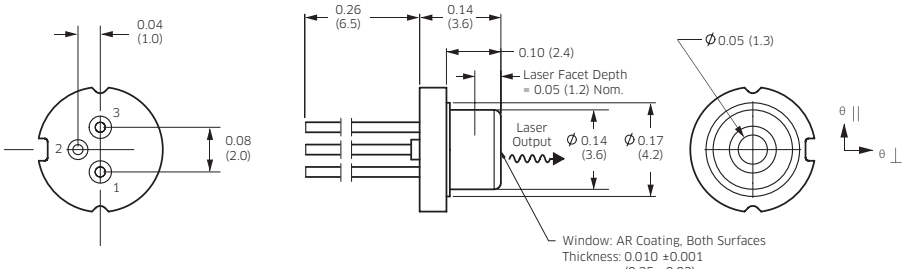
Key Features
- 200 mW kink-free power
- Narrow spectral width
- High efficiency
- Low astigmatism
- High reliability

Applications
- Illumination
- Printing
- Sensing
- Medical applications
- Imaging

Dimensions Diagram

(Specifications are in inches [mm] unless otherwise noted.)
Standard Tolerances
inches: x.xx = ±0.02 mm: x.x = ±0.5
x.xxx = ±0.010 x.xx = ±0.25

Package Style: TO-56 Window (J1)



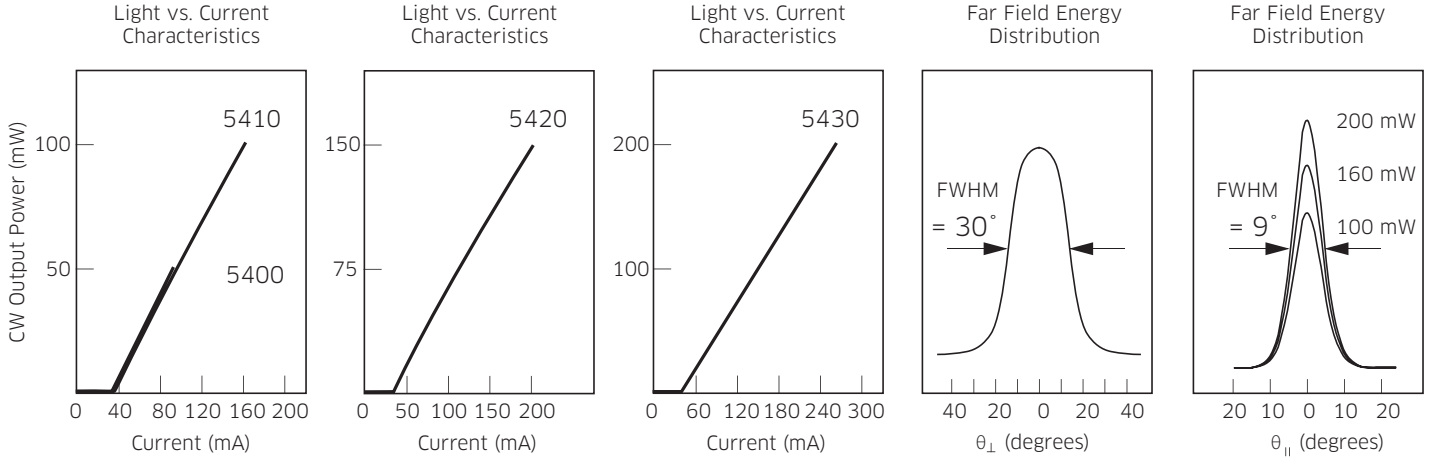
Pin Assignments

Pin	Description
1	Laser cathode (–)
2	Laser anode, MPD cathode and case ground
3	Monitor photodiode anode (+)

Configurations

5400 Series	5410 Series	5420 Series	5430 Series
5401	5411	5421	5431

Typical Optical Characteristics



Electro-Optical Specifications

Parameter		Symbol		5400 Series	5410 Series	5420 Series	5430 Series	Unit
Laser Characteristics								
CW output power, kink-free[1]		P_O	Max.	50	100	150	200	mW
Center wavelength[2]		λ_C	Typ.	810 – 850 842 – 862	810 – 850 842 – 862	810 – 850 842 – 862	Limited to 820 – 840	nm
Spectral width[3]		$\Delta\lambda$	Typ.	3	3	3	3	nm
			Max.	5	5	5	5	nm
Slope efficiency		$\eta D = P_O/(I_{op}-I_{th})$	Min.	0.75	0.75	0.75	0.75	mW/mA
			Typ.	0.85	0.85	0.85	0.85	mW/mA
Conversion efficiency		$\eta = P_O/(I_{op}V_{op})$	Typ.	30	30	30	30	%
Emitting dimensions		W x H	Typ.	3 x 1	3 x 1	3 x 1	3 x 1	µm
FWHM beam divergence	Parallel to junction	$\theta_{//}$	Typ.	9	9	9	9	degrees
	Perpendicular to junction	$\theta_{\perp}$	Typ.	30	30	30	30	degrees
Threshold current		I_{th}	Typ.	35	35	35	40	mA
			Max.	45	45	45	50	mA
Operating current		I_{op}	Typ.	95	160	210	270	mA
			Max.	105	170	230	300	mA
Operating voltage (forward)		V_{op}	Typ.	Forward voltage is typically: $V_f = 1.5\ V + I_{op} \times R_s$				
Series resistance		R_s	Typ.	4.0	4.0	4.0	4.0	Ω
			Max.	6.0	6.0	6.0	6.0	Ω
Thermal resistance		R_{th}	Typ.	60	60	60	60	°C/W
Recommended case temperature		T_c	Min.	–20	–20	–20	–20	°C
			Max.	30	30	30	30	°C
Absolute Maximum Ratings								
Reverse voltage		V_{rl}	Max.	3	3	3	3	V
Case operating temperature		T_{op}	Min.	–20	–20	–20	–20	°C
			Max.	50	50	50	50	°C
Storage temperature range		T_{stg}	Min.	–40	–40	–40	–40	°C
			Max.	80	80	80	80	°C
Lead soldering temperature		T_{ls}	Max.	250	250	250	250	°C (5 s)
Monitor Photodiode								
Sensitivity		—	Min.	3.0	3.0	0.1	0.1	µA/mW
			Max.	24	24	20	20	µA/mW
Capacitance		—	Typ.	6	6	6	6	pF
Breakdown voltage		V_{bd}	Typ.	25	25	25	25	V
Operating voltage		V_{op}	Typ.	10	10	10	10	V
General								
Duty factor		—		100	—	—	—	%
Temperature coefficient of wavelength		—		0.3 (approx.)	—	—	—	nm/°C
Temperature coefficient of threshold current model		—		Note 4	—	—	—	
Temperature coefficient of operating current		—		0.5 to 0.7	—	—	—	%/°C
Astigmatism		—		<5	—	—	—	µm

1. Typical values at 25°C and 0.6 NA collection optics.
2. Consult the Ordering Information table on page 5 for the part numbers designated for a particular subset within these wavelength ranges:
   810 – 850 nm
   842 – 862 nm
3. Emission bandwidth for 90% integrated power.
4. $I_{TH2} = I_{TH1} \exp [(T_2 - T_1)/T_0]$ where T_0 is a device constant of about 110°K

Ordering Information

For more information on this or other products and their availability, please contact your local Lumentum account manager or Lumentum directly at customer.service@Lumentum.com.

Power	Wavelength	Part Number
50 mW	830 (–10/+20) nm	54-00203
50 mW	852 (±10) nm	54-00204
100 mW	830 (–10/+20) nm	54-00206
100 mW	852 (±10) nm	54-00207
150 mW	830 (±10) nm	54-00211
150 mW	852 (±10) nm	54-00212
200 mW	830 (±10) nm	54-00213
200 mW	852 (±10) nm	54-00214

User Safety

Safety and Operating Considerations

The laser light emitted from this diode laser is invisible and may be harmful to the human eye. Avoid looking directly into the diode laser or into the collimated beam along its optical axis when the device is in operation.

CAUTION: THE USE OF OPTICAL INSTRUMENTS WITH THIS PRODUCT WILL INCREASE EYE HAZARD.

Operating the diode laser outside of its maximum ratings may cause device failure or a safety hazard. Power supplies used with the component must be employed such that the maximum peak optical power cannot be exceeded. CW diode lasers may be damaged by excessive drive current or switching transients. When using power supplies, the diode laser should be connected with the main power on and the output voltage at zero. The current should be increased slowly while monitoring the diode laser output power and the drive current.

Device degradation accelerates with increased temperature, and therefore careful attention to minimize the case temperature is advised. For example, life expectancy will decrease by a factor of four if the case is operated at 50°C rather than 30°C.

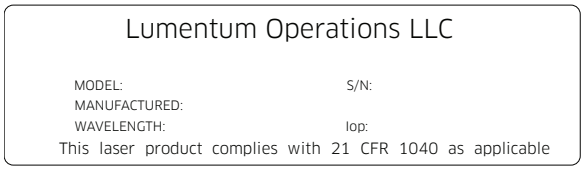
A proper heatsink for the diode laser on a thermal radiator will greatly enhance laser life. Firmly mount the laser on a radiator with a thermal impedance of less than 2°C/W for increased reliability.

ESD PROTECTION – Electrostatic discharge is the primary cause of unexpected diode laser failure. Take extreme precaution to prevent ESD. Use wrist straps, grounded work surfaces and rigorous antistatic techniques when handling diode lasers.

Labeling

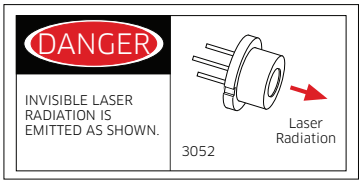
21 CFR 1040.10 Compliance

Because of the small size of these devices, each of the labels shown is attached to the individual shipping container. They are illustrated here to comply with 21 CFR 1040.10 as applicable under the Radiation Control for Health and Safety Act of 1968.



Serial Number Identification Label

Output Power Danger Label



Package Aperture Labels

LUMENTUM

North America
Toll Free: 844 810 LITE (5483)

Outside North America
Toll Free: 800 000 LITE (5483)

China
Toll Free: 400 120 LITE (5483)