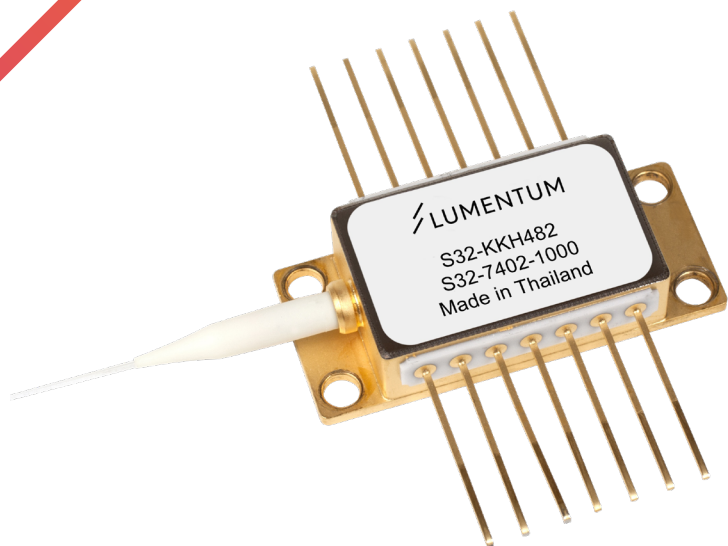


Up to 1000 mW Fiber Bragg Grating Stabilized 980 nm Pump Modules

S32 Series



The Lumentum S32 Series 980 nm pump laser modules uses a number of revolutionary design steps and the very latest material technologies to significantly improve scalability of the production process. The S32 series pump module incorporates the high-reliability Lumentum 980 nm laser diode in a cooled fiber Bragg grating-stabilized 14-pin butterfly module. The module meets the stringent requirements of the telecommunications industry, including Telcordia GR-468-CORE for hermetic 980 nm pump modules.

The S32 Series pump module, which uses fiber bragg grating stabilization to lock the emission wavelength, provides a noise-free, narrowband spectrum, even under changes in temperature, drive current and optical feedback. Wavelength selection is available for applications requiring the highest performance in spectrum control with the highest power available

Key Features

- Operating power range from 600 to 1000 mW
- 25°C internal temperature
- Low-profile 14-pin butterfly package
- Fiber Bragg grating stabilization
- Wavelength selection available
- Integrated thermoelectric cooler, thermistor, and monitor diode
- High dynamic range
- Excellent low-power stability

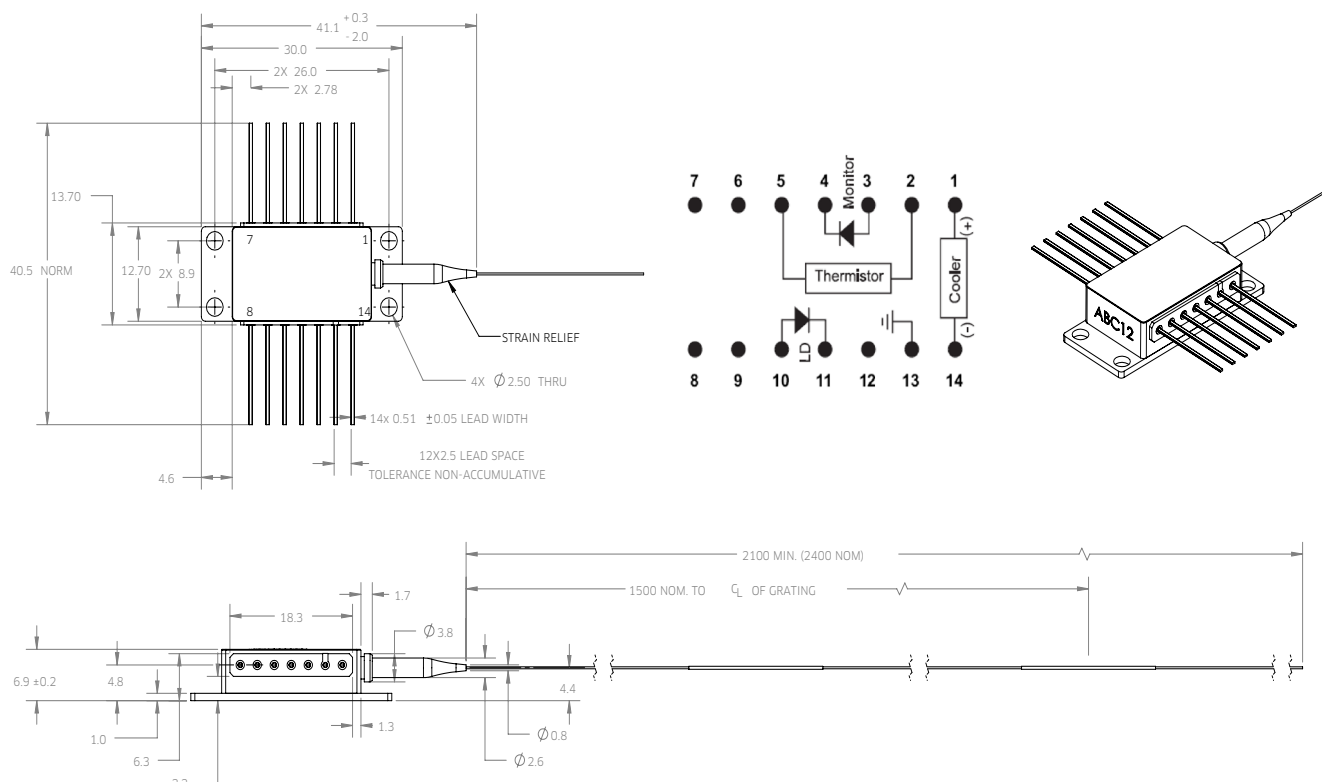
Applications

- Dense wavelength division multiplexing (DWDM) EDFAs
- High bit-rate, high channel-count EDFAs
- CATV distribution

Compliance

- Telcordia GR-468-CORE

Dimensions Diagram



Pin Assignments

Pin	Description
1	Cooler (+)
2	Thermistor
3	Monitor PD anode
4	Monitor PD cathode
5	Thermistor
6	N/C
7	N/C
8	N/C
9	N/C
10	Laser anode
11	Laser cathode
12	N/C
13	Case ground
14	Cooler (-)

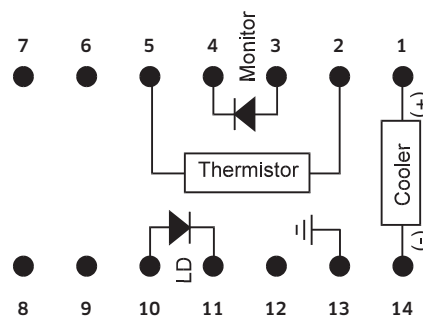


Table 1 Absolute Maximum Ratings

Parameter	Symbol	Test Condition	Minimum	Maximum
Operating case temperature	T_{op}		-5°C	75°C
Storage temperature	T_{stg}	2000 hr	-40°C	85°C
Laser operating temperature	T_{LD}		-5°C	50°C
LD reverse voltage	V_f			2 V
LD forward current	$I_{f,max}$			2000 mA
LD current transient		20 μ s maximum		2100 mA
LD reverse current				10 μ A
PD reverse voltage	V_{PD}			20 V
PD forward current	I_{PF}			10 mA
LD electrostatic discharge (ESD)	$V_{ESD,LD}$	C = 100 pF, R = 1.5 k Ω , HBM		1000 V
PD electrostatic discharge (ESD)	$V_{ESD,PD}$	C = 100 pF, R = 1.5 k Ω , HBM		500 V
TEC current	I_{TEC}		-1.4 A	4A
TEC voltage	V_{TEC}			4.5 V
Axial pull force		3 x 10 s		5 N
Side pull force		3 x 10 s		2.5 N
Fiber bend radius			16 mm	
Relative humidity	RH	Non-condensing	5%	95%
Lead soldering time		300°C		10 s

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 5. 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 necessarily be met under these conditions.

Table 2 Operating Parameters (BOL, $T_{case} = -5$ to 75°C, -50 dB reflection, unless otherwise noted.)

Product Code	Maximum Operating Power P_{op} (mW)	Maximum Operating Current I_{op} (mA)	Minimum Kink-Free Power P_{max} (mW)	Maximum Kink-Free Current I_{max} (mA)
S32-xxxx-600	600	1020	660	1120
S32-xxxx-620	620	1050	682	1150
S32-xxxx-640	640	1075	704	1185
S32-xxxx-660	660	1105	726	1215
S32-xxxx-680	680	1135	748	1250
S32-xxxx-700	700	1160	770	1280
S32-xxxx-720	720	1195	792	1315
S32-xxxx-740	740	1225	814	1355
S32-xxxx-760	760	1260	836	1400
S32-xxxx-780	780	1295	858	1440
S32-xxxx-800	800	1330	880	1485
S32-xxxx-820	820	1370	902	1535
S32-xxxx-840	840	1405	924	1585
S32-xxxx-860	860	1445	946	1635
S32-xxxx-880	880	1485	968	1725
S32-xxxx-900	900	1525	990	1810
S32-xxxx-920	920	1560	1012	1850
S32-xxxx-940	940	1605	1034	1865
S32-xxxx-960	960	1645	1056	1870
S32-xxxx-980	980	1680	1078	1880
S32-xxxx-1000	1000	1745	1100	1880

The xxxx denotes the wavelength per the product code in Table 3.

Table 3 Available Peak Wavelength Selection

Product Code	Minimum Center Wavelength	Maximum Center Wavelength
S32-7402-yyy	973.0 nm	975.0 nm
S32-7602-yyy	975.0 nm	977.0 nm
S32-8000-yyy	973.0 nm	981.5 nm

The yyy denotes the power per the product code in Table 2.

Table 4 Electro-Optical Performance (BOL, $T_{\text{case}} = -5^{\circ}\text{C}$ to 75°C , $T_{\text{LD}} = 25^{\circ}\text{C}$, $P_{\text{f}} = 30\text{mW}$ to P_{op} , -50dB reflection, unless otherwise noted)

Parameter	Symbol	Test Condition	Minimum	Maximum
Threshold current	$I_{\text{th-BOL}}$			85 mA
Forward voltage	V_{f}	$I_{\text{f}} = I_{\text{op}}$		2.1 V
Fiber output power range	P_{f}		30 mW	P_{op}
Pump power in band	P_{pump}	Pump band = $\lambda_{\text{m}} \pm 1.5 \text{ nm}$, at P_{op}	90%	
Spectral width	$\Delta\lambda_{\text{RMS}}$	Over P_{f} Range		2.0 nm
Wavelength tuning vs. temperature	$\Delta\lambda/T$	$I_{\text{f}} = I_{\text{op}}$		0.01 nm/ $^{\circ}\text{C}$
Optical power stability	$\Delta P_{\text{f,t}}$	Over P_{f} range, DC to $\sim 50 \text{ kHz}$, $50 \text{ mW} - P_{\text{op}}$		2.0%
Tracking ratio ¹	TR	$0.1P_{\text{op}} < P_{\text{f}} < P_{\text{op}}$	0.60	1.40
Tracking error ²	TE	P_{op}	$\sim 40\%$	40%
Monitor diode response	I_{BF}	-5 V Bias, at P_{op}	0.5 $\mu\text{A}/\text{mW}$	5 $\mu\text{A}/\text{mW}$
LD temperature	T_{LD}	Nominal $T_{\text{LD}} = 25^{\circ}\text{C}$	24°C	26°C
Thermistor resistance: S32-7402-yyy, S32-7602-yyy	R_{th}	$T_{\text{set}} = 25^{\circ}\text{C}$	9.5 k Ω	10.5 k Ω
Thermistor resistance: S32-8000-yyy	R_{th}	$T_{\text{set}} = 25^{\circ}\text{C}$	9.0 k Ω	11.5 k Ω

Note:

- The tracking ratio is a measure of the front-to-back tracking when the output power is varied. On a plot of optical power versus back-face photocurrent, a straight line is drawn between the minimum power (30 mW) and the operating power (P_{op}) points. The tracking ratio is defined as the ratio between measured optical power (shown as data points on the plot) to the value derived from the straight line.
- The tracking error is defined as the normalized change of output power relative to P_{f} at 25°C , i.e., $(P_{\text{f}} - P_{\text{f},25})/P_{\text{f},25}$, over case temperature range 0°C to 75°C , at constant back-face monitor current corresponding to lowest back-face monitor current at $P_{\text{f}} = P_{\text{op}}$ of 0°C , 25°C , 75°C .

Table 5 TEC and Total Module Power Consumption at $T_{LD} = 25^{\circ}\text{C}$ (BOL, $\Delta T = 50^{\circ}\text{C}$, $T_{case} = 75^{\circ}\text{C}$)

Product Code	TEC Current I_{max} (A)	TEC Voltage V_{max} (V)	TEC Power Consumption P_{TEC} (W)	Total Module Power Consumption P_{max} (W)
S32-xxxx-600	1.78	2.19	3.61	5.4
S32-xxxx-620	1.80	2.21	3.67	5.5
S32-xxxx-640	1.81	2.22	3.73	5.6
S32-xxxx-660	1.83	2.24	3.79	5.8
S32-xxxx-680	1.85	2.25	3.85	5.9
S32-xxxx-700	1.86	2.27	3.91	6.0
S32-xxxx-720	1.88	2.29	3.98	6.2
S32-xxxx-740	1.90	2.31	4.06	6.3
S32-xxxx-760	1.92	2.32	4.13	6.5
S32-xxxx-780	1.94	2.34	4.20	6.6
S32-xxxx-800	1.96	2.36	4.28	6.8
S32-xxxx-820	1.99	2.38	4.35	6.9
S32-xxxx-840	2.01	2.41	4.43	7.1
S32-xxxx-860	2.04	2.43	4.50	7.2
S32-xxxx-880	2.06	2.45	4.58	7.3
S32-xxxx-900	2.09	2.47	4.65	7.5
S32-xxxx-920	2.12	2.50	4.78	7.7
S32-xxxx-940	2.15	2.53	4.93	8.0
S32-xxxx-960	2.18	2.56	5.04	8.2
S32-xxxx-980	2.21	2.59	5.13	8.3
S32-xxxx-1000	2.25	2.62	5.22	8.6

Table 6 HI 1060 Fiber Nominal Characteristics and Tolerances

Parameters	Specification
Cutoff wavelength	920 nm
Maximum attenuation at 980 nm	2.1 dB/km
Cladding outside diameter	125 \pm 1 μm
Coating outside diameter	245 \pm 10 μm
Core-cladding concentricity	\leq 0.5 μm
Mode field diameter	5.9 \pm 0.3 μm

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.

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 .001 inch 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.

Labeling

Laser Safety

The Lumentum pump laser module emits hazardous invisible laser radiation. Due to the small size of the pump module, the box packaging is labeled with the laser radiation hazard symbol and safety warning labels shown below.



14-pin module label



Output power and laser emission indicator label

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.

s32 - -

Peak Wavelength	Code
973.0 to 975.0 nm	7402
975.0 to 977.0 nm	7602
973.0 to 981.5 nm	8000

Maximum Operating Power	Code
600 mW	600
620 mW	620
640 mW	640
660 mW	660
680 mW	680
700 mW	700
720 mW	720
740 mW	740
760 mW	760
780 mW	780
800 mW	800
820 mW	820
840 mW	840
860 mW	860
880 mW	880
900 mW	900
920 mW	920
940 mW	940
960 mW	960
980 mW	980
1000 mW	A00



North America
Toll Free: 844 810 LITE (5483)

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

China
Toll Free: 400 120 LITE (5483)

© 2020 Lumentum Operations LLC
Product specifications and descriptions in this document are subject to change without notice.