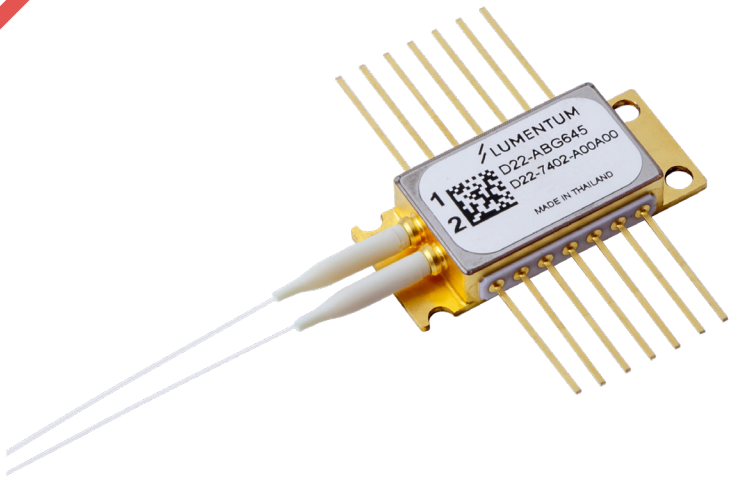
LUMENTUM

2 x 1000 mW Fiber Bragg Grating Stabilized 980 nm Pump Modules

D22 Series



The Lumentum D22 Series is dual-chip 980 nm pump laser module with each emitter independently controlled. It is based on a number of revolutionary design steps and provides high optical power density within a compact space. The D22 series pump module incorporates the high-reliability, high-efficiency Lumentum 980 nm laser diode in a cooled fiber Bragg grating-stabilized 14-pin low profile butterfly design. The module meets the stringent requirements of the telecommunications industry, including Telcordia GR-468-CORE for hermetic 980 nm pump modules

The D22 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 1400 – 2000 mW
- 45°C internal temperature
- Low-profile 5.3mm 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

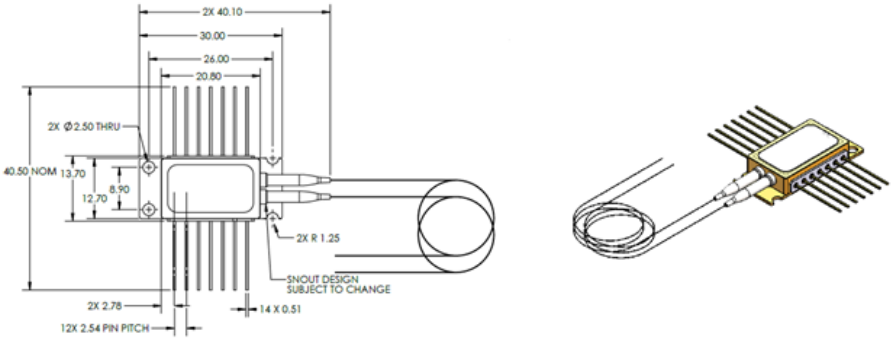
- Dense wavelength division multiplexing (DWDM) EDFAs
- High bit-rate, high channel-count EDFAs
- CATV distribution

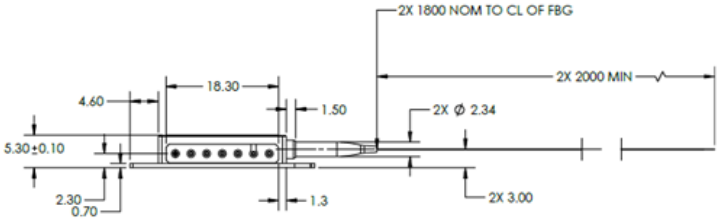
Compliance

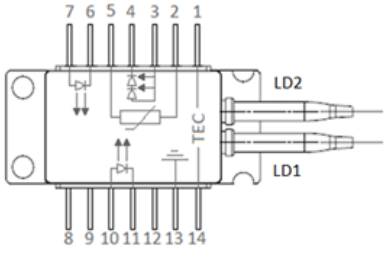
- Telcordia GR-468-CORE

Dimensions Diagram and Pin Assignment

Package dimensions:
- Length (including boot and excluding pins): 41 mm
- Width: 45 mm (including uncut lead)
- Height: 5.3 mm







Pin Assignments

Pin	Description
1	TEC+
2	Thermistor
3	MPD Anode (+)
4	MPD Cathode (-)
5	Thermistor
6	LD2 Cathode (-)
7	LD2 Anode (+)
8	Not Connected
9	Not Connected
10	LD1 Anode (+)
11	LD1 Cathode (-)
12	Not Connected
13	Case Ground
14	TEC-

Table 1 Absolute Maximum Rating

Characteristics	Symbol	Test Conditions	Minimum	Maximum	Unit
Operating case temperature	Top		–5	+75	°C
Storage temperature	T_{stg}	2000 hrs	–40	+85	°C
Laser Operating Temperature	T_{LD}		15	60	°C
LD reverse voltage	V_r		–	2	V
D22 LD forward current	If_max	Unlimited time	–	2200	mA
D22 LD current transient		20 µs maximum	–	2400	mA
LD Reverse current			–	10	µA
PD reverse voltage	V_{PD}		–	20	V
PD forward current	I_{PF}		–	10	mA
LD Electrostatic discharge (ESD)	V_{ESD}	C = 100 pF, R = 1.5 kΩ, HBM	–	1000	V
PD Electrostatic discharge (ESD)	V_{ESD}	C = 100 pF, R = 1.5 kΩ, HBM	–	500	V
TEC forward current	I_c		–	5	A
TEC reverse current	I_{rc}		-2.2	–	A
TEC voltage	V_c		–	5	V
Axial Pull Force		3X 10 sec.	–	5	N
Side Pull Force		3X 10 sec.	–	2.5	N
Fiber Bend Radius			16	–	mm
Atmospheric Pressure		Storage	11	–	kPa
Atmospheric Pressure		Operating	58	–	kPa
Relative Humidity	RH	Non-condensing	5	95	%
Lead soldering time		350°C	–	10	Sec

Absolute maximum ratings are the maximum stresses that may be applied to the module for short periods of time without causing damage. 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 Optical and Electrical Characteristics of D22 Pump (Case temperature Tcase = 0°C to 75°C) for different Pop

	Maximum Operating Power (mW)		Maximum Operating Current (mA)		Minimum Kink-Free Power (mW)		Maximum Kink-Free Current (mA)	
Product Code	Low power Port	High Power Port	Low power Port	High Power Port	Low power Port	High Power Port	Low power Port	High Power Port
D22-xxxx-700700	700	700	1255	1255	770	770	1370	1370
D22-xxxx-800800	800	800	1420	1420	880	880	1565	1565
D22-xxxx-800900	800	900	1420	1600	880	990	1565	1765
D22-xxxx-800A00	800	1000	1420	1785	880	1100	1565	1975
D22-xxxx-900900	900	900	1600	1600	990	990	1765	1765
D22-xxxx-900A00	900	1000	1600	1785	990	1100	1765	1975
D22-xxxx-950950	950	950	1690	1690	1045	1045	1870	1870
D22-xxxx-950A00	950	1000	1690	1785	1045	1100	1870	1975
D22-xxxx-A00A00	1000	1000	1785	1785	1100	1100	1975	1975

Note: xxxx denotes wavelength and tolerance per Table 3 below.

Table 3. Available Peak Wavelength Selection

Product Code	Minimum Peak Wavelength	Maximum Peak Wavelength
D22-7402-xxxxxx	973 nm	975. nm
D22-7602-xxxxxx	975 nm	977 nm

Note: xxxxxx denotes operating power per Table 2 above.

Table 4 Optical- Electrical Performance (BOL, T_{case} = –5°C to 75°C, Pf range = 30mW to Pmax, –50dB reflection, unless otherwise noted)

Parameter	Symbol	Test Conditions	Limits		unit
			Min.	Max.	
Threshold current per port	I_{th}-BOL		–	130	mA
Operating forward current	I_{op}		–	Table 2	mA
Forward voltage	V_f		Vmin	2.2	V
Fiber output power range	P_f		30 mW	Pmax per Table 2	mW
Kink-free output power	P_{max}	$I_f = I_{max}$, Table 2	Kink-free power per Table 2	–	mW
Center emission wavelength	λ_m	Over P_f range,	See Table 3		nm
Power in pump band	P_{pump}	Pump band = λm ±1.5nm, 60 mW <Pop<Pmax	90	–	%
Power in pump band	P_{pump}	Pump band = λm ±1.5nm, 30 mW <Pop<60 mW	80	–	%
Spectral width	ΔλRMS	CW, over P_f range,	–	2.0	nm
Wavelength tuning vs. temperature	Δλ/T	$I_f = I_{op}$	0	0.01	nm/°C
Laser diode 10%-90% rise/fall time	t_r / t_f	Step response	–	100	ns
1550 return loss	RL	1480 – 1620 nm	–	9	dB
Optical power cross talk		Over Pf and Tcase range		1.0	mW
Thermal cross talk		Over Pf and Tcase range		1.0	degC
Monitor diode response per LD	I_{BF}	Over P_{op} range	0.5	5	μA/mW
Monitor diode rise/fall time	$t_{PDr/tPDf}$	5V reverse bias, 10%-90%, 50Ω load	–	100	ns
Monitor diode capacitance	C_t	5V reverse bias, f=1MHz	–	10	pF
LD operating temperature	T_{LD}	45°C, nominal	43	47	°C
Thermistor resistance	R_{th}	T_{set} = 45°C	9.5	10.5	kΩ

Table 5 TEC and Total Module Power Consumption at T_{LD} = 45°C (BOL/EOL, ΔT=30°C, T_{CASE} = 75°C)

Product code	TEC Current I_{max} (A) BOL/EOL	TEC Voltage V_{max} (V) BOL/EOL	TEC Power Consumption P_{TEC} (W) BOL/EOL	Total Module Power Consumption P_{max} (W) BOL/EOL
D22-xxxx-700700	1.83/1.9	2.02/2.08	3.5/3.7	7.5/8.2 (Typ. 6.3/6.8)
D22-xxxx-800800	1.93/2.02	2.1/2.17	3.8/4.1	8.5/9.4 (Typ. 7.1/7.8)
D22-xxxx-800900	2/2.1	2.15/2.24	4.1/4.4	9.2/10.2 (Typ. 7.6/8.4)
D22-xxxx-800A00	2.07/2.2	2.21/2.31	4.3/4.7	9.9/11.1 (Typ. 8.1/9)
D22-xxxx-900900	2.04/2.16	2.19/2.29	4.2/4.6	9.6/10.8 (Typ. 8/8.8)
D22-xxxx-900A00	2.12/2.26	2.26/2.37	4.5/5	10.4/11.7 (Typ. 8.5/9.5)
D22-xxxx-950950	2.1/2.24	2.24/2.35	4.4/4.9	10.3/11.5 (Typ. 8.4/9.4)
D22-xxxx-950A00	2.14/2.29	2.28/2.39	4.6/5.1	10.7/12 (Typ. 8.7/9.8)
D22-xxxx-A00A00	2.17/2.33	2.3/2.42	4.7/5.2	10.9/12.4 (Typ. 8.9/10)

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 ±1 µm
Coating outside diameter	245 ±10 µm
Core-cladding concentricity	≤0.5 µm
Mode field diameter	5.9 ±0.5 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.

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 heat sinking and proper mounting of this device is required to ensure specified performance over its

Operating life

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 package is labeled with the laser radiation hazard symbol and safety warning labels shown blow:

Shipping Box 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.

D22 - □□□□ □□□□□□

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

Maximum Operating Power	Code
700 mW / 700 mW	700700
800 mW / 800 mW	800800
800 mW / 900 mW	800900
800 mW / 1000 mW	800A00
900 mW / 900 mW	900900
900 mW / 1000 mW	900A00
950 mW / 950 mW	950950
950 mW / 1000 mW	950A00
1000 mW / 1000 mW	A00A00

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