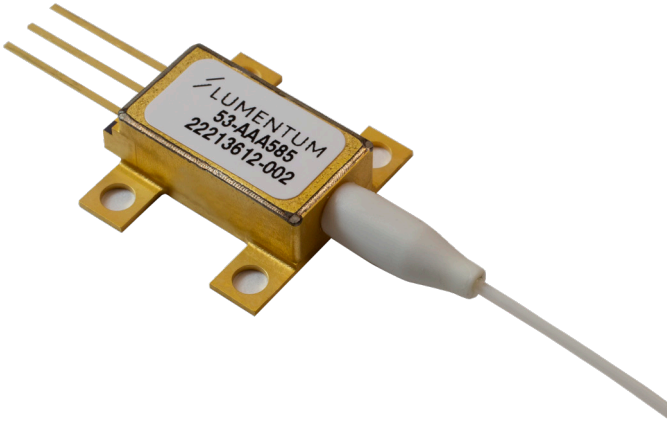
LUMENTUM

800 mW High-Reliability 980 nm Pump Laser for Undersea Applications

5300HP Series



The 5300HP series pump laser, a 980 nm small form factor pump laser designed for undersea fiber-optic transmission system applications, uses a highly efficient 6575HE laser chip with 800 mW output power. This pump module features low thermal impedance mounting, a single-mode polarization-maintaining (PM) fiber pigtail with a fiber Bragg grating (FBG) to stabilize the wavelength, and a hermetically-sealed small form factor package.

The laser chip is based on GaAs/AlGaAs/InGaAs Fabry Perot structure. A low-reflectivity Bragg grating is integrated in a single-mode PM fiber pigtail to provide wavelength locking.

The pump is comprised of the following items:

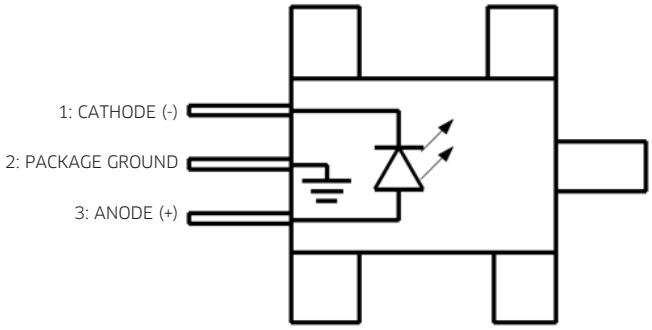
- 6575HE 980 nm laser chip
- Fiber pigtail comprised of polarization-maintaining fiber with dual-coat acrylate coating
- Hytrel 7246/7247, 0.9 mm diameter loose tube jacket, length customized, to protect the fiber
- Single fiber Bragg grating for stabilizing the wavelength
- Hermetic, small form factor package with passive cooling of the laser chip
- Getter to assure low moisture level

Key Features

- High reliability
- 800 mW output power
- PM fiber output
- 3-pin small-form factor package

Applications

- Undersea repeaters and branching units



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

Absolute Maximum Ratings

Absolute maximum ratings are the maximum stresses that may be applied to the module for short periods of time without causing damage and are listed in Table 1. Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. Exposure to absolute maximum ratings for extended periods of time or exposure to more than one absolute maximum rating simultaneously may adversely affect device reliability. Specifications may not be met under these conditions.

Lumentum recommends operating the device at no more than 90% of the specified beginning-of-life (BOL) operating current for that individual module.

Table 1. Absolute Max Ratings

Parameter	Unit	Minimum	Maximum	Condition	Notes
LD transient current	mA	–	2000	0–45°C	For 1 ms max for a square pulse with a 10%–90% rise time of 10 µs
LD forward current	mA	–	1600	0–45°C	Permanent
LD reverse voltage	V	–	2	0–45°C	
LD reverse current	µA	–	10	0–45°C	At 2 V reverse bias
Electrostatic discharge	V	–	1000	C = 100 pF; R = 1.5 Ω, HBM	
Atmospheric pressure storageoperating	atm atm	– –	1.5 1.5		
Relative humidity	–	5%	95%	Non-condensing	
Lead soldering time	s	–	10	260°C	

Storage Conditions

Table 2 listed the general storage conditions for the modules.

Table 2. General Storage Conditions

Parameters	Specifications
Storage temperature	Short-term: -20-60°C (24 hrs) Long-term: -10-45°C[1]
Storage humidity	45-65 %RH
Pressure	1.2 atm

Note: 1. Long term is defined as the total storage + usage period should be <25 years.

Specifications

Module parameter	Symbol	Condition/Notes	Minimum	Maximum	Unit
Beginning of life	***BOL***	***Note 1***			
Threshold current	Ith-BOL	Note 2	–	90	mA
Minimum power	Pmin	0°C to 45°C, Note 3	50	–	mW
Operating power	Pop	0°C to 45°C, Note 3	–	800	mW
Operating forward current	Iop	Continuous current to maintain output power at Pop.		1400	mA
Forward voltage	Vf	Defined as voltage drop between the bias input and ground at Pop		1.95	V
Series resistance	Rs	0-45°C.	0.2	0.55	Ohm
Kink current margin		Note 4	10	–	%
Center emission wavelength	λm	974 nm: Pmin < P < Pop, in vacuum	973	975	nm
		976.5 nm: Pmin < P < Pop in vacuum	975.5	977.5	nm
Power in pump band	PIB	Pump band = λ_FBG ±2nm, Pmin < P < Pop, 0°C-45°C.	90	–	%
Spectral width	ΔλRMS	CW, Pmin < P < Pop	–	0.8	nm
Wavelength tuning vs. temperature	Δλ/T	I = Iop 0C to 45C	0	0.01	nm/°C
Optical power stability, DC to 50 kHz	ΔPf_t	50 mW < Pf < 80mW		0.15	dB
		80 mW < Pf < 800mW		0.1	
Polarization Extinction Ratio	PER		11		dB
End of life	***EOL***	***Note 5***			
Forward Current	Iop_EOL	continuous current to maintain Pop, Note 6		1.1 Iop	mA
Forward Voltage	Vf_EOL	Defined as voltage drop between the bias input and ground at Iop_EOL		1.1 Vf	V

Note:
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. Threshold is defined as the point where the instantaneous slope of the LI curve attains 50% of the average slope between 80mW and 120mW.
3. The pump laser must fulfill all requirements over this output power range unless otherwise stated.
4. The kink current margin is with reference to the operating current at maximum operating power. For example, 10% margin means: Ikink*90%-Iop >0.
5. End of life shall have occurred when any of the EOL specifications are exceeded.
6. It is allowed to specify the Iop_EOL=1.1*Iop if the pump laser fulfills the reliability requirements.

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

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.

Description	Part Number
5300HP Undersea Pump Module, 800 mW, 974 nm	22213612-001
5300HP Undersea Pump Module, 800 mW, 976.5 nm	22213612-002

LUMENTUM

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