

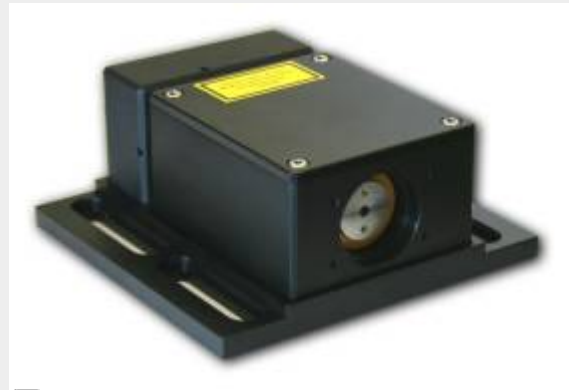
# DBR Laser Module

Model No. D2-100-DBR

Document Revision: 2

Document Last Updated on 2021/08/26 14:26

Please read [Limited Warranty](#) and [General Warnings and Cautions](#) prior to operating the D2-100-DBR.



D2-100-DBR DBR Laser

## Description

The DBR laser module is comprised of a distributed feedback (DBR) laser diode in a precision temperature-controlled housing with beam conditioning optics and an optical isolator. DBR laser diodes are fabricated with the feedback grating patterned directly over the gain section of the diode. They are highly immune to vibrations and by virtue of a very short cavity ( $\sim 1$  mm), they can be current tuned over more than 50 GHz. The result is a robust laser capable of very fast servo control for easy locking to atomic transitions. The module contains no moving parts or piezo-electrics and is therefore inherently robust and rugged.

DBR lasers have 2-3 times larger temperature and current tuning coefficients as compared to external-cavity diode lasers. Vescent carefully controls these parameters with two stages of temperature control and a precision low-noise current controller with fast servo input.

The DBR laser is collimated by a 0.68 NA lens mounted to a movable plate for pointing adjustments. The module also comes with a 35 dB optical isolator and a pair of anamorphic prisms. (Note that prior to fiber coupling we recommend a second stage of isolation.)

The temperature controllers use an 8-pin circular connector on the back of the DBR subassembly (see [table 2](#) for identity of connectors). The injection current connection to the laser diode is through an SMA connector also on the back of the DBR subassembly.

The DBR laser chip is contained in a thermal package allowing temperature control between 15° to 30° C. Vescent can replace the package if it exceeds its lifetime.

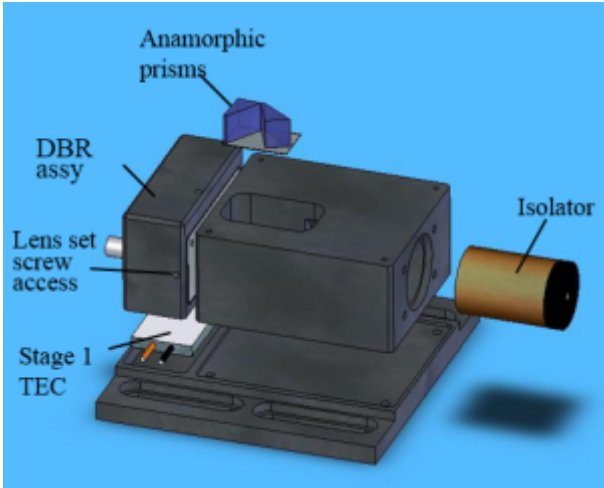


Fig. 1: The DBR Laser Module

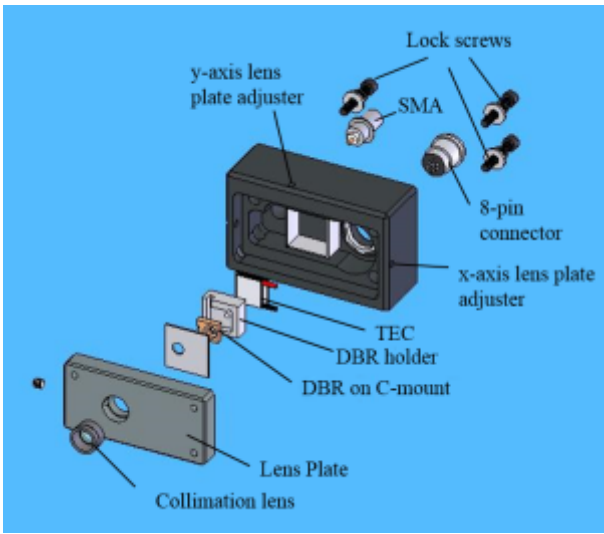


Fig. 2: Exploded view of the DBR subassembly

Purchase Includes

- D2-100 DBR Laser

Absolute Maximum Ratings

Note: All modules designed to be operated in laboratory environment

Parameter	Rating
Environmental Temperature	>15°C and <30°C
Environmental Humidity	<60%
Environmental Dew Points	<15°C
Stage 2 Temperature of DBR Laser Diode	>15°C and <40°C
Laser Diode Current	See datasheet included with your laser.



The laser should never be operated at a temperature below the dew point temperature for your laboratory conditions. Condensation can form on the laser chip and/or mounting hardware resulting irreparable damage.

Specifications



	Min.	Typical	Max.	Units
Wavelength	767, 770, 780, 795, 852, 895, 1064, or 1083 <sup>1)</sup>	nm		
Output power	30	40	50	mW
Beam diameter	0.8	1.1	1.7	mm (1/e <sup>2</sup> dia.)
Polarization	Horizontal			
Optical isolation		35		dB
Operating current		150	180	mA
Threshold Current	40	50	70	mA
Temperature range				
Stage 1, housing	15	20	40	°C
Stage 2, laser	0	15	50 <sup>(2)</sup>	
Temperature stability	See <a href="#">Laser Controller</a>			
Analog Technologies ATH10KR8 Thermistor		<html> &nbsp;&nbsp;&nbsp;</html>	10k	Ω
Analog Technologies ATH10KR8 Beta		<html> &nbsp;&nbsp;&nbsp;</html>	3480	K
Analog Technologies ATH10KR8 T <sub>0</sub> <sup>3)</sup>		<html> &nbsp;&nbsp;&nbsp;</html>	25	°C
Safety Class	3B			
Beam height	0.95	inches		
Total package Size (L x W x H)	3.75 x 4 x 2	inches		

# Inputs, Outputs, and Controls

## Cable Connector

The connections to the TECs and thermistors are made to an 8-pin Hirose connector (see [table 2](#) for identity of connectors). The pin definitions are:

Pin	Signal
1	TEC1+
2	TEC1-
3	Rth-1
4	Rth1-RTN
5	TEC2+
6	TEC2-
7	Rth2
8	Rth2-RTN

Tab. 1: Pin assignment for 8-pin Hirose connector

Connector Location	Connector (Hirose Part Number)
D2-105 Bulkhead	<a href="#">HR25-7TR-8SA</a>
Cable Connection to D2-105	<a href="#">HR25-7TP-8P</a>
Cable Connection to D2-100	<a href="#">HR25-7TP-8S</a>
D2-100 Bulkhead	<a href="#">HR25-7TR-8PA</a>

Tab. 2: Connectors used in Temperature Control Cabling

NOTE: Earlier models use a push-pull connector for the 8-pin connector to the DBR module. To remove take care to apply opposition forces with the thumb and forefinger knuckles against the housing. Excessive force could displace the output beam and require realignment.

## Laser Current (SMA)



Never connect or disconnect the D2-100 Laser to a laser controller that is energized. Always power down the laser controller completely before making connections to this laser.

Always make sure to make a snug connection between the D2-100 and the current-carrying SMA cable, and between the cable and the laser controller.

Current is provided to the DBR chip through an SMA connector. The central conductor of the SMA connects to the laser anode, and the shield connects to the laser cathode. *This is a direct, unprotected connection to the DBR chip, so care must be taken to avoid ESD damage.*

## Aligning the DBR Laser Module

The module should not need adjustments, but if necessary the following procedure can be used to fine tune the beam positioning.

1. Loosen the three locking screws on the back of the DBR module  $\frac{1}{2}$  turn past the crack point.
2. With a 0.050" Allen driver, adjust the vertical adjustment setscrew on the top of the DBR housing to level the beam.
3. Adjust the horizontal adjustment 4-40 set screw on the left side of the DBR housing (See [figure ##](#)).
4. Alternatively, use the spectroscopy module as a beam target. Place the spectroscopy module as far down the table as possible, bolt it down, and center the beam to the input hole.
5. Gently retighten the three locking screws.

1)

Contact factory for other wavelengths

2)

Operation above 40° C can reduce the lifetime of the laser diode

3)

Temperature at which thermistor reads 10 k $\Omega$

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Last update: **2021/08/26 14:26**

