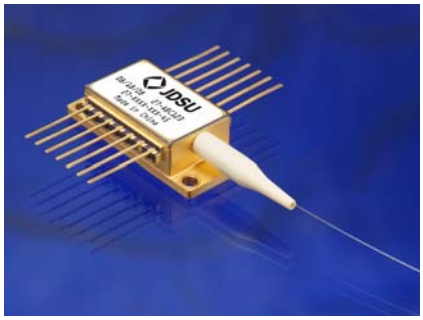
Up to 400 mW Fiber Bragg Grating Stabilized 980 nm Pump Modules

2745 Series



Key Features

- **High kink-free powers to 400 mW**
- **Reduced TEC power consumption, compatible with legacy temperature control**
- **Low-profile 14-PIN butterfly planar package**
- **Fiber Bragg grating stabilization**
- **Wavelength selection available**
- **Integrated thermoelectric cooler, thermistor, and monitor diode**
- **High dynamic range**

Applications

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

Compliance

- Telcordia GR-468-CORE

The JDSU 2745 series of 980 nm pump modules uses a planar construction with chip on subcarrier. The `semicooled' 45°C laser diode operation provides for a significant reduction in TEC and overall power consumption. The high-power JDSU laser chip is hermetically sealed in a low-profile, 14-pin butterfly package, 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 2745 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 powers available.

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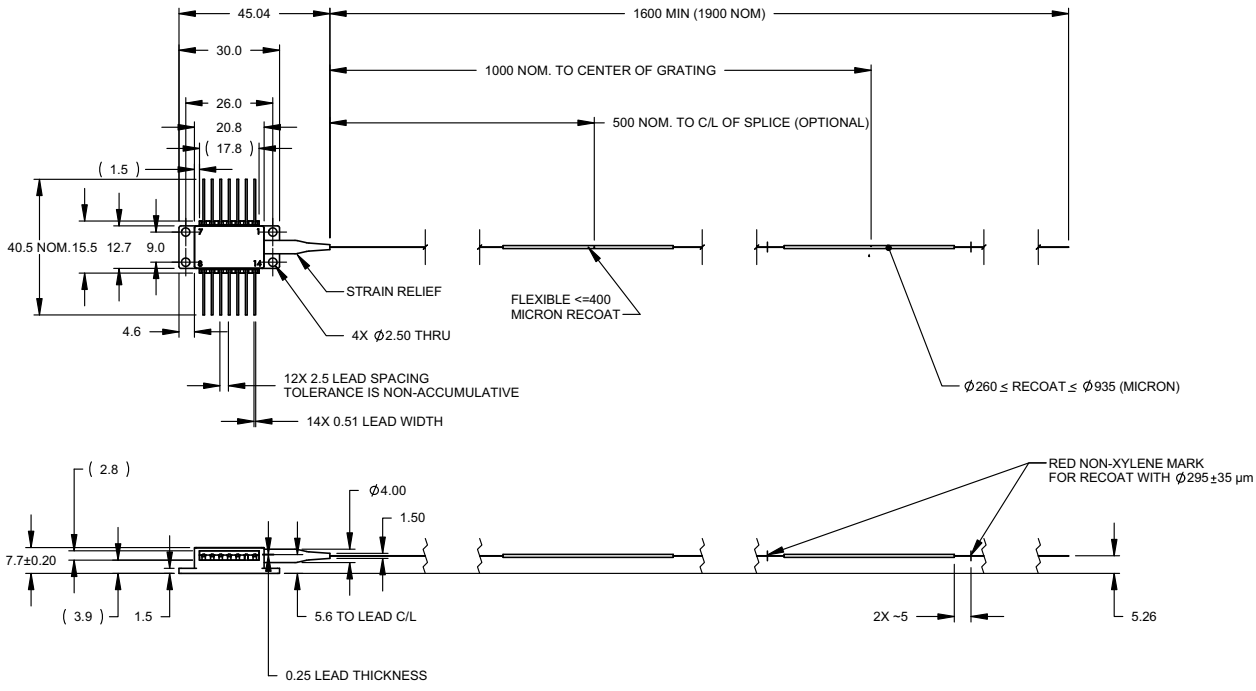
Dimensions Diagram
250 µm Bare Fiber Type A Wiring

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 (-)

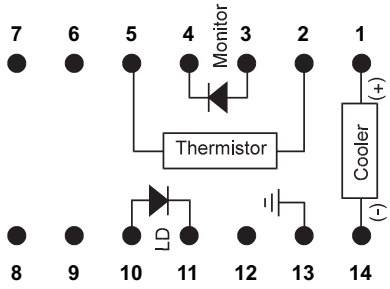


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Table 1 Absolute Maximum Ratings

Parameter	Symbol	Test Conditions	Minimum	Maximum
Operating case temperature	T_{op}	-	-5°C	75°C
Storage temperature	T_{stg}	2,000 hours	-40°C	85°C
LD submount temperature	T_{LD}	-	0°C	50°C
LD reverse voltage	V_r	-	-	2 V
LD forward current		-	-	1,000 mA
LD current transient		1 µs maximum	-	1,100 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	-	1,000 V
TEC current	I_{TEC}	-	-	2.5 A
TEC voltage	V_{TEC}	-	-	4.0 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} = 45°C, -50 dB reflection, unless noted otherwise)

Product Code	Maximum Operating Power P_{op} (mW)	Maximum Operating Operating Current I_{op} (mA)	Minimum Kink-Free Power P_{max} (mW)	Kink-Free Current I_{max} (mA) Maximum
27-xxxx-120-45	100	300	120	340
27-xxxx-140-45	120	320	140	355
27-xxxx-160-45	135	330	160	380
27-xxxx-180-45	155	360	180	420
27-xxxx-200-45	170	400	200	460
27-xxxx-220-45	190	440	220	510
27-xxxx-240-45	205	480	240	560
27-xxxx-260-45	225	520	260	600
27-xxxx-280-45	240	560	280	650
27-xxxx-300-45	260	600	300	700
27-xxxx-320-45	275	640	320	750
27-xxxx-340-45	295	680	340	820
27-xxxx-360-45	310	725	360	860
27-xxxx-380-45	330	780	380	910
27-xxxx-400-45	340	820	400	950

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

Product Code	Minimum Peak Wavelength	Maximum Peak Wavelength
27-8000-xxx-45	973.5 nm	978.0 nm
27-7402-xxx-45	973.5 nm	975.0 nm
27-7552-xxx-45	974.5 nm	976.5 nm
27-7602-xxx-45	975.0 nm	977.0 nm
27-7702-xxx-45	976.0 nm	978.0 nm

Table 4 Electro-optical Performance (BOL, T_{case} = 0 to 75°C, T_{LD} = 45°C, -50 dB reflection, unless noted otherwise)

Parameter	Symbol	Test Condition	Minimum	Maximum
Threshold current	I_{th}	-	-	40 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]	-25%	25%
Tracking ratio	TR	20 mW < P < P_{op}[2]	0.75	1.25
Monitor diode responsivity	$Resp_{BF}$	20 mW < P < P_{op}	2 µA/mW	10 µA/mW
TEC current	I_{TEC}	T_{case} = 75°C	-	1.5 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

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.

Table 5 TEC and Total Module Power Consumption (For $\Delta T = 30°C$, BOL, $T_{case} = 75°C$, $T_{ld} = 45°C$ unless noted otherwise)

Product Code	TEC Current I_{max} (A)	TEC Voltage V_{max} (V)	TEC Power Consumption P_{max} (W)	Total Module Power Consumption P_{max} (W)
27-xxxx-120-45	0.58	0.90	0.52	1.01
27-xxxx-140-45	0.60	0.92	0.55	1.08
27-xxxx-160-45	0.63	0.96	0.60	1.17
27-xxxx-180-45	0.65	0.98	0.64	1.26
27-xxxx-200-45	0.69	1.04	0.72	1.43
27-xxxx-220-45	0.71	1.07	0.76	1.56
27-xxxx-240-45	0.78	1.17	0.91	1.81
27-xxxx-260-45	0.83	1.25	1.04	2.04
27-xxxx-280-45	0.90	1.31	1.18	2.28
27-xxxx-300-45	0.94	1.38	1.30	2.51
27-xxxx-320-45	1.00	1.45	1.45	2.76
27-xxxx-340-45	1.06	1.52	1.61	3.03
27-xxxx-360-45	1.13	1.57	1.77	3.31
27-xxxx-380-45	1.21	1.65	2.00	3.68
27-xxxx-400-45	1.28	1.75	2.24	4.03

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: 27-7402-180-45

27- ☐☐☐☐ **-** ☐☐☐ **-45**

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
8000	973.5 to 978.0 nm

Code	Minimum Kink-Free Power
120	120 mW
140	140 mW
160	160 mW
180	180 mW
200	200 mW
220	220 mW
240	240 mW
260	260 mW
280	280 mW
300	300 mW
320	320 mW
340	340 mW
360	360 mW
380	380 mW
400	400 mW

User Safety

Safety and Operating Considerations

The laser light emitted from this diode laser 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 diode laser 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 diode lasers may be damaged by excessive drive current or switching transients. When using power supplies, the diode laser should be connected with the main power on and the output voltage at zero. The current should be increased slowly while monitoring the diode laser 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.

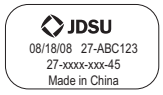
ESD PROTECTION — ESD is the primary cause of unexpected diode laser failure. Take extreme precaution to prevent ESD. Use wrist straps, grounded work surfaces, and rigorous antistatic techniques when handling diode lasers.

Labeling

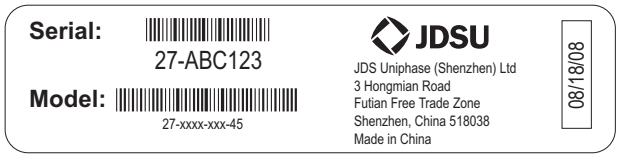
21 CFR 1040.10 Compliance

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