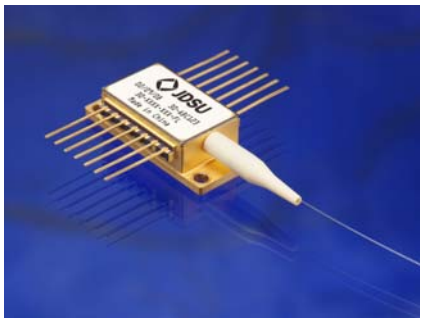
Up to 660 mW Fiber Bragg Grating Stabilized 980 nm Pump Modules

3000-FL Series



Key Features

- Very high kink-free powers up to 660 mW
- Low-profile, epoxy-free, and flux-free 14-PIN butterfly planar package
- Fiber Bragg grating stabilization
- Wavelength selection available
- Tight tracking of fiber-coupled power
- Integrated thermoelectric cooler, thermistor, and monitor diode
- High dynamic range
- Excellent low power stability

Applications

- Next-generation, dense wavelength division multiplexing (DWDM) erbium-doped fiber amplifiers (EDFAs) requiring the highest power with "locked" wavelength emission
- Reduced pump-count EDFA architectures
- Very long distance CATV trunks and very high node-count distribution
- Pump splitting (multiple EDFA stages)
- FTTx, agile metro/ROADM

Compliance

- Telcordia GR-468-CORE

The JDSU 3000-FL Series 980 nm pump module features a planar construction with chip on subcarrier. The high-power JDSU laser chip is hermetically sealed in a low-profile, epoxy- and flux-free, 14-pin butterfly package and fitted with a thermistor, thermoelectric cooler, and monitor diode. The module meets the stringent requirements of the telecommunications industry, including Telcordia™ GR-468-CORE for hermetic 980 nm pump modules.

The 3000-FL Series pump module uses fiber Bragg grating stabilization to "lock" the emission wavelength. It provides a noise-free narrowband spectrum, even under changes in temperature, drive current, and optical feedback. Wavelength selection is available for applications that require the highest performance in spectrum control with the highest available powers.

The 3000-FL Series design also offers tight tracking of fiber-coupled power via the monitor diode signal.

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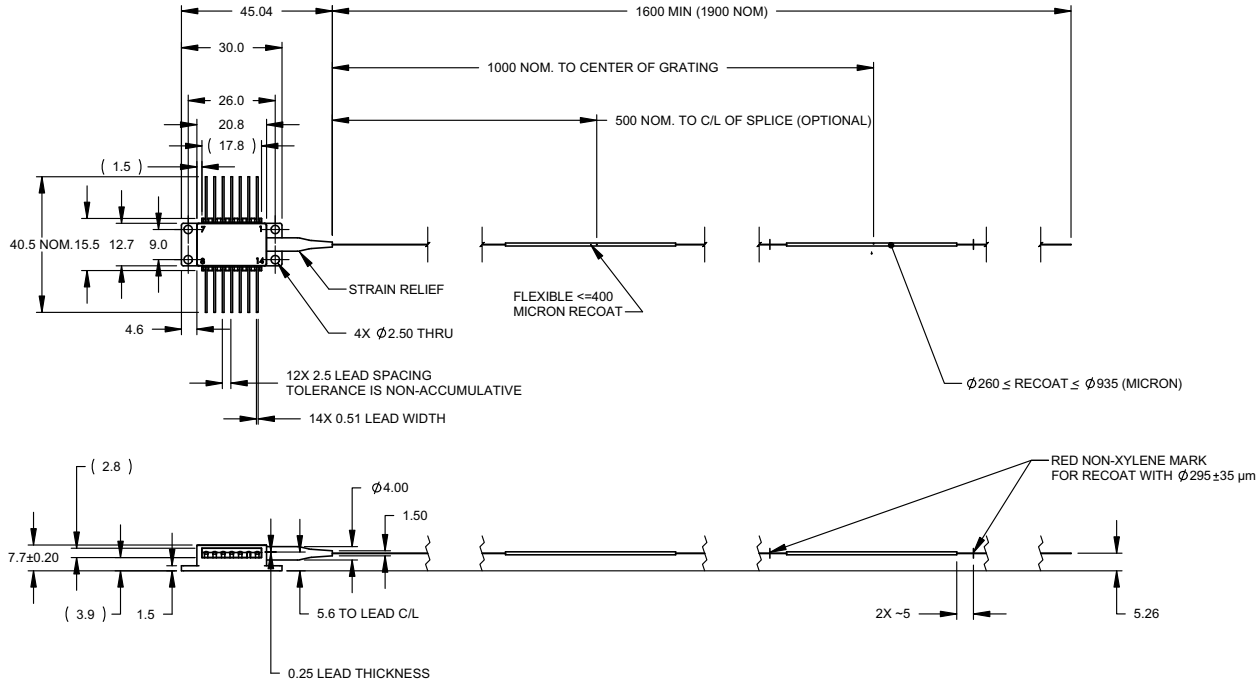
Dimensions Diagram
250 µm Bare Fiber Type A Wiring

(Note: Specifications in mm unless otherwise noted; tolerance = .x ± .3, .xx ± .20
The module pigtail consists of 250 µm buffered, Corning PureMode™ HI-1060 single-mode fiber.)



Pinout

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 (-)

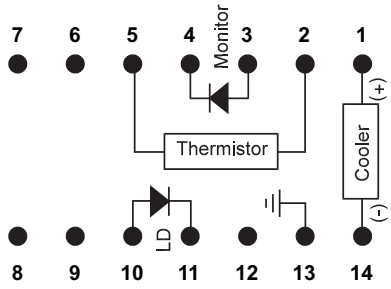


Table 1: Absolute Maximum Ratings

Parameter	Symbol	Test Condition	Minimum	Maximum
Operating case temperature	T_{op}	-	-20°C	75°C
Storage temperature	T_{stg}	2000 hours	-40°C	85°C
LD submount temperature	T_{LD}	-	0°C	50°C
LD reverse voltage	V_r	-	-	2.5 V
LD forward current	I_{f_max}	Unlimited time	-	1400 mA
LD current transient		1 µs maximum	-	1500 mA
LD reverse current		-	-	10 µA
PD reverse voltage	V_{PD}	-	-	20 V
PD forward current	I_{PD}	-	-	10 mA
Electrostatic discharge (ESD)	V_{ESD}	C = 100 pF, R = 1.5 Ω, human body model	-	1000 V
TEC current	I_{TEC}	-	-	4.0 A
TEC voltage	V_{TEC}	-	-	4.5 V
Atmospheric pressure		Storage	-	11 kPa
		Operating	-	58 kPa
Relative humidity	R_H	Non condensing	5%	95%
Lead soldering time		260°C	-	10 seconds

Note: Absolute maximum ratings are the maximum stresses that may be applied to the pump module for short periods of time without causing damage. Stresses in excess of the absolute maximum ratings can permanently damage the device. Exposure to absolute maximum ratings for extended periods, or exposure to more than one absolute maximum rating simultaneously may adversely affect device reliability.

Table 2: Operating Parameters (BOL, T_{case} = 0 to 75°C, T_{LD} = 25°C, -50 dB reflection, unless noted otherwise)

Product Code	Maximum Operating Power P_{op} (mW)[1,3]	Maximum Operating Current I_{op} (mA) Maximum[1]	Minimum Kink-Free Power P_{max} (mW)[2]	Kink-Free Current I_{max} (mA)[3] Maximum[2]
30-xxxx-500-FL	450	1000	500	1100
30-xxxx-520-FL	460	1020	520	1150
30-xxxx-540-FL	480	1060	540	1200
30-xxxx-560-FL	500	1100	560	1250
30-xxxx-580-FL	520	1150	580	1300
30-xxxx-600-FL	540	1200	600	1350
30-xxxx-620-FL	560	1250	620	1400
30-xxxx-640-FL	580	1250	640	1400
30-xxxx-660-FL	600	1250	660	1400

1. The maximum operating power (P_{op}) will be achieved at a device-specific maximum operating current (I_{op}). The individual value of I_{op} is noted on the hardcopy data sheet shipped with the device. All values of I_{op} are limited by the maximum value listed in Table 2.
2. The module is kink-free up to a minimum kink-free power (P_{max}) that the module will achieve at a device-specific kink-free current (I_{max}). The individual value of I_{max} is noted on the hardcopy data sheet shipped with the device. All values of I_{max} are limited by the maximum value listed in Table 2.
3. The pump laser shall never be operated at a power higher than the P_{op} throughout its lifetime. At beginning of life (BOL), the operating current shall never be higher than the device-specific I_{op} that is noted on the hardcopy data sheet shipped with the device. At end of life (EOL), the operating current shall never be higher than the device-specific I_{max} that is noted on the hardcopy data sheet shipped with the device.

Table 3: Available Peak Wavelength Selection (T_{amb} = 25±3°C, 50 mW < P < P_{op})

Product Code	Minimum Peak Wavelength	Maximum Peak Wavelength
30-7402-xxx-FL	973.5 nm	975.0 nm
30-7602-xxx-FL	975.0 nm	977.0 nm
30-8000-xxx-FL	973.5 nm	985.0 nm

Table 4: Electro-Optical Performance (BOL, T_{case} = 0 to 75°C, T_{LD} = 25°C, -50 dB reflection, unless noted otherwise)

Parameter	Symbol	Test Condition	Minimum	Maximum
Threshold current	I_{th}	-	-	35 mA
Laser diode temperature	T_{LD}	-	20°C	30°C
Forward voltage	V_f	$I_f = I_{op}$	-	2.6 V
Operating power	P_{op}	$I_f = I_{op}$	20 mW	P_{op}
Kinkfree output power	P_{max}	$I_f = I_{max}$	500 mW	660 mW
Wavelength	λ_m	-	973.5 nm	985 nm
Pump in pump band	P_{pump}	Pump band = λ_m±1.5 nm	90%	-
Spectral width	$\Delta\lambda_{RMS}$	-	-	2.0 nm
Wavelength tuning vs. temperature	$\Delta\lambda/T$	-	-	0.02 nm/°C
Optical power stability	ΔP_{f_t}	Over P_f range, DC to 50 kHz, 50 kHz sampling, T_{case} = 25°C 20 mW < P_{op} < 100 mW 100 mW < P_{op} < 600 mW	 - -	 4% 2.5%
Tracking error	TE	50 mW < P < P_{op}[1]	-15%	15%
Tracking ratio	TR	50 mW < P < P_{op}[2]	0.85	1.15
Monitor diode responsivity	I_{BF}	-	1 µA/mW	10 µA/mW
TEC cooling capacity	ΔT_{EC}	$I_f = I_{max}$, T_{LD} = 25°C, see table on next page	50°C	-
Thermistor resistance	R_{th}	T_{set} = 25°C	9.5 kΩ	10.5 kΩ
Thermistor constant	B	-	3600 K	4200 K

1. The tracking error is defined as the normalized change of output power relative to the operating power over case temperature range (0°C to 75°C), at constant back-face monitor current corresponding to the operating power at 25°C.

2. 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 (50 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.

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Table 5: TEC and Total Module Power Consumption (For $\Delta T = 50°C$, BOL, $T_{case} = 75°C$, $T_{ld} = 25°C$ unless noted otherwise)

Product Code	TEC Current Imax (A)	TEC Voltage Vmax (V)	TEC Power Consumption Pmax (W)	Total Module Power Consumption Pmax (W)
30-xxxx-500-FL	1.94	2.69	5.22	7.17
30-xxxx-520-FL	1.97	2.73	5.38	7.38
30-xxxx-540-FL	2.01	2.76	5.55	7.66
30-xxxx-560-FL	2.03	2.78	5.64	7.87
30-xxxx-580-FL	2.06	2.80	5.77	8.14
30-xxxx-600-FL	2.09	2.83	5.91	8.45
30-xxxx-620-FL	2.20	2.90	6.38	9.19
30-xxxx-640-FL	2.20	2.90	6.38	9.19
30-xxxx-660-FL	2.20	2.90	6.38	9.19

Ordering Information

For more information on this or other products and their availability, please contact your local JDSU account manager or JDSU directly at 1-800-498-JDSU (5378) in North America and +800-5378-JDSU worldwide, or via e-mail at customer.service@jdsu.com.

Sample: 30-7402-620-FL

30- □□□□ **-** □□□ **-FL**

Code	Peak Wavelength
7402	973.5 to 975.0 nm
7602	975.0 to 977.0 nm
8000	973.5 to 985.0 nm

Code	Minimum Kink-Free Power
500	500 mW
520	520 mW
540	540 mW
560	560 mW
580	580 mW
600	600 mW
620	620 mW
640	640 mW
660	660 mW

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 .001" and the mounting screws must be torqued down to 1.5 in.-lb.

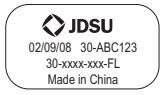
ESD PROTECTION—Electrostatic discharge (ESD) is the primary cause of unexpected laser diode failure. Take extreme precaution to prevent ESD. Use wrist straps, grounded work surfaces, and rigorous antistatic techniques when handling laser diodes.

Labeling

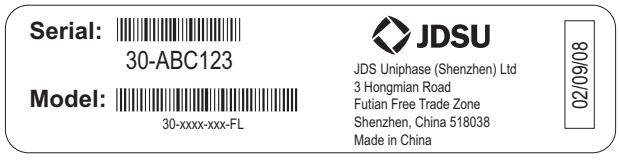
21 CFR 1040.10 Compliance

Because of the small size of these devices, the output power and laser emission indicator label shown below is attached to the individual shipping container. All labels are illustrated here to comply with 21 CFR 1040.10 as applicable under the Radiations Control for Health and Safety Act of 1968.

14-Pin Module Label



Shipping Box Label



Output Power and Laser Emission Indicator Label