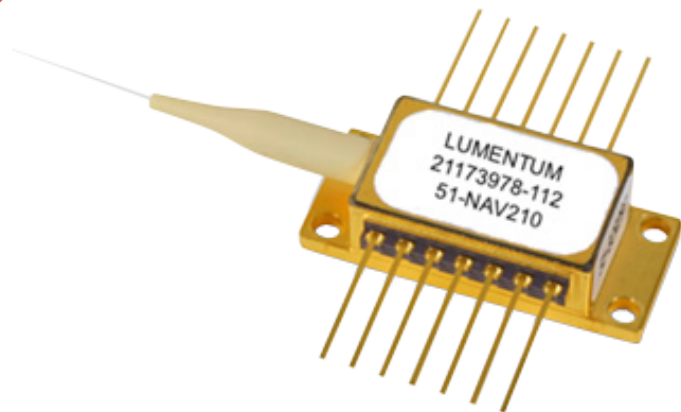


# Up to 300 mW High-Reliability Pump Laser Module for 980 nm operation

5050 Series



The Lumentum 5050 Series 980 nm pump laser module features low thermal impedance, a single-mode polarization-maintaining fiber output with a fiber Bragg grating (FBG) to stabilize the wavelength, and a hermetically-sealed 14-pin butterfly package.

The laser chip is based on GaAs/AlGaAs/InGaAs Fabry Perot structure. A low-reflectivity Bragg grating is integrated in a polarization maintaining fiber pigtail to provide wavelength stability. The pump modules are to be supplied in a butterfly package with an integral rear facet monitor photodiode.

#### **Key Features**

- High reliability
- Operating power range 50-300 mW
- Uncooled module, operation temperature 0-43°C
- Fiber Bragg grating stabilization
- Integrated monitor photodiode
- PM fiber pigtail
- 14 pin butterfly package
- 974 or 976 nm wavelength options

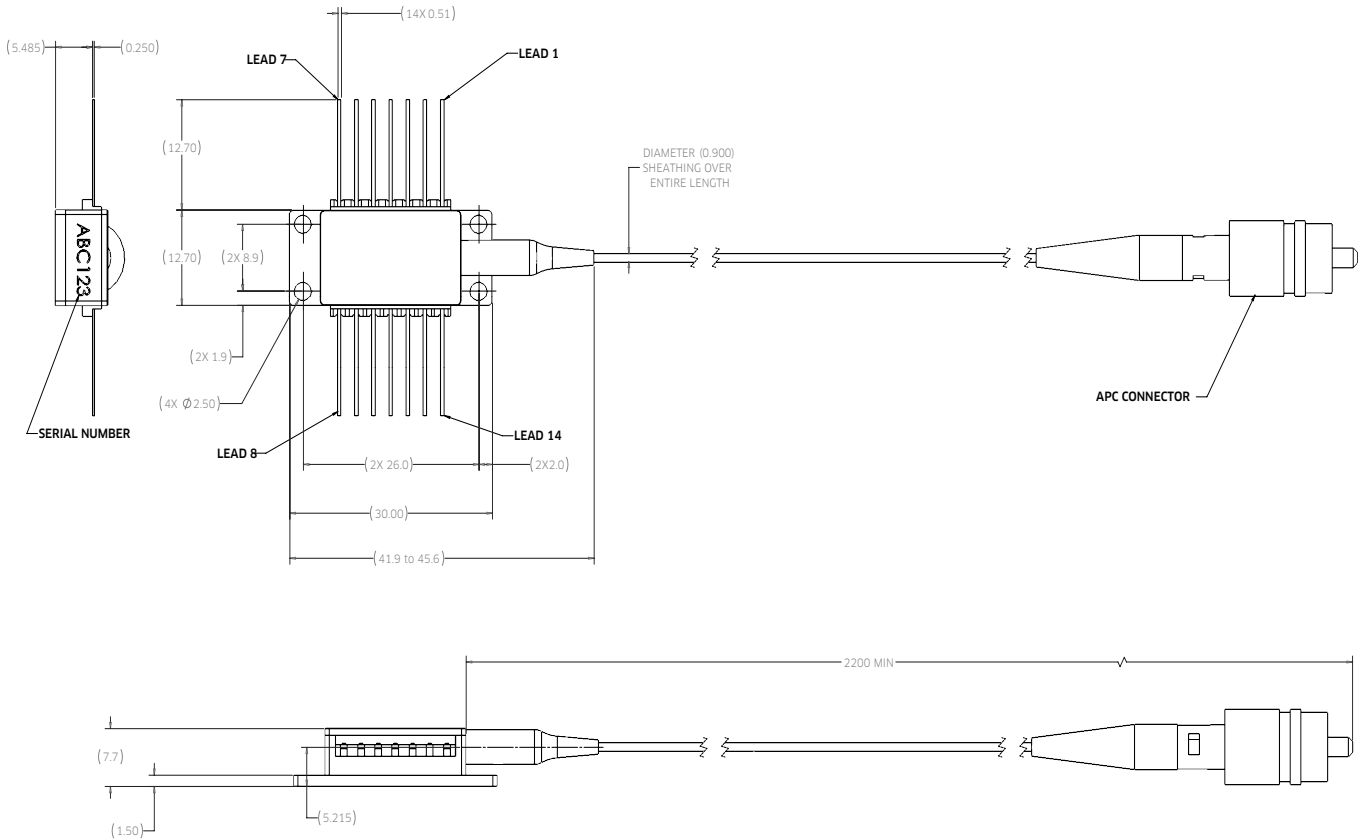
#### **Applications**

- Test and measurement instruments
- Optical sensing
- Aerospace
- Space

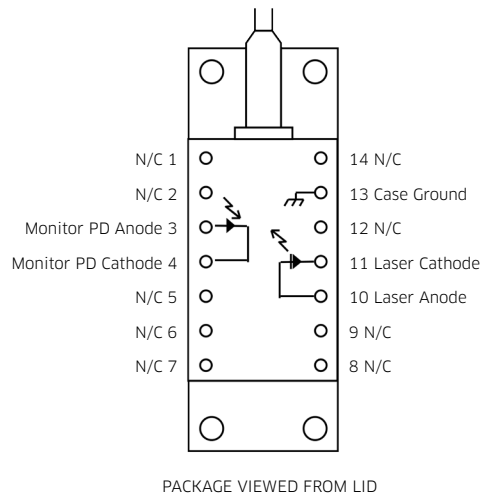
#### **Compliance**

- Telcordia GR-468-CORE

### Dimensions Diagram



### Pin Assignments



The anode and cathode of the laser and of the monitor diode will be in a floating configuration, i.e., the four pins will be isolated from the package ground with a resistance greater than 1 MΩ.

## Section 1 Absolute Maximum Ratings

### 1.1 Electro-Optical Limits

The ratings given in the following table represent the maximum limits on electro-optic parameters. Devices subjected, exclusively, to these limits under the conditions stated shall show no degradation of performance or reliability. The values apply to each parameter in isolation. It cannot be assumed that limiting values of more than one parameter can be applied to a device at the same time.

Operation at the maximum operating current raises the hazard for sudden failure for the laser chip. No new failure modes shall be created by this operation. The Customer assumes responsibility operating for any additional failures induced by this operation. Based upon the Customer's objective to limit the hazard, Lumentum recommends the device at no more than 10% of the specified beginning-of-life (BOL) operating current for that individual module.

Parameter	Unit	Min	Max	Condition	Notes
LD transient current	mA	–	1300	0-43°C	for 1 ms max for a square pulse with a 10%-90% rise time of 10 $\mu$ s
LD forward current	mA	–	1150	0-43°C	Permanent
LD reverse voltage	V	–	2	0-43°C	
LD reverse current	$\mu$ A	–	10	0-43°C	At 2 V reverse bias
PD reverse voltage	V	–	20	0-43°C	
PD forward current	mA	–	10	0-43°C	
Electrostatic discharge	V	–	1000	C = 100 pF; R = 1.5 $\Omega$ , HBM	
Atmospheric pressure storage operating	kPA kPa	– –	11 58		
Relative humidity	–	5%	95%	Non-condensing	
Lead soldering time	s	–	10	260°C	

## Section 2 Specifications

Module parameter	Symbol	Condition	Limits		Unit
			Minimum	Maximum	
Beginning of life	BOL	Note 1			
Threshold current	I <sub>th</sub> -BOL	Note 2	–	40	mA
Minimum power	P <sub>min</sub>	0°C to 43°C	50	–	mW
Operating power	P <sub>op</sub>	0°C to 43°C	–	300	mW
Operating forward current	I <sub>op</sub>	Continuous current to maintain output power at P <sub>op</sub>		900	mA
Forward voltage	V <sub>f</sub>	Defined as voltage drop between the bias input and ground at P <sub>op</sub>		2.4	V
Series resistance	R <sub>s</sub>	0°C to 43°C	–	1	ohm
Kink current margin			10	–	%
Center emission wavelength	λ <sub>m</sub>	P <sub>min</sub> < P < P <sub>op</sub>	973	977	nm
Power in pump band	P <sub>pump</sub>	Pump band = λ <sub>m</sub> ± 2 nm P <sub>min</sub> < P < P <sub>op</sub> 5°C to 43°C 0°C to 5°C	90 70	– –	% %
Spectral width	Δλ <sub>RMS</sub>	CW, P <sub>min</sub> < P < P <sub>op</sub>	–	2.0	nm
Wavelength tuning vs. temperature	Δλ / T	I = I <sub>op</sub> 0°C to 43°C	0	0.02	nm / °C
Optical power stability, DC to 50 kHz	ΔP <sub>f_t</sub>	50 mW < P <sub>f</sub> < 80 mW		0.15	dB
		80 mW < P <sub>f</sub> < 300 mW		0.1	
Laser diode 10%-90% Rise/Fall Time	t <sub>r</sub> / t <sub>f</sub>	Step response, Note 2		100	ns
Monitor diode response	IBF	P = P <sub>op</sub>	1	10	μA / mW
Monitor diode capacitance	C <sub>t</sub>	5V reverse bias, f=1 MHz	–	10	pF
End of life	EOL	Note 3			
Forward current	I <sub>op-EOL</sub>	continuous current to maintain P <sub>op</sub>		1.1 I <sub>op</sub>	mA
Forward voltage	V <sub>f-EOL</sub>	Defined as voltage drop between the bias input and ground at I <sub>op-EOL</sub>		1.1 V <sub>op</sub>	V

1. All parameters at BOL shall be guaranteed over a laser diode temperature range of TLD = 25 ± 2°C and an optical return loss of less than 50 dB.

2. The laser diode current should be set at I(P<sub>min</sub>) and a drive signal should be applied with a step from I(P<sub>min</sub>) to I<sub>op</sub> and back to I(P<sub>min</sub>). The time interval between the on and off-steps should be at least 10 ms. This drive signal should have a 10% to 90% rise and fall times of less than 10 ns. During the positive and negative step of the drive current the pump laser must be locked by the reflection of the grating to ensure emission in pump band.

3. End of life shall have occurred when any of the EOL specifications are exceeded.

### Section 3 Quality Assurance Requirements

This pump laser is designed for fiber optic systems requiring operation for periods of twenty five years with the absolute minimum of repair or maintenance. Expectation for pump failure operating at 300 mW, packaging base temperature of 43°C is 53 FIT.

### Safety and Environmental Requirements

#### Safety

- Warning: CLASS IV LASER PRODUCT (IEC 60825-1: 2001-08-30)
- Invisible laser radiation. Exposure to beam should be avoided. Maximum output = 800 mW
- NOHD = 2.7 m
- Emitted wavelength = 950-1000 nm
- Precautions:
  - Read Laser warning labels – wear goggles
  - Use the correct setup – prevent others from coming too close.

#### ESD

This is an electrostatic sensitive device (ESD) and precautions must be taken during handling.



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