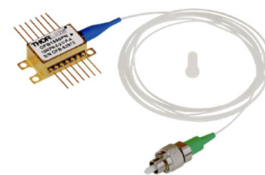


## 1646 nm, 80 mW (Typ.) DFB Butterfly Laser with Isolator, PM Fiber

DFB1646P



### Description

Thorlabs' DFB1646P Distributed Feedback (DFB) laser is a single-frequency laser diode that is well-suited as a low-noise pump source for Methane gas sensing, near infrared spectroscopy (NIRS), and general sensing. The DFB1646P laser includes an integrated dual-stage optical isolator, thermoelectric cooler (TEC), thermistor, and monitor photodiode. It is packaged in a 14-pin butterfly package with PM1550 polarization-maintaining optical fiber and an FC/APC connector with the connector key aligned to the slow axis of the fiber.

### Specifications

DFB1646P <sup>a</sup>				
	Symbol	Min	Typical	Max
Center Wavelength	$\lambda_c$	1641 nm	1646 nm	1651 nm
Laser Linewidth	$\Delta\nu$	-	50 kHz	-
Output Power CW @ $I_{OP}$	$P_{OP}$	70 mW	80 mW	-
Operating Current	$I_{OP}$	-	-	900 mA
Mode-Hop-Free Operating Current <sup>b</sup>	$\Delta I_{\text{Mode-Hop-Free}}$	350 mA	-	-
SMSR in Mode-Hop-Free Range <sup>c</sup>	SMSR	30 dB	50 dB	-
Threshold Current	$I_{TH}$	-	50 mA	-
Forward Voltage	$V_F$	-	-	3.0 V
Slope Efficiency	$\Delta P / \Delta I$	-	0.11 W/A	-
Current Tuning	$\Delta \lambda / \Delta I$	-	0.005 nm/mA	-
Temperature Tuning	$\Delta \lambda / \Delta T$	-	0.11 nm/°C	-
Monitor Diode Responsivity	$I_{MON} / P$	-	5 $\mu\text{A/mW}$	-
Polarization Extinction Ratio <sup>d</sup>	$r_{ex}$	-	23 dB	-
Internal Isolation	ISO	-	50 dB	-
TEC Operation (Typical / Max @ $T_{CASE} = 25^\circ\text{C} / 50^\circ\text{C}$ )				
TEC Current	$I_{TEC}$	-	0.45 A	2.3 A
TEC Voltage	$V_{TEC}$	-	0.60 V	3.8 V
Thermistor Resistance @ 25 °C	$R_{TH}$	-	10 k $\Omega$	-

- $T_{CASE} = 25^\circ\text{C}$ ;  $T_{CHIP} = 15 - 35^\circ\text{C}$ .
- The current range where mode-hops are not observed, allowing for continuous tuning.
- As measured with an optical spectrum analyzer (OSA) with spectral resolution of 0.02 nm to empirically determine single frequency range. Laser 30 dB bandwidth and SMSR are subject to monochromator settings and OSA internal algorithms and will differ from instrument to instrument.
- Ratio of transmitted light polarized along the fiber's slow axis to transmitted light polarized along the fast axis.



## Absolute Maximum Ratings

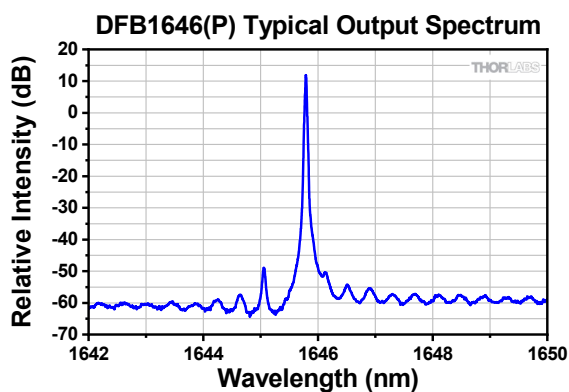
Laser Current <sup>a</sup>	See Serialized Datasheet
Laser Power <sup>a</sup>	See Serialized Datasheet
LD Reverse Voltage	2 V
TEC Current	2.5 A
TEC Voltage	4.0 V
PD Reverse Voltage	15 V
Operating Case Temperature	0 to 50 °C
Operating Chip Temperature	15 to 35 °C
Storage Temperature	-10 to 65 °C

- a. Some devices will produce the max laser power before exceeding the typical operating current. Do not drive the laser diode beyond the absolute max laser current or power. Operating in this regime can cause damage to the device.

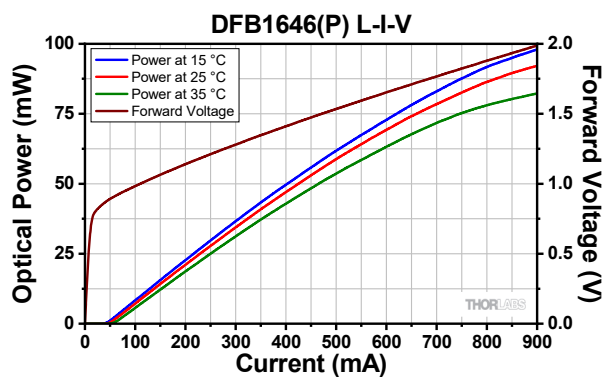
## Fiber Specifications

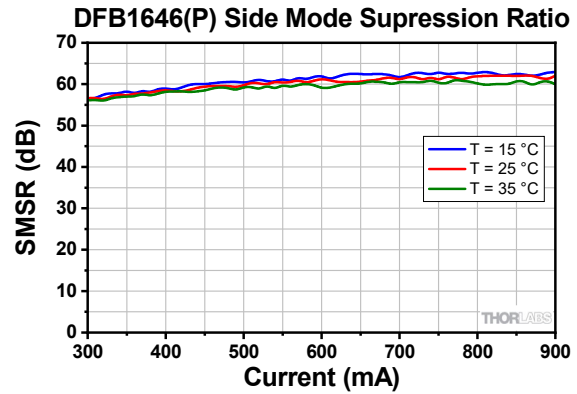
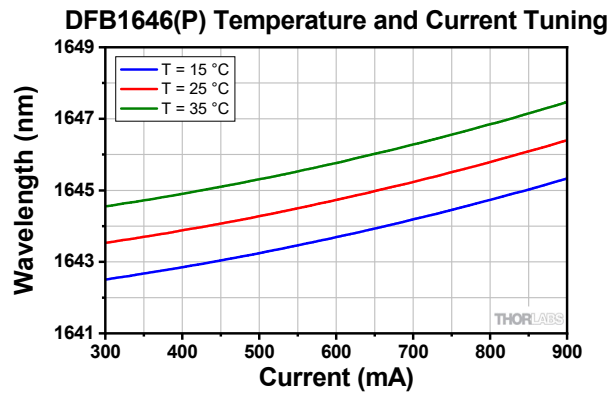
Fiber Type	PM1550
Numerical Aperture	0.125
Core Diameter	8.5 $\mu\text{m}$
Mode Field Diameter	10.5 $\pm$ 0.5 $\mu\text{m}$ at 1550 nm
Fiber Length	1.5 m
Connector	FC/APC, 2.0 mm Narrow Key
Connector Key Alignment	Slow Axis
Jacket	$\varnothing$ 900 $\mu\text{m}$ , Loose Tube

## Typical Performance Plots

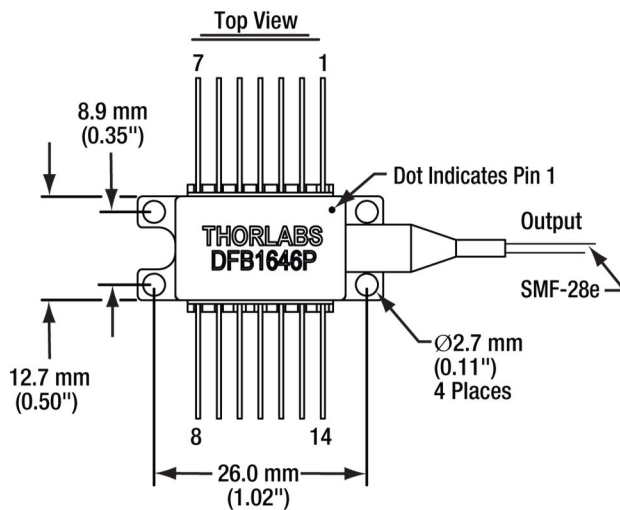


The spectrum was measured using an optical spectrum analyzer with a spectral resolution of 0.02 nm.





## Drawings



### PIN IDENTIFICATION

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

