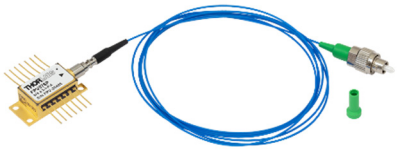
976 nm Grating Stabilized Single-Frequency Laser Diode



FPV976P

Description

The FPV976P 976 nm, Single-Frequency, Wavelength-Stabilized Laser Diode is based on quantum well epitaxial layer growth and a highly reliable ridge waveguide structure with external volume-holographic-grating (VHG) feedback. This single-frequency laser diode is housed in a butterfly package with an internal optical isolator, monitor diode, TEC and a thermistor that allows the laser to be temperature controlled. This laser diode produces a wavelength-stabilized spectrum with a single-frequency narrow linewidth over the operating power range of approximately 15 to 30 mW. The output is coupled to 1.0 m of FC/APC-terminated PM980-XP fiber.

Specifications

Absolute Maximum Ratings[a]	
LD Reverse Voltage (Max)	2.0 V
PD Reverse Voltage (Max)	20 V
Absolute Max Current	400 mA
Absolute Max Power	40 mW
Operating Case Temperature	0 to 70 °C
Storage Temperature	-10 to 70 °C
Pin Code	14 Pin, Type 1

a. Do not exceed the maximum optical power or maximum drive current, whichever occurs first.

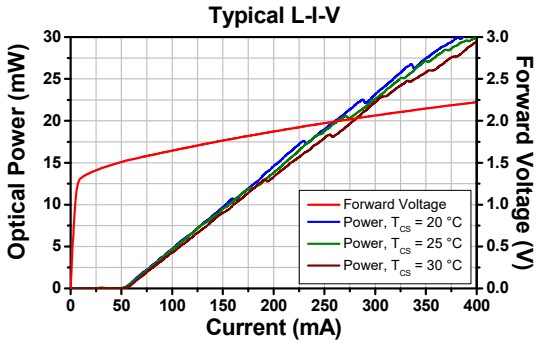
Characteristics (CW; $T_{CHIP} = T_{CS}$, T_{CASE} = 0 - 70 °C)	Symbol	Min	Typical	Max
Center Wavelength	λ_C	975 nm	976 nm	977 nm
Single Frequency Output Power[a] (CW @ I_{CW} and T_{CS})	P_{CW-SF}	27 mW	30 mW	-
Single Frequency Power Range	ΔP_{SF}	15 mW[b]	-	-
Operating Current (CW)	I_{CW}	-	-	400 mA
Center Temperature for $\Delta T_{stabilized}$	T_{CS}	15 °C	-	35 °C
Wavelength-Stabilized Temperature Range	$\Delta T_{stabilized}$	5 °C	10 °C	-
Threshold Current	I_{TH}	-	50 mA	70 mA
Side Mode Suppression Ratio (SMSR)	SMSR	25 dB	40 dB	-
Internal Isolator Isolation	ISO	30 dB	-	-
Forward Voltage	V_F	-	2.2 V	2.8 V
Slope Efficiency at 25 °C	$\Delta P/\Delta I$	-	0.1 W/A	-
Laser Linewidth	Δv	-	15 MHz	-
Monitor Photodiode Current	I_{photo}	-	2.0 mA	-
Polarization Extinction Ratio	PER	15 dB		
TEC Operation (Typical/Max @ T_{CASE} = 25 °C / 70 °C)				
-TEC Current	I_{TEC}	-	0.1 A	1.4 A
-TEC Voltage	V_{TEC}	-	0.5 V	6.0 V
-Thermistor Resistance	R_{TH}	-	10 kΩ	-

a. This value is the upper limit of the range where the diode can produce a single-frequency output and varies from laser to laser. The performance of each individual laser can be found on the unit-specific data sheet.

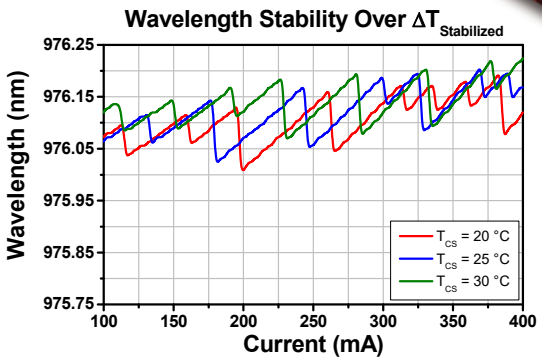
b. Multimode operation may occur below a minimum power threshold. This minimum power threshold can be found by subtracting the single frequency power range, ΔP_{SF}, from the maximum power, P_{CW-SF}. The maximum power will vary by item; see the item-specific data sheet for these values. This is valid over the temperature range $T_{CS} \pm \Delta T_{stabilized}/2$.

Typical Performance Plots

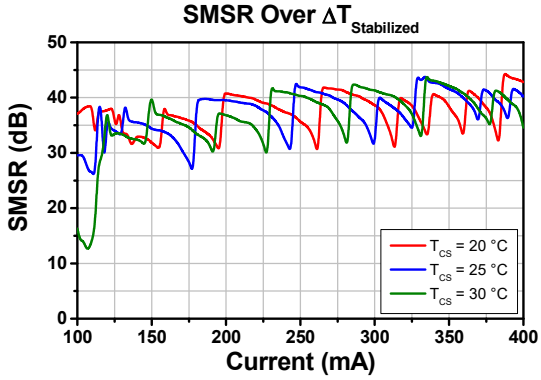
The plots below are typical; performance will vary between individual lasers. Each laser includes a serial-number-specific datasheet detailing performance.



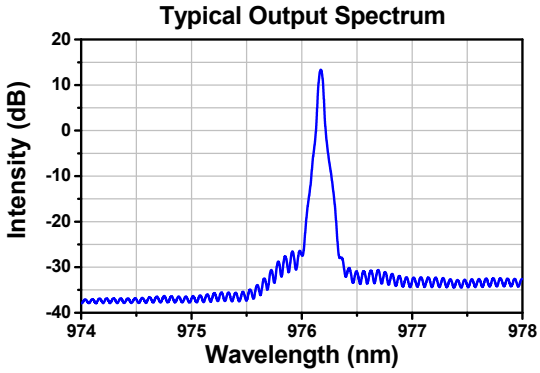
The typical output power vs. current is shown for three temperatures within the wavelength stabilized temperature range ($T_{CS} \pm \Delta T_{stabilized}/2$) of a FPV976P laser diode.



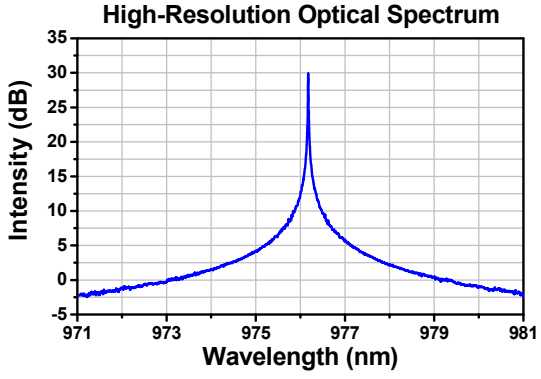
When used within the wavelength stabilized temperature range ($T_{CS} \pm \Delta T_{stabilized}/2$), the FPV976P laser shows excellent wavelength stability over a range of drive currents.



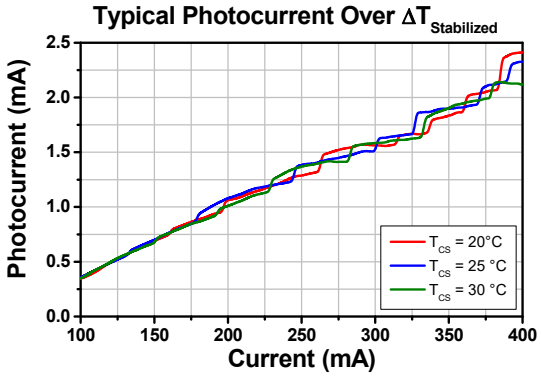
The typical side mode suppression ratio (SMSR) is shown for three temperatures within the wavelength stabilized temperature range ($T_{CS} \pm \Delta T_{stabilized}/2$).



The typical optical spectrum is shown above. The data was obtained with a 380 mA drive current and with measurement resolution of 0.02 nm.

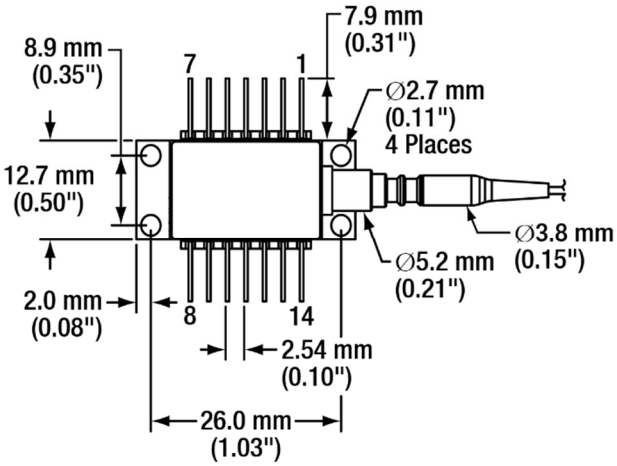


This high-resolution optical spectrum was obtained using one of Thorlabs' Optical Spectrum Analyzers (OSA201C), which provides 8 pm resolution at 976 nm.



The typical monitor photodiode current over laser diode current is shown above.

Drawing



PIN IDENTIFICATION	
1. TEC +	14. TEC -
2. Thermistor	13. Case Ground
3. PD Anode	12. NC
4. PD Cathode	11. Laser Cathode
5. Thermistor	10. Laser Anode
6. NC	9. NC
7. NC	8. NC