DATA SHEET

TOPTICA EAGLEYARD

# EYP-DFB-0760-00040-1500-BFW01-0005

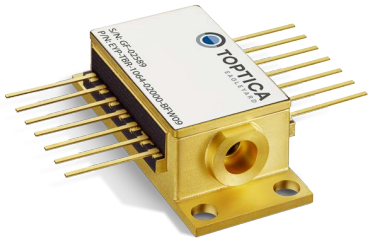
Revision 0.94

2020-11-11

## SINGLE FREQUENCY LASER DIODES
## Distributed Feedback Laser

### General Product Information

| Product | Application |
|---|---|
| Tunable 760 nm DFB Laser | Spectroscopy |
| with hermetic 14 Pin Butterfly Housing (RoHS compliant) | Metrology |
| including Monitor Diode, Thermoelectric Cooler and Thermistor | Oxygen Detection |
| with integrated Beam Collimation | |



### Absolute Maximum Ratings

| Parameter | Symbol | Unit | min | typ | max | Measurement Conditions / Comments |
|---|---|---|---|---|---|---|
| Storage Temperature | $T_S$ | °C | -40 | | 85 | Stress in excess of one of the Absolute Maximum Ratings may damage the laser. Please note that a damaging optical power level may occur although the maximum current is not reached. These are stress ratings only, and functional operation at these or any other conditions beyond those indicated under Recommended Operational Conditions is not implied. |
| Operational Temperature at Case | $T_C$ | °C | -40 | | 85 | |
| Operational Temperature at Laser Chip | $T_{LD}$ | °C | 10 | | 50 | |
| Forward Current | $I_F$ | mA | | | 130 | |
| Reverse Voltage | $V_R$ | V | | | 2 | |
| Output Power | $P_{opt}$ | mW | | | 50 | |
| TEC Current | $I_{TEC}$ | A | | | 1.1 | |
| TEC Voltage | $V_{TEC}$ | V | | | 2.8 | |

### Recommended Operational Conditions

| Parameter | Symbol | Unit | min | typ | max | Measurement Conditions / Comments |
|---|---|---|---|---|---|---|
| Operational Temperature at Case | $T_{case}$ | °C | -20 | | 65 | |
| Operational Temperature at Laser Chip | $T_{LD}$ | °C | 10 | | 35 | measured by integrated thermistor |
| Forward Current | $I_F$ | mA | | | 120 | |
| Output Power | $P_{opt}$ | mW | 10 | | 40 | |

### Characteristics at $T_{LD}$ = 25° C at BOL

| Parameter | Symbol | Unit | min | typ | max | Measurement Conditions / Comments |
|---|---|---|---|---|---|---|
| Center Wavelength | $\lambda_C$ | nm | 759.9 | 760.9 | 761.9 | |
| Target Wavelength | $\lambda_T$ | nm | | 760.9 | | reached within $T_{LD}$ = 10° and 35° C at 40 mW |
| Linewidth (FWHM) | $\Delta\lambda$ | MHz | | 2 | | $P_{opt}$ = 40 mW |
| Mode-hop free Tuning Range | $\Delta\lambda_{tune}$ | pm | 40 | | | at target wavevelength |
| Sidemode Supression Ratio | SMSR | dB | 30 | 50 | | $P_{opt}$ = 40 mW |

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### Characteristics at $T_{LD}$ = 25° C at BOL cont'd

| Parameter | Symbol | Unit | min | typ | max | Measurement Conditions / Comments |
|---|---|---|---|---|---|---|
| Temperature Coefficient of Wavelength | $d\lambda / dT$ | nm / K | | 0.06 | | |
| Current Coefficient of Wavelength | $d\lambda / dI$ | nm / mA | | 0.002 | | |
| Laser Current @ $P_{opt}$ = 40 mW | $I_{LD}$ | mA | | | 120 | |
| Slope Efficiency | $\eta$ | W / A | 0.6 | 0.8 | 1.3 | |
| Threshold Current | $I_{th}$ | mA | | | 70 | |
| Divergence parallel (FWHM) | $\Theta_{\parallel}$ | ° | | 0.1 | | parallel to the base plate of the housing (see p. 3) |
| Divergence perpendicular (FWHM) | $\Theta_{\perp}$ | ° | | 0.1 | | perpendicular to base plate of the housing (see p. 3) |
| Beam Diameter horizontal | $d_{\parallel}$ | mm | | 1.0 | 1.2 | parallel to the base plate of the housing (see p. 3) |
| Beam Diameter vertical | $d_{\perp}$ | mm | | 0.8 | 1.2 | perpendicular to base plate of the housing (see p. 3) |
| Degree of Polarization | DOP | % | | 90 | | $P_{opt}$ = 40 mW; E field perpendicular to base plate |

### Monitor Diode

| Parameter | Symbol | Unit | min | typ | max | Measurement Conditions / Comments |
|---|---|---|---|---|---|---|
| Monitor Detector Responsivity | $I_{mon} / P_{opt}$ | µA/mW | 3 | | 60 | $U_R$ = 5 V |

### Thermoelectric Cooler

| Parameter | Symbol | Unit | min | typ | max | Measurement Conditions / Comments |
|---|---|---|---|---|---|---|
| Current | $I_{TEC}$ | A | | 0.4 | | $P_{opt}$ = 40 mW, $\Delta T$ = 20 K |
| Voltage | $U_{TEC}$ | V | | 1.3 | | $P_{opt}$ = 40 mW, $\Delta T$ = 20 K |
| Power Dissipation (total loss at case) | $P_{loss}$ | W | | 0.4 | | $P_{opt}$ = 40 mW, $\Delta T$ = 20 K |
| Temperature Difference | $\Delta T$ | K | | | 50 | $P_{opt}$ = 40 mW, $\Delta T$ = \|Tcase - TLD\| |

### Thermistor (Standard NTC Type)

| Parameter | Symbol | Unit | min | typ | max | Measurement Conditions / Comments |
|---|---|---|---|---|---|---|
| Resistance | R | kΩ | | 10 | | $T_{LD}$ = 25° C |
| Beta Coefficient | $\beta$ | | | 3892 | | $R_1 / R_2 = e^{\beta (1/T_1 - 1/T_2)}$ at $T_{LD}$ = 0° … 50° C |
| Steinhart & Hart Coefficient A | A | | | $1.1293 \times 10^{-3}$ | | $1/T = A + B(\ln R) + C(\ln R)^3$ |
| Steinhart & Hart Coefficient B | B | | | $2.3410 \times 10^{-4}$ | | T: temperature in Kelvin |
| Steinhart & Hart Coefficient C | C | | | $8.7755 \times 10^{-8}$ | | R: resistance at T in Ohm |

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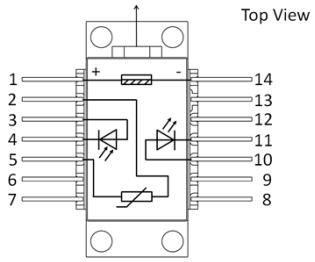
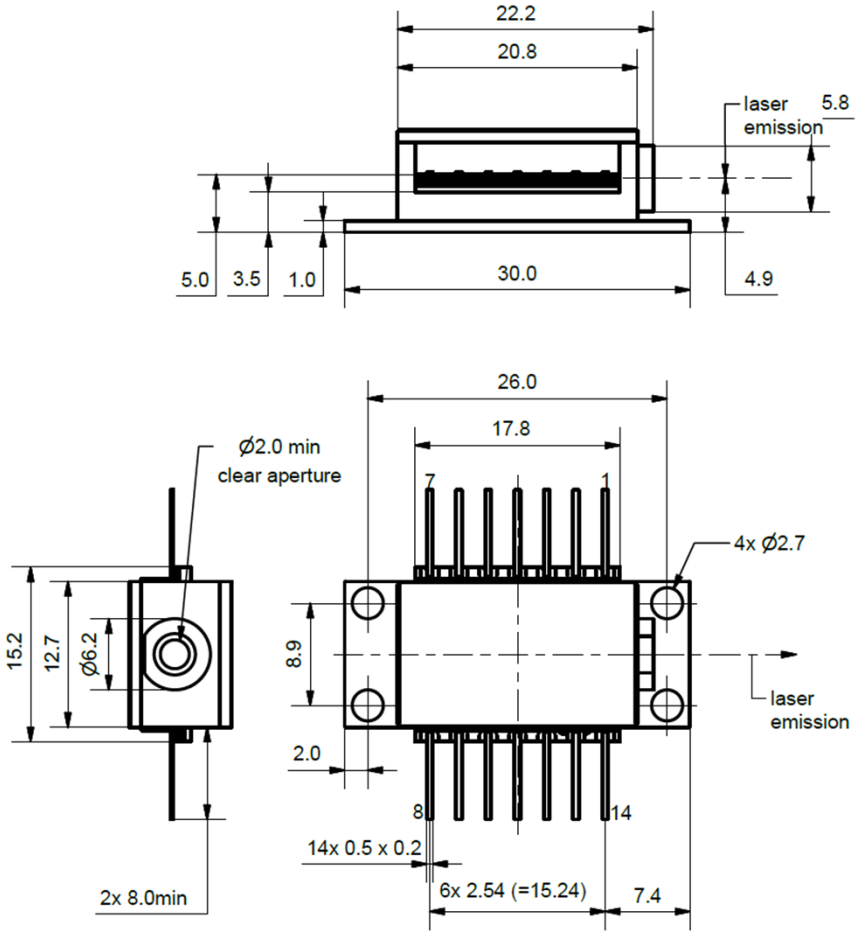
### Pin Assignment

| | | | |
|---|---|---|---|
| 1 | Thermoelectric Cooler (+) | 14 | Thermoelectric Cooler (-) |
| 2 | Thermistor | 13 | Case |
| 3 | Photodiode (Anode) | 12 | not connected |
| 4 | Photodiode (Cathode) | 11 | Laser Diode (Cathode) |
| 5 | Thermistor | 10 | Laser Diode (Anode) |
| 6 | not connected | 9 | not connected |
| 7 | not connected | 8 | not connected |




### Package Drawings

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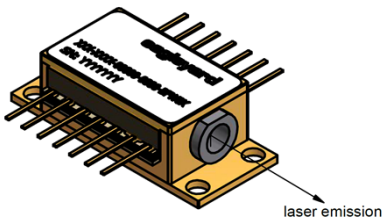


Caution. Excessive mechanical stress on the package can lead to a damage of the laser.
See instruction manual on www.eagleyard.com

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## SINGLE FREQUENCY LASER DIODES
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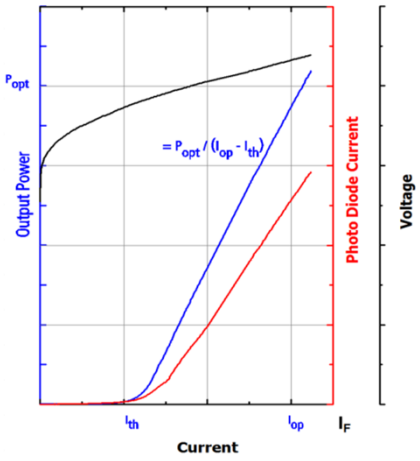
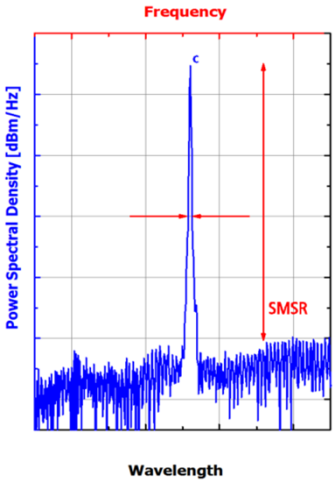
### Typical Measurement Results

Output Power vs. Current




Spectra at Specified Optical Output Power




Performance figures, data and any illustrative material provided in this specification are typical and must be specifically confirmed in writing by eagleyard Photonics before they become applicable to any particular order or contract. In accordance with the eagleyard Photonics policy of continuous improvement specifications may change without notice.

### Unpacking, Installation and Laser Safety

Unpacking the laser diodes should only be done at electrostatic safe workstations (EPA). Though protection against electro static discharge (ESD) is implemented in the laser package, charges may occur at surfaces. Please store this product in its original package at a dry, clean place until final use. During device installation, ESD protection has to be maintained.

The DFB laser is sensitive against optical feedback, so an optical isolator may be required in order to avoid any disturbance of the emission spectrum. Operating at moderate temperatures on proper heat sinks will contribute to a long lifetime of the diode.

Avoid direct and/or indirect exposure to the free running beam. Collimating and focussing the free running beam with optics as common in optical instruments will increase threat to the human eye.

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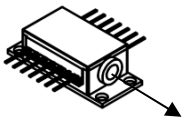
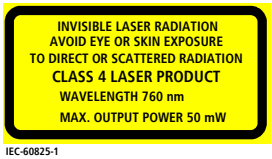


Laser Emission

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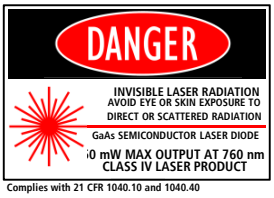


Complies with 21 CFR 1040.10 and 1040.40