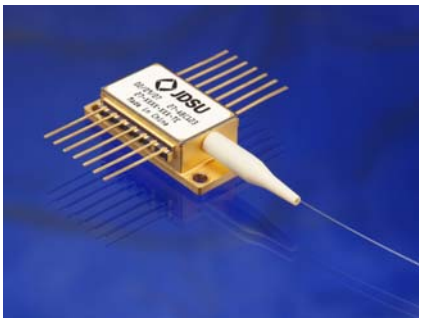
Up to 300 mW Fiber Bragg Grating Stabilized 980 nm Pump Modules with Tight Tracking

2700-TE Series



Key Features

- **High kink-free powers to 300 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

- Erbium doped fiber amplifiers (EDFAs) without a front-fiber tab for tracking
- 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 2700-TE Series 980 nm pump module utilizes 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 2700-TE 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 2700-TE Series design also offers tight tracking of fiber-coupled power via the monitor diode signal.

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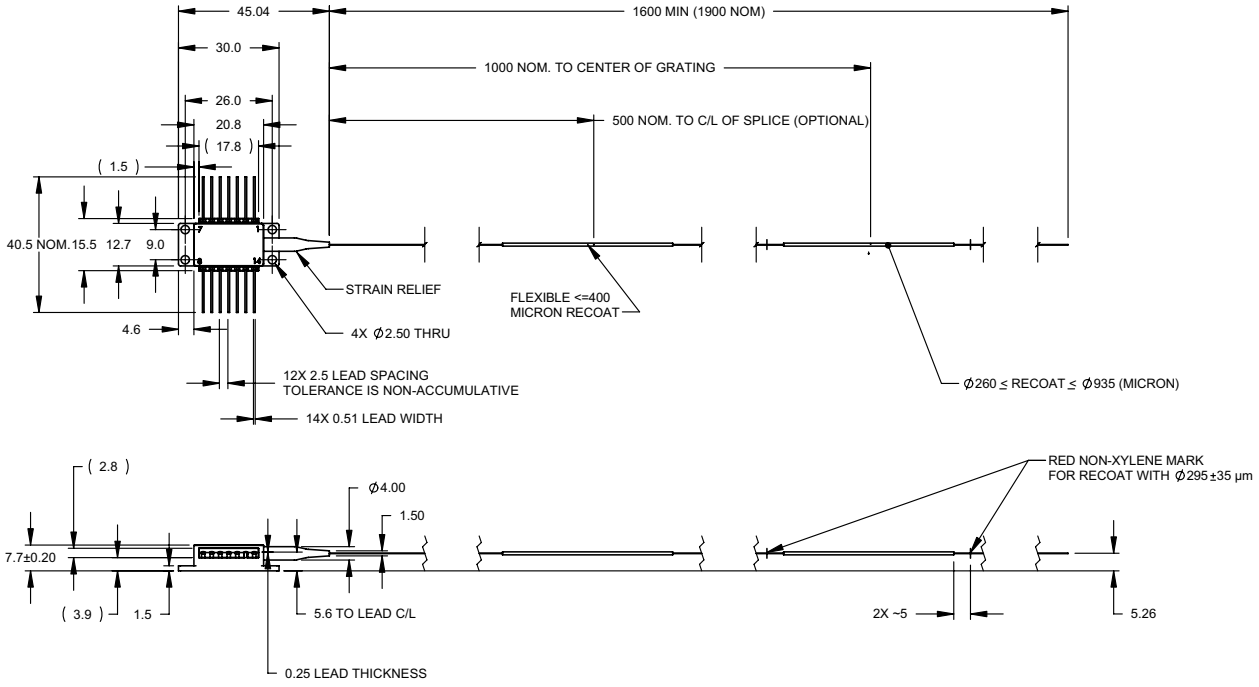
Dimensions Diagram
250 µm Bare Fiber Type A Wiring

(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 (-)

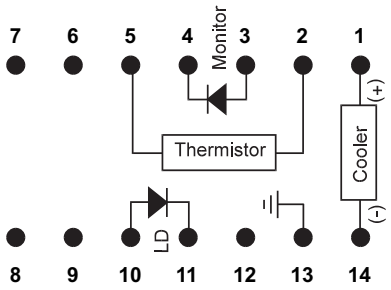


Table 1: Absolute Maximum Ratings

Parameter	Symbol	Test Conditions	Minimum	Maximum
Operating case temperature	T_{op}	-	-5 °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 V
LD forward current		-	-	650 mA
LD current transient		1 µs maximum	-	1000 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}	-	-	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		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[1]	Maximum Operating Power P_{op} (mW)[2,3]	Maximum Operating Current I_{op} (mA) Maximum[2]	Minimum Kink-Free Power P_{max} (mW)[4]	Kink-Free Current I_{max} (mA)[3] Maximum[4]
27-xxxx-190-TE	170	360	190	400
27-xxxx-200-TE	180	380	200	420
27-xxxx-210-TE	190	400	210	440
27-xxxx-220-TE	200	420	220	460
27-xxxx-230-TE	210	440	230	480
27-xxxx-240-TE	220	460	240	500
27-xxxx-250-TE	230	480	250	520
27-xxxx-260-TE	240	500	260	540
27-xxxx-270-TE	250	520	270	560
27-xxxx-280-TE	260	540	280	580
27-xxxx-290-TE	270	560	290	600
27-xxxx-300-TE	280	560	300	600

1. The 29-xxxx-xxx-FL may be substituted for this part series. All 27-xxxx-xxx-TE end product specifications will remain as published; there is no change to part numbers, product testing, quality or reliability. Traceability is accomplished through product serial number.
2. The maximum operating power P_{op} will be achieved at a device-specific current, the 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.
3. The pump laser shall never be operated at a power higher than the maximum operating power P_{op} throughout its lifetime. At Begin of Life (BOL), the operating current shall never be higher than the device-specific maximum operating current 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 kink-free current I_{max} that is noted on the hardcopy data sheet shipped with the device.
4. The module is kink-free (at least) up to a minimum kink-free power P_{max} that the module will achieve at a device-specific current, the 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.

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-TE	970.0 nm	985.0 nm
27-7402-xxx-TE	973.0 nm	975.0 nm
27-7552-xxx-TE	974.5 nm	976.5 nm
27-7602-xxx-TE	975.0 nm	977.0 nm
27-7702-xxx-TE	976.0 nm	978.0 nm
27-8052-xxx-TE	979.5 nm	981.5 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}	-	-	25 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	-	1.5 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
Module power consumption		T_{case} = 75 °C	-	4.5 W
		T_{case} = 75 °C, EOL	-	5.5 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.

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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: 27-7402-190-TE

27- □□□□ **-** □□□ **-TE**

Code	Peak Wavelength
7402	973.0 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	970.0 to 985.0 nm
8052	979.5 to 981.5 nm

Code	Minimum Kink-Free Power
190	190 mW
200	200 mW
210	210 mW
220	220 mW
230	230 mW
240	240 mW
250	250 mW
260	260 mW
270	270 mW
280	280 mW
290	290 mW
300	300 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.

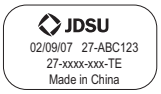
ESD PROTECTION — Electrostatic discharge (ESD) is the primary cause of unexpected laser diode failure. Take extreme precaution to prevent ESD. Use wrist straps, grounded work surfaces, and rigorous antistatic techniques when handling laser diodes.

Labeling

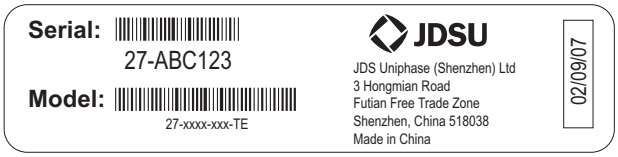
21 CFR 1040.10 Compliance

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