

# LD4B-1590-DFB-2.5G-20

## OVERVIEW

Laser diode coupled to an optical fiber and packaged into a hermetic case.

## MAIN FEATURES

- Wavelength: 1590 nm
- Cavity type: DFB
- Optical power in CW mode in single-mode fiber: 20 mW
- Instantaneous linewidth < 500 kHz
- Data rate 2.5 Gbps
- Package types: coaxial, coaxial with bracket, 14 pins DIL, 14 pins BTF
- Built-in monitor photodiode

## ORDERING INFORMATION

### LD4B-1590-DFB-2.5G-20-X-X-X-X-X-X

#### Case type

**COAX:** compact coaxial (low duty cycle pulse mode only)

**COAXB:** compact coaxial with a bracket

**TH:** compact coaxial with a bracket compatible to Thorlabs mount

**DIL:** common 14-pins DIL for active thermal stabilization (TEC and thermistor)

**DILRAD:** 14-pins DIL for active thermal stabilization (TEC and thermistor) with wall radiator

**BTF:** 14-pins BTF type 1 (Pump) for active thermal stabilization (TEC and thermistor)

#### Pinout code

2: see more details on page 5

#### Fiber type

**SM1:** SM, G.657.A1, [Corning SMF-28 Ultra](#), furcation tubing Ø0.9 mm or **BSM1** Ø0.25mm

**SM3:** SM, G.657.B3, [Corning ClearCurve ZBL](#), furcation tubing Ø0.9 mm or **BSM3** Ø0.25mm

**MM5:** MM, [50/125.OM3](#), furcation tubing Ø0.9 mm

Other type on request

#### Connector type

**FU:** FC/UPC (SM1, SM3)

**FA:** FC/APC (SM1, SM3, SMP13)

**SU:** SC/UPC (SM1)

**SA:** SC/APC (SM1)

**N:** no connector (scissors cut)

Other type: on request

#### Test measurements

**CW:** CW mode (electro-optical parameters at T=25+/-5 C and spectrum)

#### Fiber length

**0.5:** 500+/-50 mm

**1.0:** 1000+/-100 mm

Other length on request

# LD4B-1590-DFB-2.5G-20

## ABSOLUTE MAXIMUM RATINGS

Parameter		Value	Unit	Conditions
Laser diode CW forward current	I <sub>max</sub>	140	mA	CW, T = 25°C
Laser diode pulse forward current	I <sub>pmax</sub>	450	mA	10 us, duty cycle 1%
Laser diode reverse voltage	V <sub>RL</sub>	2	V	
Photodiode reverse voltage	V <sub>RP</sub>	30	V	
Photodiode forward current	I <sub>RP</sub>	5	mA	
Operating temperature*	T <sub>op</sub>	-40 - +85	°C	Coaxial package
Operating temperature*	T <sub>op</sub>	-40 - +60	°C	DIL, BTF (T <sub>st</sub> = 25°C)
Storage temperature	T <sub>stg</sub>	-40 - +85	°C	
Soldering temperature	T <sub>sold</sub>	260	°C	Max. 5 seconds

\*Operating temperature is defined by the case temperature. It is necessary to ensure sufficient heat dissipation so that the module's maximum operating temperature is not exceeded. Operation at elevated temperatures reduces the lifetime of the laser diode.

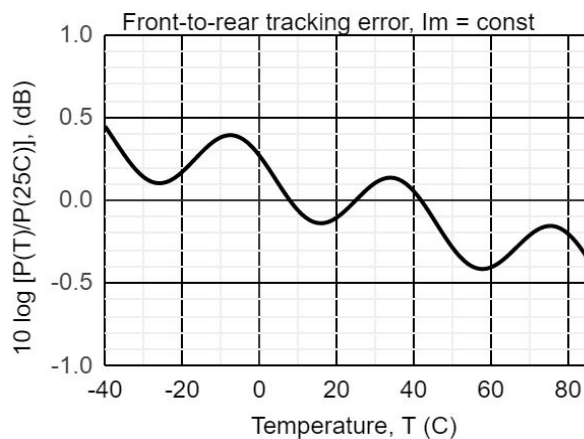
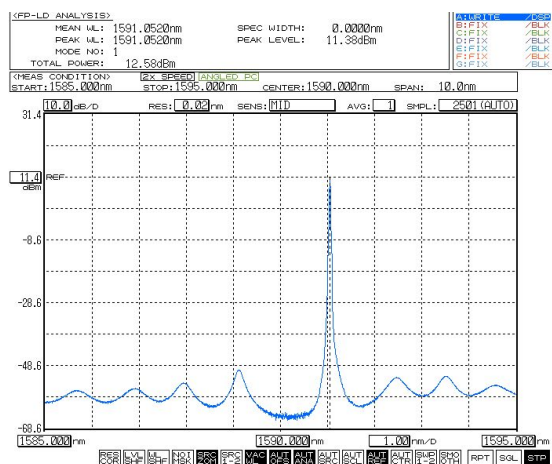
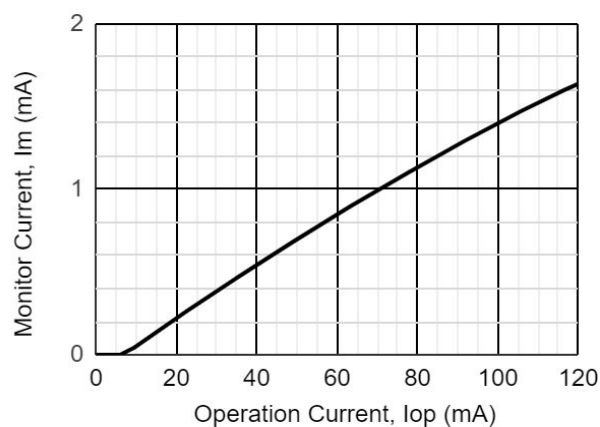
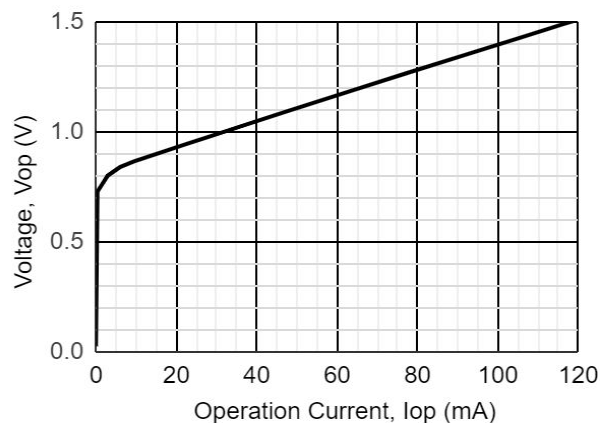
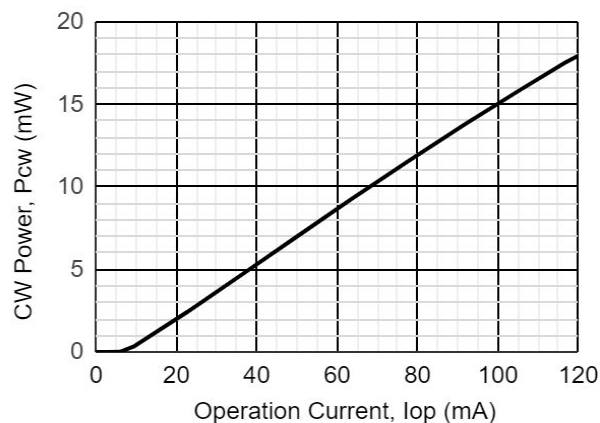
Operating temperature for the DIL, DILRAD and BTF 14-pins case T with TEC is defined for internal temperature stabilization at T<sub>st</sub> = 25°C that corresponds to thermistor resistance R<sub>t</sub> = 10 kOhm.

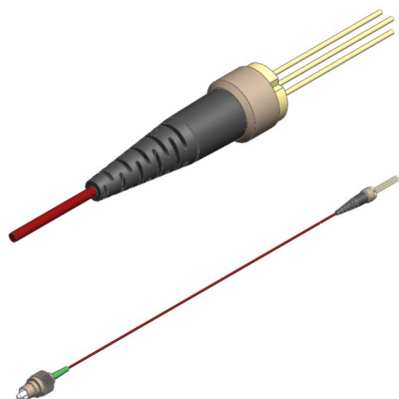
# LD4B-1590-DFB-2.5G-20

## ELECTRICAL-OPTICAL CHARACTERISTICS (T = 25 °C)

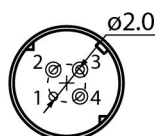
Parameter		MIN	TYP	MAX	Unit	Conditions
Optical power (CW)	P <sub>cw</sub>	17	20		mW	CW, I <sub>op</sub> = 120 mA, SM1
Mean wavelength	λ	1587	1590	1593	nm	CW, I <sub>op</sub> = 120 mA
Spectral width, OSA	Δλ		0.09		nm	CW, I <sub>op</sub> = 120 mA, OSA
Instantaneous linewidth	Δf			500	kHz	CW, I <sub>op</sub> = 120 mA, self-delayed heterodyne method
Wavelength-temperature coefficient	dλ/dT		0.10		nm/°C	CW, I <sub>op</sub> = 120 mA
Side-mode suppression ratio	SMSR	45	55		dB	CW, I <sub>op</sub> = 120 mA
Threshold current	I <sub>th</sub>		8	12	mA	CW
Slope efficiency	S <sub>e</sub>	0.12	0.14		mW/mA	CW, SM1
Operating voltage	V <sub>op</sub>		1.4	1.8	V	CW, I <sub>op</sub> = 120 mA
Monitor current	I <sub>m</sub>	1.0	1.8	5.0	mA	CW, I <sub>op</sub> = 120 mA, V <sub>r</sub> = 5 V
Tracking error	ER		0.5	1.0	dB	CW, I <sub>op</sub> (25°C)=25 mA, I <sub>m</sub> = const
Rise and fall time	t <sub>r</sub> , t <sub>f</sub>		80	120	ps	20%-80%, coaxial package
Resonance frequency	f <sub>r</sub>		6		GHz	2.5 Gbps, I <sub>b</sub> =I <sub>th</sub> +15 mA
Capacitance (mPD)	C <sub>t</sub>		10	20	pF	V <sub>R</sub> = 5 V, f = 1 MHz
Dark current (PD)	I <sub>d</sub>			100	nA	V <sub>R</sub> = 5V

Tracking error ER = max |10 lg [P(T)/P(25C)]|, I<sub>m</sub>= const, T = T<sub>min</sub> ÷ T<sub>max</sub>

**LD4B-1590-DFB-2.5G-20**

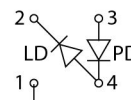
**LD4B-1590-DFB-2.5G-20****COAX**

BACK VIEW



PINOUT

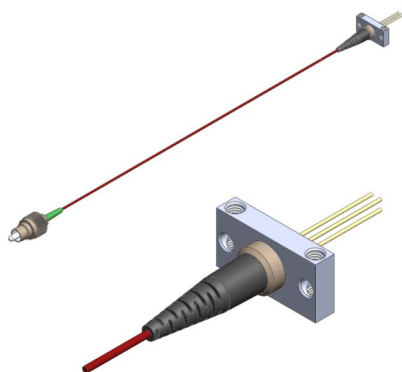
#2

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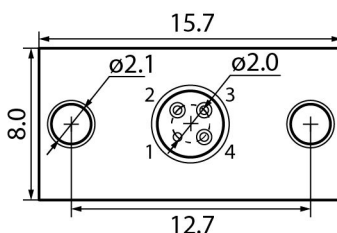
Drawing

3D model

Application Notes

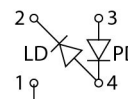
**COAXB**

BACK VIEW



PINOUT

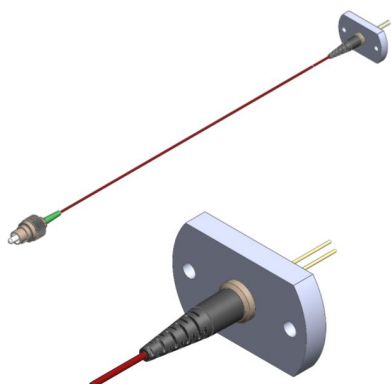
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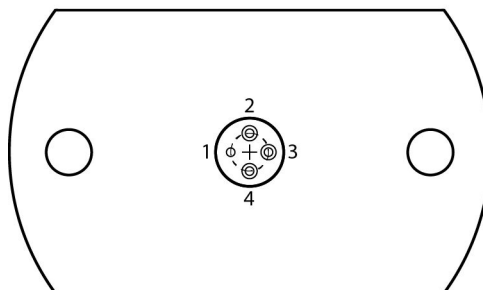
Drawing

3D model

Application Notes

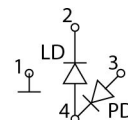
**PACKAGE TH**

BACK VIEW



PINOUT

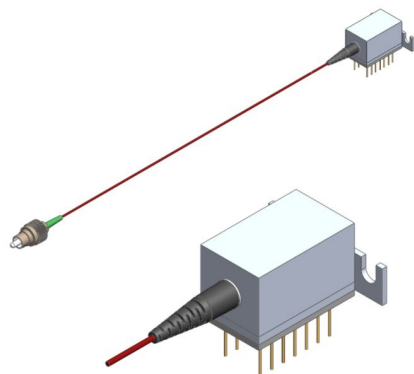
#2

Thorlabs Pin Code G  
mPD not usedCompatible to Thorlabs  
LDM9LP mountDownload more  
information

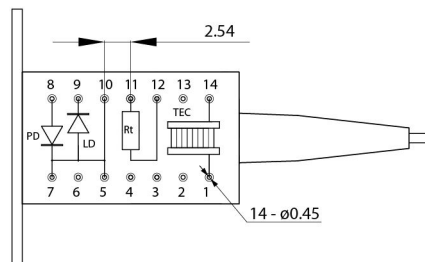
Drawing

3D model

Application Notes

**LD4B-1590-DFB-2.5G-20****DIL**

BOTTOM VIEW



PINOUT #2, #3

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

TEC LP:  $I_{max} = 0.7A$ ,  $U_{max} = 3.9V$ ,  $Q_{max} = 1.4W$ ,  
 $AC R = 4.7 \Omega$ ,  $\Delta T_{max} = 72 K$

Thermistor:  
 $R_t = 10 * \exp(3600 * \{1/T[K] - 1/298\}) \text{ k}\Omega$

Package limits RF bandwidth to 500 MHz

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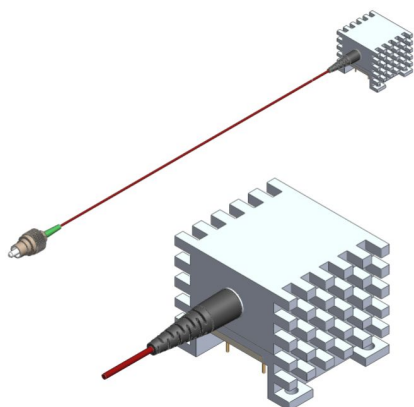
Drawing



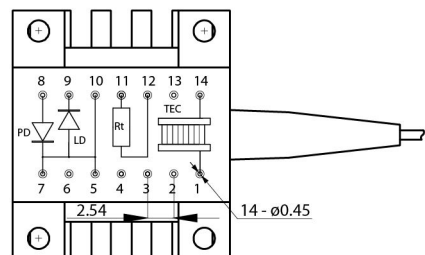
3D model



Application Notes

**DILRAD**

BOTTOM VIEW



PINOUT #2, #3

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

TEC LP:  $I_{max} = 0.7A$ ,  $U_{max} = 3.9V$ ,  $Q_{max} = 1.4W$ ,  
 $AC R = 4.7 \Omega$ ,  $\Delta T_{max} = 72 K$

Thermistor:  
 $R_t = 10 * \exp(3600 * \{1/T[K] - 1/298\}) \text{ k}\Omega$

Package limits RF bandwidth to 500 MHz

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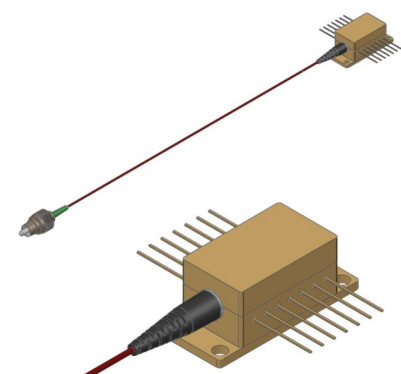
Drawing



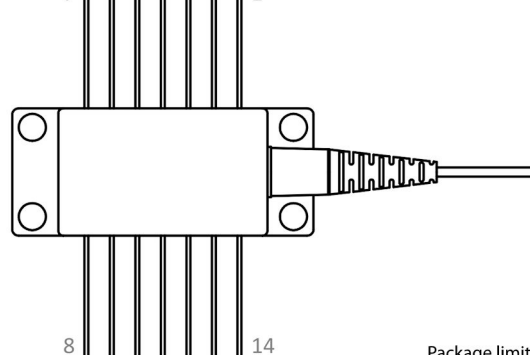
3D model



Application Notes

**BTF**

7 1



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

TEC LP:  $I_{max} = 0.7A$ ,  $U_{max} = 3.9V$ ,  $Q_{max} = 1.4W$ ,  
 $AC R = 4.7 \Omega$ ,  $\Delta T_{max} = 72 K$

Package limits RF bandwidth to 500 MHz  
 Thermistor:  
 $R_t = 10 * \exp(3600 * \{1/T[K] - 1/298\}) \text{ k}\Omega$

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Drawing



3D model



Application Notes

# LD4B-1590-DFB-2.5G-20

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Characteristics, data, materials and structures specified in this datasheet are subject to change without notice. Please refer to the latest specification before use of the products.

## **Safety and handling cautions**

1. Avoid smashing and burning of the module. Avoid storing and using the module in conditions where water, organic solvents or aggressive acids or bases may contact the module or where there is a possibility of exposure to corrosive gases, explosive gases, dust, salinity or other harsh conditions. The module should be disposed as special industrial waste.
2. Exceeding absolute maximum ratings even for a short time can cause permanent damage of the module.
3. The module is sensitive to and can be broken by ESD (static electricity).

## **Conflict Minerals Policy Statement**

LD4B achieves business objectives and customer needs with social responsibility. We do not support or contribute to the violence and human rights violations associated with the mining of conflict minerals coming from Conflict Regions according to US "Dodd-Frank Act". When possible, our suppliers' conflict mineral statements are reviewed. We do not directly purchase Conflict Minerals from any source and do not knowingly procure any parts and products containing Conflict Minerals from Conflict Regions.

## **RoHS Compliance Statement**

Restriction of Hazardous Substances (RoHS) directive (Directive 2011/65/EC amended with Directive (EU) 2015/863) is the directive aimed at reducing the harmful environmental impact of waste electrical equipment by restricting the use of known dangerous substances. Based on information received from our supply sources, LD4B hereby states that the banned substances listed in the RoHS directive are not found in the parts and materials used above the threshold level listed other than exceptions approved by the European Commission.

## **REACH Compliance Statement**

Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) is a European Union regulation 1907/2006/EC that addresses the production and use of chemical substances, and their potential impacts on human health and the environment. Based on information received from our supply sources, LD4B hereby states compliance of the parts and materials used in manufacturing to REACH regulation. LD4B does not manufacture or import any substances or preparations as defined under REACH.