# 8500 nm Fabry-Perot Quantum Cascade Laser, 400 mW

**QF8500HB**

## Description

The QF8500HB is a single spatial mode, multi longitudinal mode, Fabry-Perot quantum cascade laser contained in a high heat load (HHL) package, designed and manufactured by Thorlabs. This laser operates in continuous wave (CW) mode at room temperature.

The QF8500HB has a collimated output and offers a standard HHL pinout for electrical and temperature control. Its package is sealed, although the seal is not hermetic. There is no monitor photodiode.

## Specifications

| Absolute Maximum Ratings ($T_{CHIP}$ = 25 °C, CW Operation) | |
|---|---|
| **Absolute Max Operating Current** | Varies Between Devices[a] |
| **Absolute Max Output Power** | 0.7 W |
| **LD Reverse Voltage (Max)** | 1 V |
| **PD Reverse Voltage (Max)** | N/A |
| **TEC Current (Max)** | 8 A |
| **TEC Voltage (Max)** | 14 V |
| **Operating Temperature** | 25 to 40 °C[b] |
| **Storage Temperature** | -40 to 85 °C[b] |

a. The absolute maximum current is determined on a device-by-device basis and is listed on the device's data sheet.
b. Non-condensing environment. Single spatial mode performance is guaranteed at 25 °C.

| Thermistor Characteristics ($T_{CASE}$ = 25 °C) | | | | |
|---|---|---|---|---|
| | **Symbol** | **Min** | **Typical** | **Max** |
| **Thermistor Resistance**[a] | $R_{th}$ | - | 10 kΩ | - |
| **Steinhart-Hart Coefficients ($T_{case}$ = 25 °C)** | A | - | $1.129 \times 10^{-3}\ K^{-1}$ | - |
| | B | - | $2.341 \times 10^{-4}\ K^{-1}$ | - |
| | C | - | $0.878 \times 10^{-7}\ K^{-1}$ | - |

a. Thermistor resistance follows the Steinhart-Hart equation:

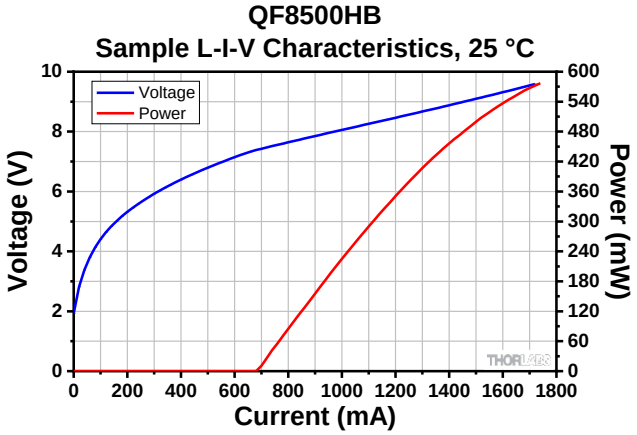
$$\frac{1}{T} = A + B(\ln R_{th}) + C(\ln R_{th})^3$$

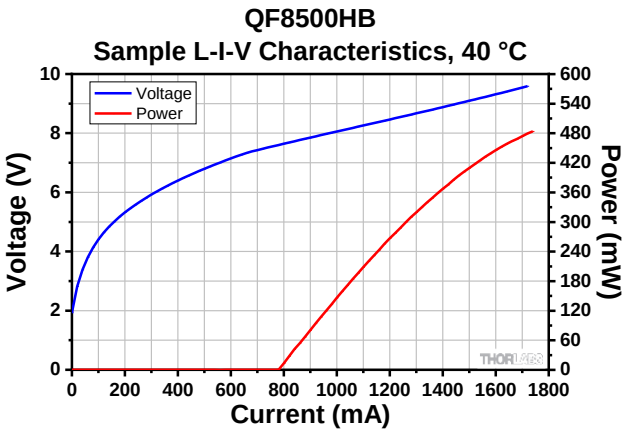
## Specifications (Cont.)

| Optical Electrical Characteristics ($T_{CHIP}$ = 25 °C, CW Operation) | | | | | |
|---|---|---|---|---|---|
| | | Symbol | Min | Typical | Max |
| Center Wavelength | | λ | 8.2 µm | 8.5 µm | 8.8 µm |
| Spectral Bandwidth (5 - 95% Integrated Power) | | Δλ | 400 nm | 500 nm | - |
| Optical Output Power | | $P_{out}$ | 400 mW | 500 mW | 700 mW |
| Operating Current | | $I_{op}$ | - | 1.5 A | 2.0 A |
| Threshold Current | | $I_{th}$ | - | 0.5 A | - |
| Forward Voltage | | $V_F$ | - | 9 V | 13 V |
| Beam Pointing | Parallel[a] | - | -0.75° | 0° | +0.75° |
| | Perpendicular[a] | - | -2.75° | -2.0° | -1.25° |
| Beam Divergence Angle (FWHM) | Parallel[a] | $\theta_{\parallel}$ | 3 mrad | 6 mrad | 11 mrad |
| | Perpendicular[a] | $\theta_{\perp}$ | 3 mrad | 6 mrad | 11 mrad |
| $M^2$ | Parallel[a] | $M^2_{\parallel}$ | 1.0 | 1.1 | 1.3 |
| | Perpendicular[a] | $M^2_{\perp}$ | 1.0 | 1.1 | 1.3 |
| Minimum Beam Diameter (D4σ Method)[b] | | D | 0.5 mm | 1.5 mm | 2.5 mm |

a. For this laser, these terms are defined with respect to the plane of the base plate.
b. Obtained by scanning a razor across the beam and measuring the points where 10% of the total beam intensity and 90% of the total beam intensity are observed.

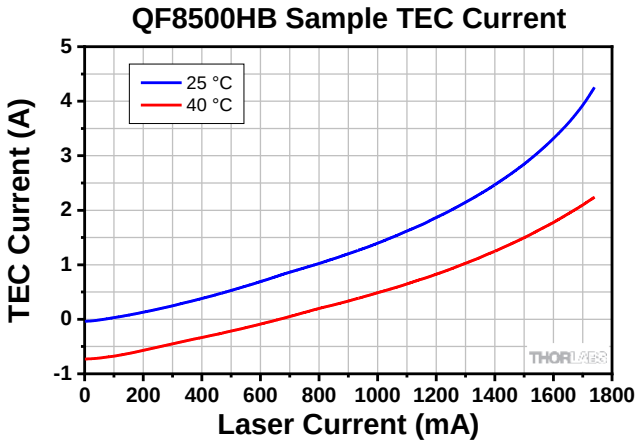
## Sample Performance Plots

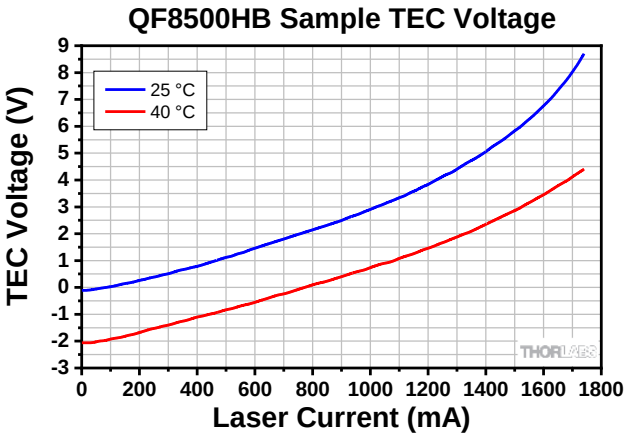


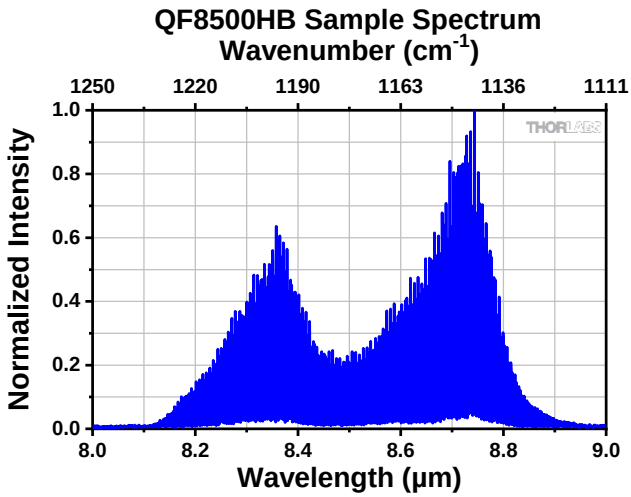

The temperatures given are for $T_{CHIP}$.

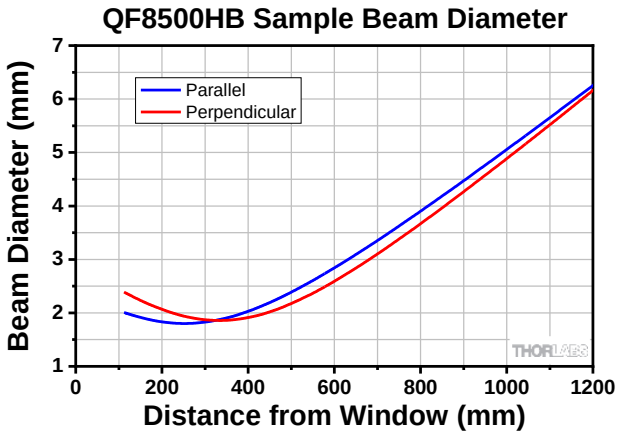
## Sample Performance Plots (Cont.)

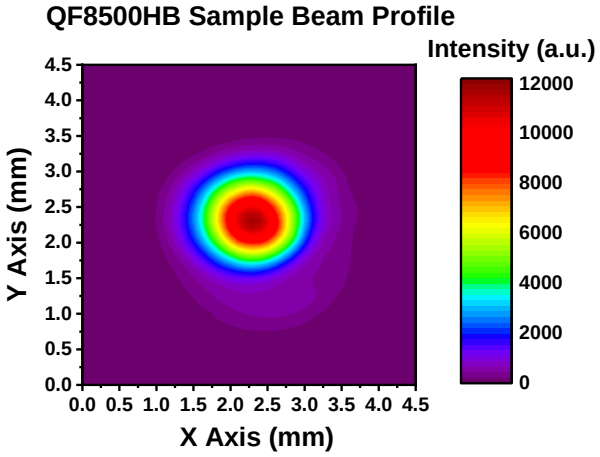



The data above is given at $T_{CHIP}$.

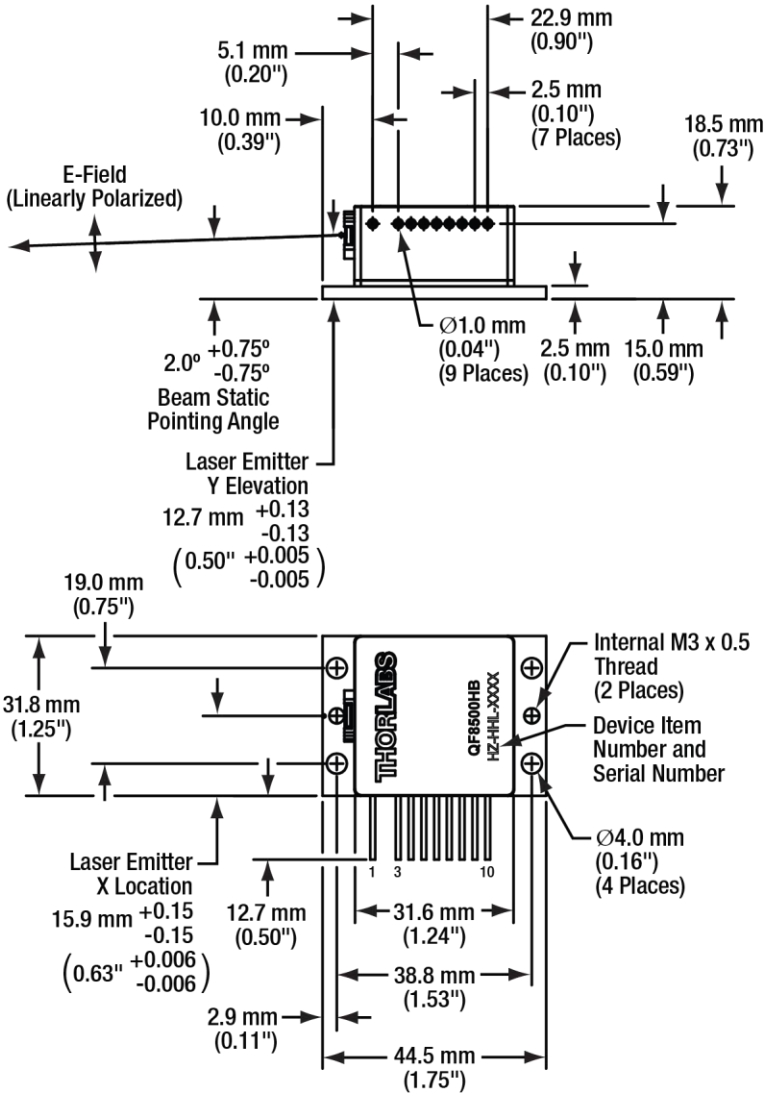



The beam profile was taken 310 mm from the sample.

# Drawing for QF8500HB




| Pin | Description |
|---|---|
| 1 | TEC (-) |
| 2 | Not Present |
| 3 | No Connection |
| 4 | Laser Anode (+) |
| 5 | TEC Control Thermistor, 10 kΩ |
| 6 | TEC Control Thermistor, 10 kΩ |
| 7 | Laser Cathode (-) |
| 8 | EEPROM (+) |
| 9 | EEPROM (-/Ground) |
| 10 | TEC (+) |