

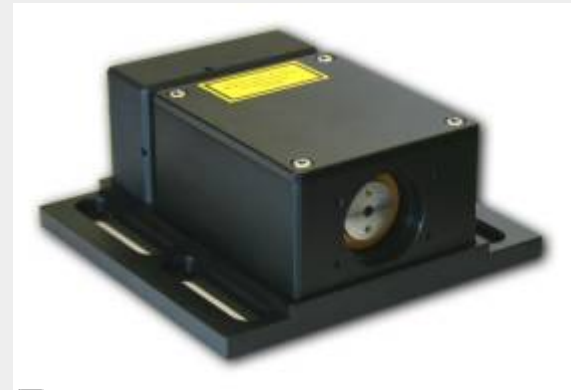
DBR Laser Module

Model No. D2-100-DBR

Document Revision: 2

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



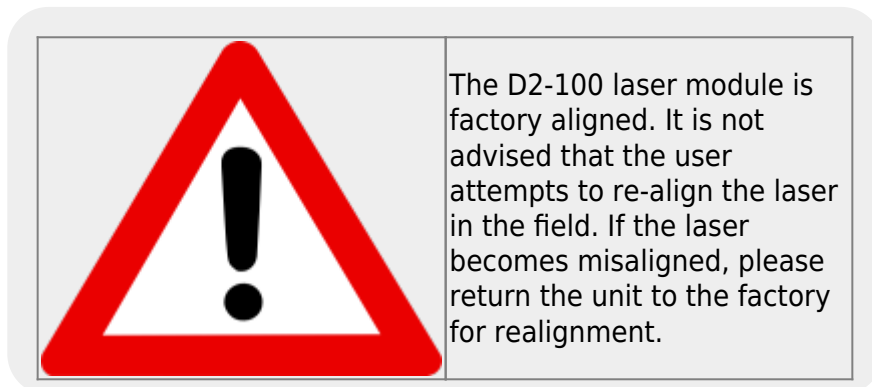
D2-100-DBR DBR Laser



Fig. ##: The D2-100

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 (~ 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.

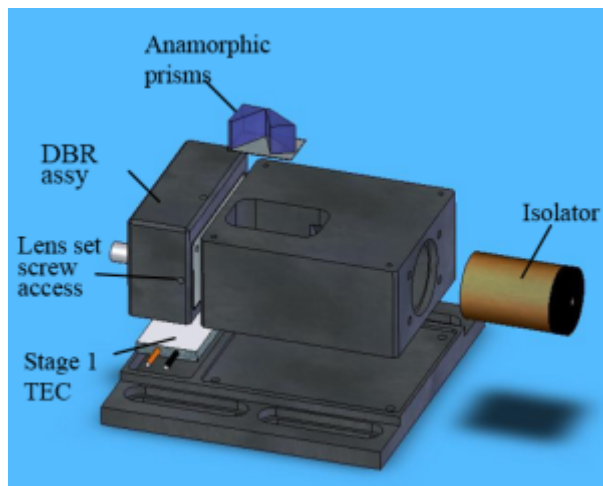


Fig. 1: The DBR Laser Module

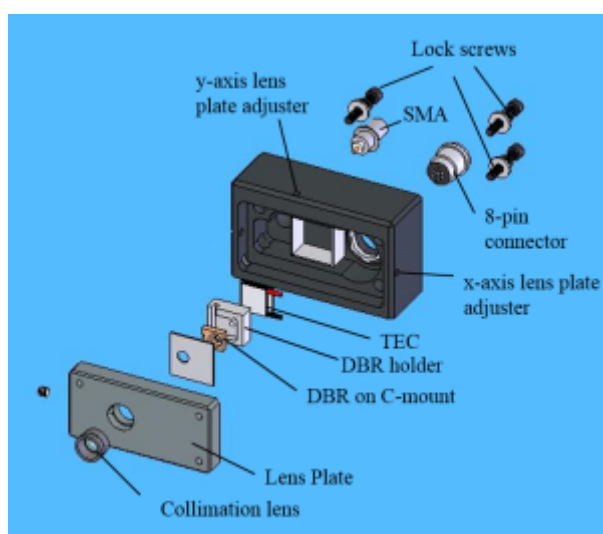


Fig. 2: Exploded view of the DBR subassembly

We use [Photodigm](#) Spectroscopy-Certified™ DBR lasers.



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 ¹⁾			nm
Output power	30	40	50	mW
-HP1 Output power	100	Wavelength Dependent	200	mW
Beam diameter	0.8	1.1	1.7	mm (1/e ² dia.)
Polarization	Horizontal			
Optical isolation		35		dB
Operating current		150	180	mA
Threshold Current	40	50	70	mA
Temperature range Stage 1, housing Stage 2, laser	15 0	20 15	40 50 ⁽²⁾	°C
Temperature stability	See Laser Controller			

	Min.	Typical	Max.	Units
Analog Technologies ATH10KR8 Thermistor			10k	Ω
Analog Technologies ATH10KR8 Beta			3480	K
Analog Technologies ATH10KR8 T ₀ ³⁾			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

Laser Control Signals

Temperature Control Loops

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	HR25-7TR-8SA
Cable Connection to D2-105	HR25-7TP-8P
Cable Connection to D2-100	HR25-7TP-8S
D2-100 Bulkhead	HR25-7TR-8PA

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.*

Safety Information

The D2-100 is a Class 3B CW laser product under the guidelines provided in IEC 60825-01:2014. It has no serviceable parts, and should not be disassembled in the field under any circumstance. Viewing of the beam, either directly, with viewing optics, or from a specular reflection can cause damage to the eye, and should be avoided.

The D2-100 is available in many wavelengths, listed above, as well as in a high powered configuration. The maximum specified output of any D2-100 is 200mW under normal operating conditions. However, if provided with too much current, some of the high powered (-HP1) lasers can reach 300mW before experiencing critical optical damage. The beam divergence is $< 0.08^\circ$ in both x and y.

The Maximum Permissible Exposure (MPE) for the D2-100 is $14.45 \text{ W} \cdot \text{m}^{-2}$, calculated with a $>10\text{s}$ exposure time, and the Nominal Ocular Hazard distance is roughly 100m. Proper eye protection for the D2-100 is highly wavelength dependent. We recommend [this](#) online tool, provided by NIOSH, and an OD value of at least 3+ for the selected wavelength when choosing the correct eye protection.

There are three safety stickers present on the D2-100. The first, located on the side of the isolator module, is the explanatory sticker, which states the classification of the laser, and several safety instructions. It reads: "Invisible laser radiation avoid exposure to beam class 3B laser product".



Fig. 3: Reproduction of Explanatory label on the D2-100. \

On the top of the D2-100, near the laser aperture, is a “Laser Aperture” sticker.



Fig. 5: Reproduction of Laser Aperture sticker on the D2-100.

Finally, on the sliding beamstop adjacent to the laser aperture, is a triangular laser radiation warning sticker.



Fig. 6: Laser Radiation Warning sticker on the D2-100.

There is only one laser aperture on the D2-100, located on the front as shown in (figure ##).

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 kΩ

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