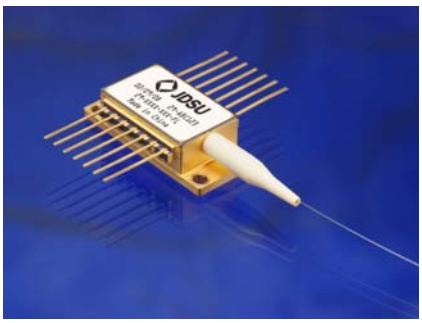
Up to 500 mW Fiber Bragg Grating Stabilized 980 nm Pump Modules

2900-FL Series



Key Features

- **Very high kink-free powers to 500 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

Compliance

- Telcordia GR-468-CORE

The JDSU 2900-FL Series 980 nm pump module uses 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 2900-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 2900-FL Series design also offers tight tracking of fiber-coupled power via the monitor diode signal.

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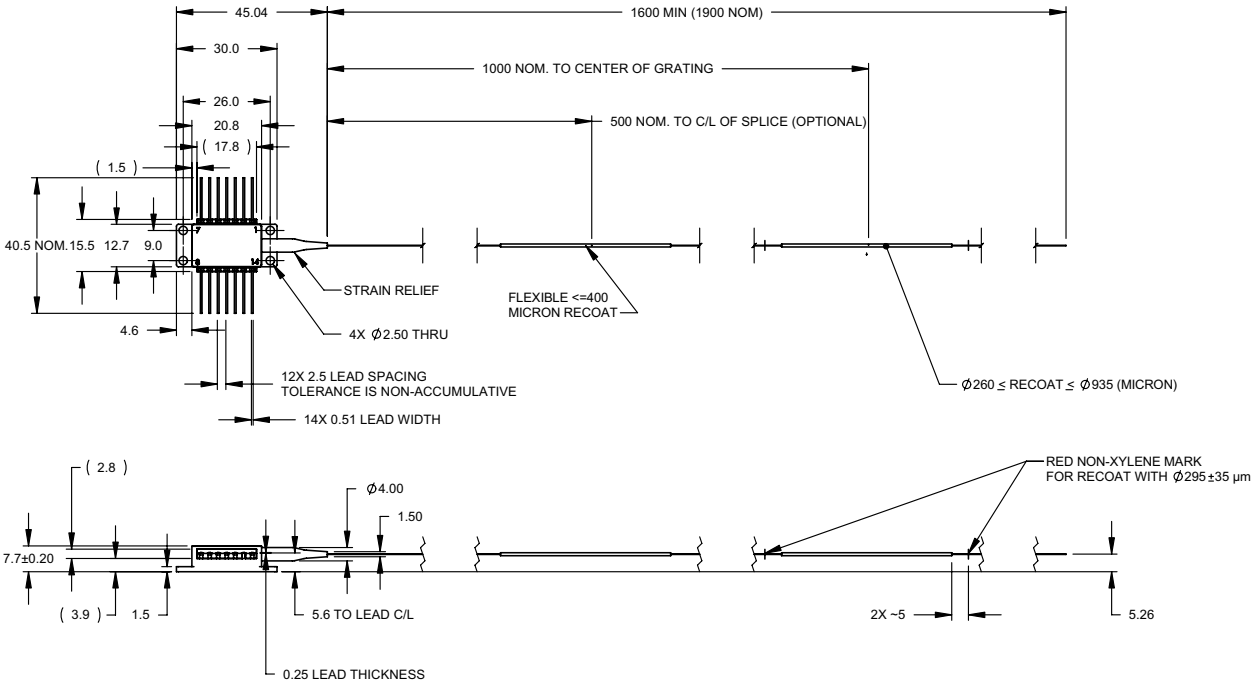
Dimensions Diagram
250 µm Bare Fiber Type A Wiring

(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 (-)

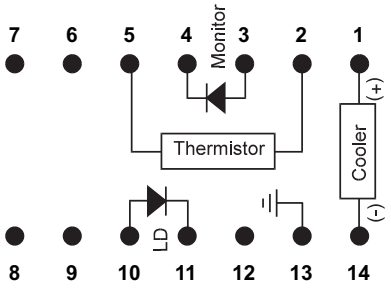


Table 1: Absolute Maximum Ratings

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}	48 hours maximum	-	1100 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
Axial pull force		3 x 10 seconds	-	5 N
Side pull force		3 x 10 seconds	-	2.5 N
Fiber bend radius		-	16 mm	-
Relative humidity	R_H	40 °C	5%	95%
Lead soldering time		300 °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]
29-xxxx-310-FL	280	560	310	640
29-xxxx-320-FL	290	590	320	670
29-xxxx-330-FL	300	630	330	700
29-xxxx-340-FL	310	640	340	700
29-xxxx-350-FL	315	650	350	700
29-xxxx-360-FL	325	660	360	700
29-xxxx-380-FL	340	680	380	760
29-xxxx-400-FL	360	720	400	805
29-xxxx-420-FL	380	760	420	855
29-xxxx-440-FL	400	805	440	910
29-xxxx-460-FL	410	840	460	950
29-xxxx-480-FL	430	875	480	985
29-xxxx-500-FL	450	900	500	1000

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
29-7402-xxx-FL	973.5 nm	975.0 nm
29-7552-xxx-FL	974.5 nm	976.5 nm
29-7602-xxx-FL	975.0 nm	977.0 nm
29-7702-xxx-FL	976.0 nm	978.0 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}	-	-	30 mA
Forward voltage	V_f	$I_f = I_{op}$	-	2.5 V
Spectral width	$\Delta\lambda_{RMS}$	50 mW < P < P_{op}	-	2.0 nm
Peak wavelength tuning	$\Delta\lambda_P/\Delta T_{amb}$	50 mW < P < P_{op}	-	0.02 nm/°C
Side-mode suppression ratio	SMSR	50 mW < P < P_{op}	15 dB	-
Relative optical power stability		Peak-to-peak, T = 10 min, 50 kHz sampling, T_{case} = 25 °C		
		20 mW < P < P_{op}	-	4%
		12 mW < P < 20 mW	-	10%
		3.5 mW < P < 12 mW	-	25%
Tracking error	TE	20 mW < P < P_{op}[1]	-8%	8%
Tracking ratio	TR	20 mW < P < P_{op}[2]	0.90	1.10
Monitor diode responsivity	$Resp_{BF}$	20 mW < P < P_{op}	2 µA/mW	10 µA/mW
TEC current	I_{TEC}	T_{case} = 75 °C	-	1.9 A
TEC voltage	V_{TEC}	T_{case} = 75 °C	-	2.5 V
Thermistor resistance	R_{th}	-	9.5 kΩ	10.5 kΩ
Thermistor constant	B	-	3600 K	4200 K
Module power consumption		T_{case} = 75 °C, BOL	-	8.2 W
		T_{case} = 75 °C, EOL	-	9.5 W

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 (20 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.

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: 29-7402-310-FL

29- □□□□ **-** □□□ **-FL**

Code	Peak Wavelength
7402	973.5 to 975.0 nm
7552	974.5 to 976.5 nm
7602	975.0 to 977.0 nm
7702	976.0 to 978.0 nm

Code	Minimum Kink-Free Power
310	310 mW
320	320 mW
330	330 mW
340	340 mW
350	350 mW
360	360 mW
380	380 mW
400	400 mW
420	420 mW
440	440 mW
460	460 mW
480	480 mW
500	500 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.

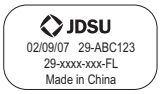
ESD PROTECTION—Electrostatic discharge (ESD) is the primary cause of unexpected laser diode failure. Take extreme precaution to prevent ESD. Use wrist straps, grounded work surfaces, and rigorous antistatic techniques when handling laser diodes.

Labeling

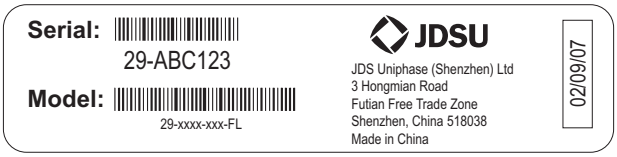
21 CFR 1040.10 Compliance

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