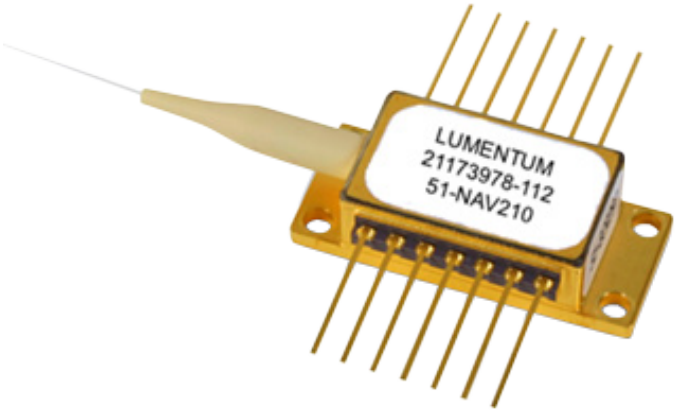
LUMENTUM

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.

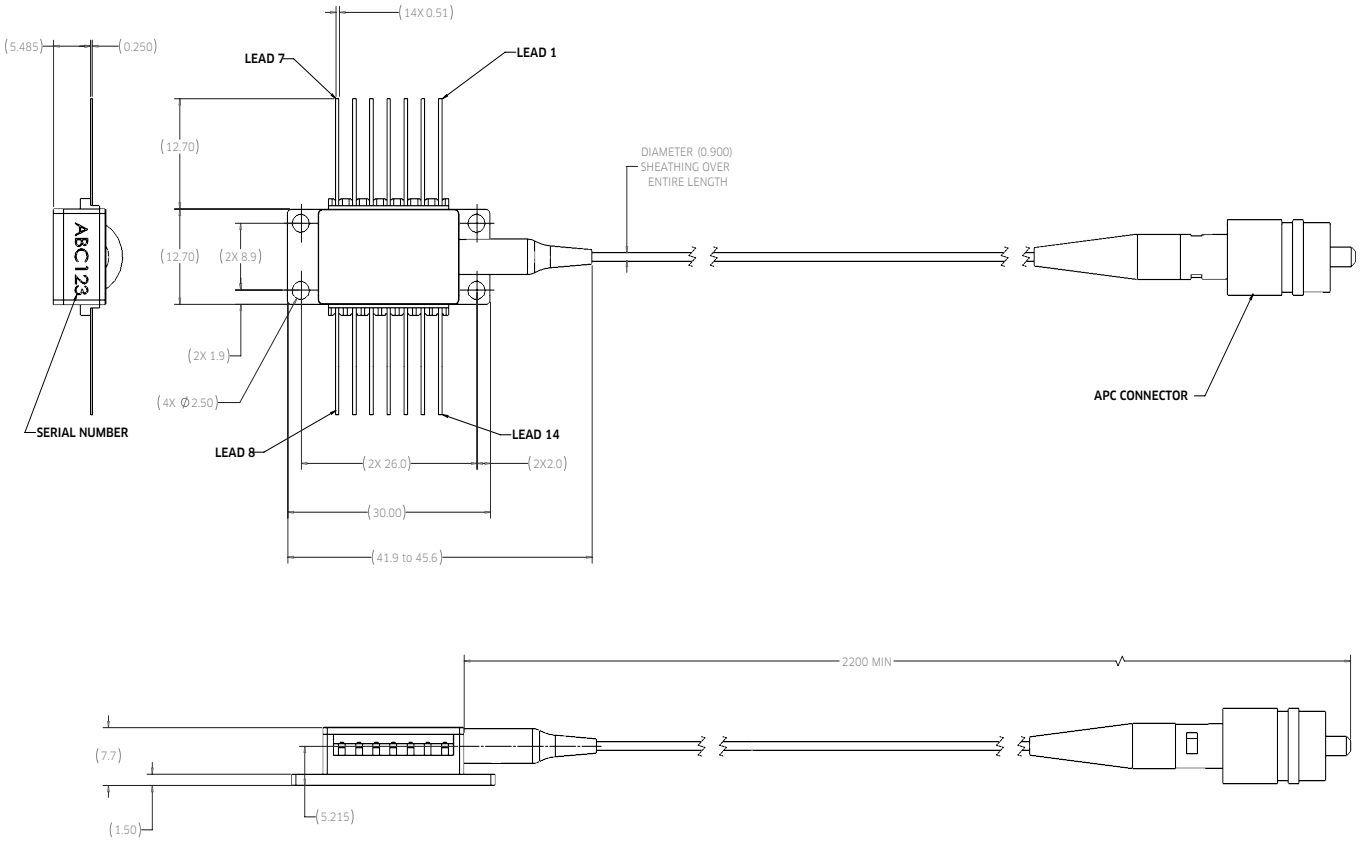
The laser chip is based on GaAs/AlGaAs/InGaAs Fabry Perot structure. A low-reflectivity Bragg grating is integrated in a polarization maintaining fiber pigtail to provide wavelength stability. The pump modules are to be supplied in a butterfly package with an integral rear facet monitor photodiode.

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

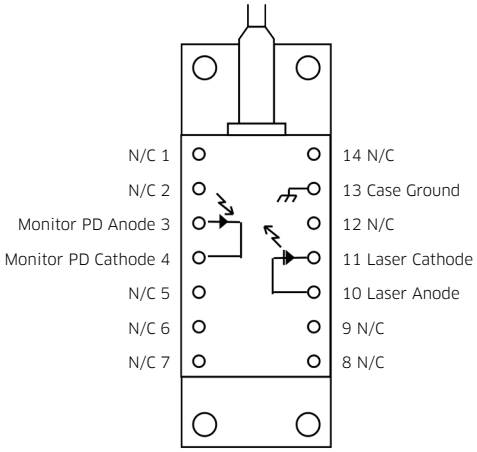
Applications
- Test and measurement instruments
- Optical sensing
- Aerospace
- Space

Compliance
- Telcordia GR-468-CORE

Dimensions Diagram



Pin Assignments



PACKAGE VIEWED FROM LID

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 µs
LD forward current	mA	–	1150	0–43°C	Permanent
LD reverse voltage	V	–	2	0–43°C	
LD reverse current	µA	–	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 = 1.5Ω, 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	Ith-BOL	Note 2	–	40	mA
Minimum power	P_{min}	0°C to 43°C	50	–	mW
Operating power	P_{op}	0°C to 43°C	–	300	mW
Operating forward current	I_{op}	Continuous current to maintain output power at P_{op}		900	mA
Forward voltage	Vf	Defined as voltage drop between the bias input and ground at P_{op}		2.4	V
Series resistance	Rs	0°C to 43°C	–	1	ohm
Kink current margin			10	–	%
Center emission wavelength	λm	$P_{min} < P < P_{op}$	973	977	nm
Power in pump band	P_{pump}	Pump band = λm ± 2 nm $P_{min} < P < P_{op}$ 5°C to 43°C 0°C to 5°C	 90 70	 – –	 % %
Spectral width	ΔλRMS	CW, $P_{min} < P <$ Pop	–	2.0	nm
Wavelength tuning vs. temperature	Δλ / T	$I = I_{op}$ 0°C to 43°C	0	0.02	nm / °C
Optical power stability, DC to 50 kHz	ΔPf_t	50 mW < Pf < 80 mW		0.15	dB
		80 mW < Pf < 300 mW		0.1	
Laser diode 10%-90% Rise/Fall Time	tr / tf	Step response, Note 2		100	ns
Monitor diode response	IBF	$P = P_{op}$	1	10	μA / mW
Monitor diode capacitance	Ct	5V reverse bias, f=1 MHz	–	10	pF
End of life	EOL	Note 3			
Forward current	I_{op}–EOL	continuous current to maintain P_{op}		1.1 I_{op}	mA
Forward voltage	Vf_EOL	Defined as voltage drop between the bias input and ground at I_{op}–EOL		1.1 V_{op}	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_{min}) and a drive signal should be applied with a step from I(P_{min}) to Iop and back to I(P_{min}). 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.

User Safety

Safety and Operating Considerations

The laser light emitted from this laser diode is invisible and may be harmful to the human eye. Avoid looking directly into the fiber when the device is in operation.

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

Operating the laser diode outside of its maximum ratings may cause device failure or a safety hazard. Power supplies used with this component cannot exceed maximum peak optical power.

CW laser diodes may be damaged by excessive drive current or switching transients. When using power supplies, the laser diode should be connected with the main power on and the output voltage at zero. The current should be increased slowly while monitoring the laser diode output power and the drive current. Careful attention to heatsinking and proper mounting of this device is required to ensure specified performance over its operating life. To maximize thermal transfer to the heatsink, the heatsink mounting surface must be flat to within .001inch and the mounting screws must be torqued down to 1.5 in/lb.

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

Laser Safety
The Lumentum pump laser module emits hazardous invisible laser radiation.

This component requires provisions of drive and control electronics before emitting laser radiation.

Laser classification depends on the system control circuit and any laser safety features provided.

This diode-pumped laser module is not 21CFR 1040.10 or IEC 60825-1:2014 certified. It is a component intended for system integration. Compliance with 21CFR 1040.10 and/or IEC 60825-1:2014 will need to be determined at the system level.

Lumentum has registered this laser with the FDA/CDRH as an OEM component. Please contact Lumentum for an FDA/CDRH accession number for this laser component.

Due to the small size of the pump module, the box packaging is labeled with the laser radiation hazard symbol and safety warning label shown below.

Laser radiation safety warning
Laser classification per IEC 60825-1:2014
Maximum output power 2W

LUMENTUM

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