

4500 nm DFB Quantum Cascade Laser, 80 mW

QD4500HHLH



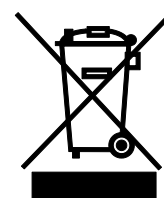
Description

The QD4500HHLH is a single spatial mode, single longitudinal mode, distributed feedback 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 QD4500HHLH 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 ($T_{\text{chip}} = 20^{\circ}\text{C}$, CW Operation)	
Absolute Max Operating Current	Varies Between Devices ^a
Absolute Max Output Power	300 mW
LD Reverse Voltage (Max)	1 V
PD Reverse Voltage (Max)	N/A
TEC Current (Max)	4.5 A
TEC Voltage (Max)	6.5 V
Operating Temperature	20 to 40 °C ^b
Storage Temperature	0 to 85 °C ^b



- The absolute maximum current is determined on a device-by-device basis and is listed on the device's data sheet.
- Non-condensing environment. Single mode performance is tested and guaranteed at 20 - 40 °C.

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

- Thermistor resistance follows the Steinhart-Hart equation:

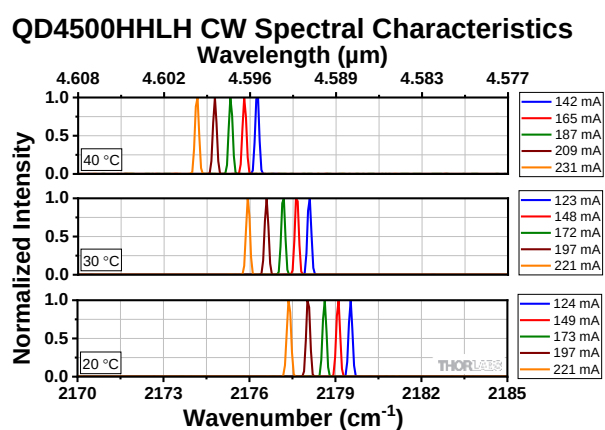
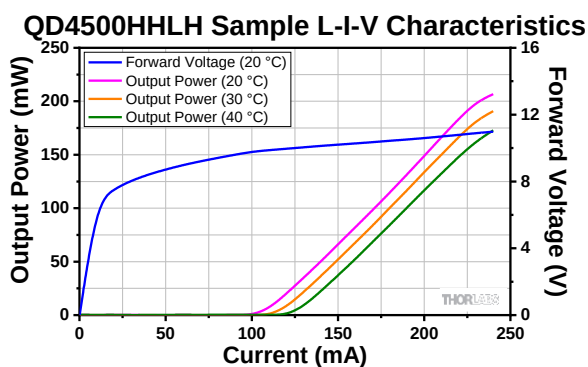
$$\frac{1}{T} = A + B(\ln R_{\text{th}}) + C(\ln R_{\text{th}})^3$$

Specifications (Cont.)

Optical Electrical Characteristics ($T_{\text{chip}} = 20\text{ }^{\circ}\text{C}$, CW Operation)				
	Symbol	Min	Typical	Max
Center Wavelength	λ	4.00 μm	-	5.00 μm
Tuning Range	$\Delta\bar{\nu}$	-	3 cm^{-1}	-
Temperature Tuning	$\Delta\bar{\nu}/\Delta T$	-	-0.1 $\text{cm}^{-1}/^{\circ}\text{C}$	-
Side Mode Suppression	SMSR	20 dB	-	-
Optical Output Power	P_{out}	20 mW	80 mW	-
Operating Current	I_{op}	-	200 mA	500 mA
Threshold Current	I_{th}	-	130 mA	-
Forward Voltage	V_F	-	11 V	14 V
Beam Pointing	Parallel ^a	-	-0.75 $^{\circ}$	0 $^{\circ}$
	Perpendicular ^a	-	-2.75 $^{\circ}$	-1.25 $^{\circ}$
Beam Divergence Angle (FWHM)	Parallel ^a	$\theta_{\parallel}$	3 mrad	6 mrad
	Perpendicular ^a	$\theta_{\perp}$	3 mrad	6 mrad
M^2	Parallel ^a	$M^2_{\parallel}$	1.0	1.1
	Perpendicular ^a	$M^2_{\perp}$	1.0	1.1
Minimum Beam Diameter (D4 σ Method) ^b	D	0.5 mm	1.5 mm	2.5 mm

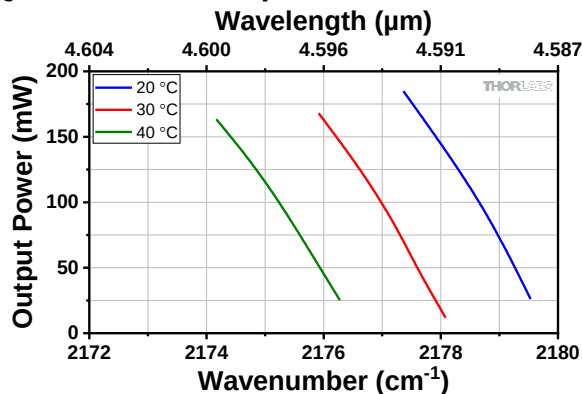
- a. For this laser, these terms are defined with respect to the plane of the base plate.
b. Obtained by fitting the 10% and 90% points of total beam intensity on the horizontal and vertical beam axes from images taken on a Mid-IR beam profiler.

Sample Performance Plots

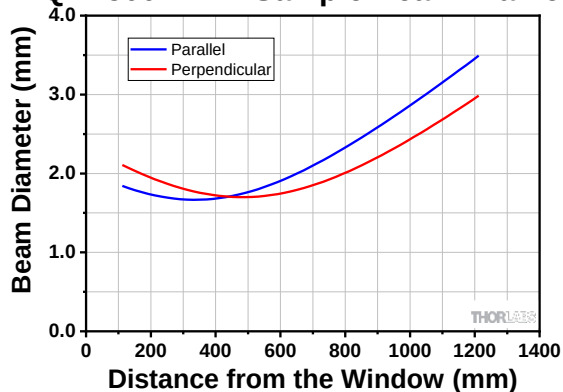


Sample Performance Plots (Cont.)

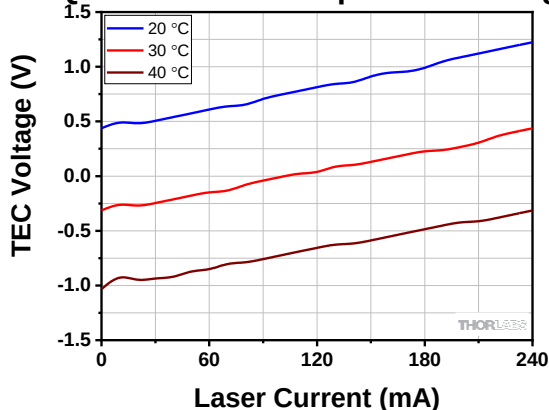
QD4500HHLH Output Power vs. Wavelength



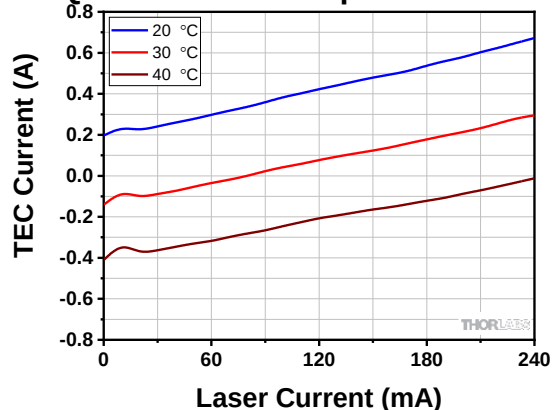
QD4500HHLH Sample Beam Diameter



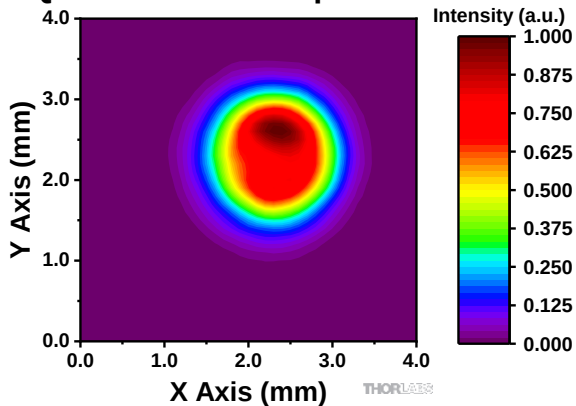
QD4500HHLH Sample TEC Voltage



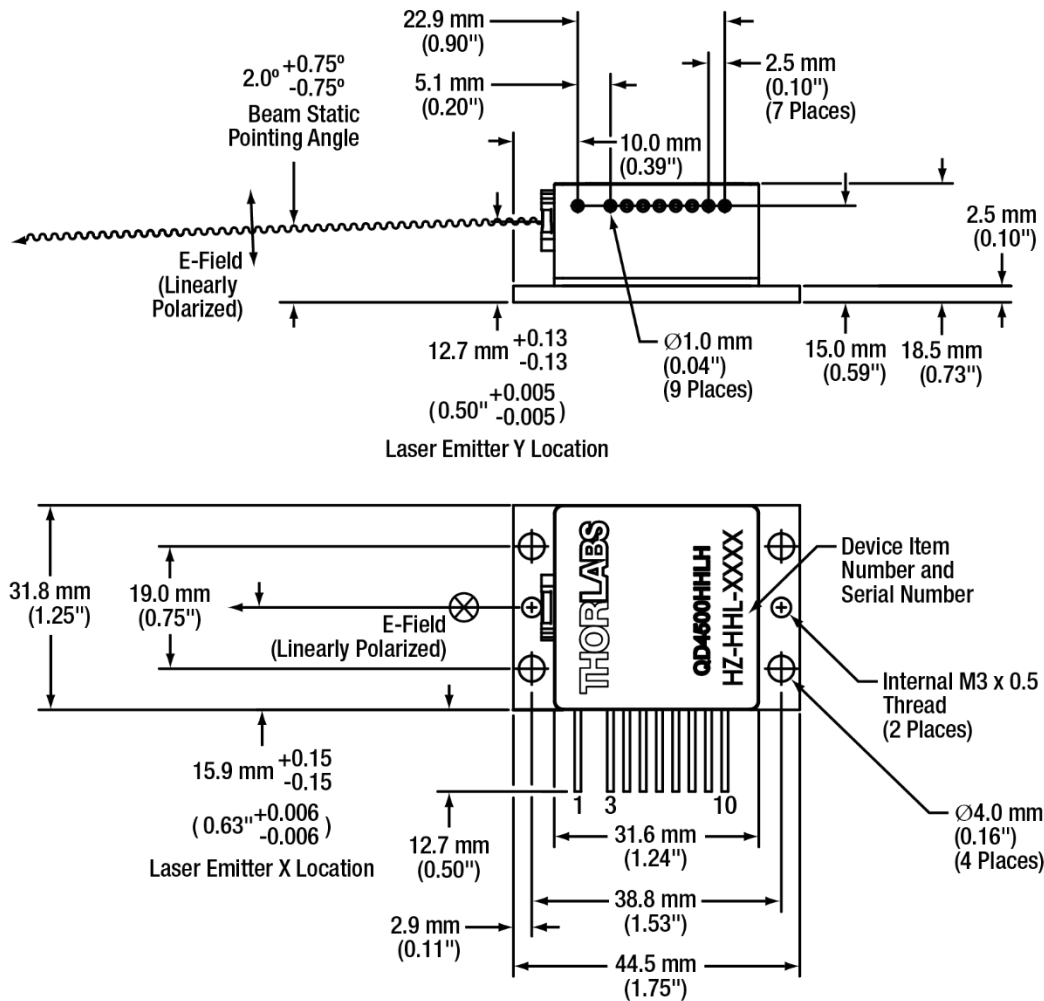
QD4500HHLH Sample TEC Current



QD4500HHLH Sample Beam Profile



Drawing for QD4500HHLH



Pin	Description
1	TEC (-)
2	Not Present
3	No Connection
4	Laser Anode
5	TEC Control Thermistor, 10 k Ω
6	TEC Control Thermistor, 10 k Ω
7	Laser Cathode
8	No Connection
9	No Connection
10	TEC (+)