4040 nm Fabry-perot Quantum Cascade Laser, 320 mW

QF4040HHLH

Description

The QF4040HHLH 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 QF4040HHLH 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	0.6 W
LD Reverse Voltage (Max)	1 V
PD Reverse Voltage (Max)	N/A
TEC Current (Max)	6 A
TEC Voltage (Max)	8.6 V
Operating Temperature	15 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 mode performance is tested and 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:

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

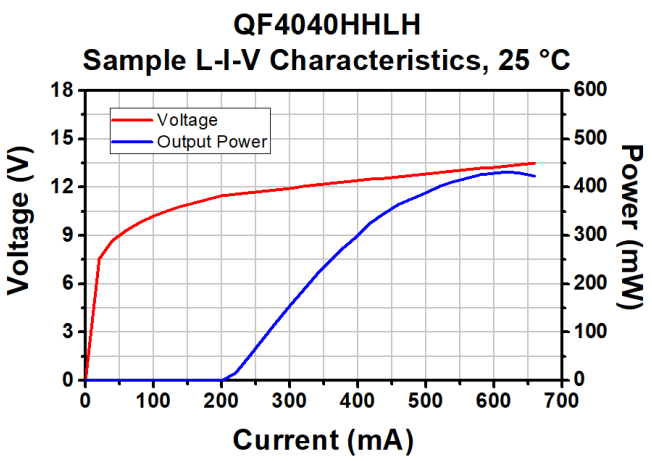
Specifications (Cont.)

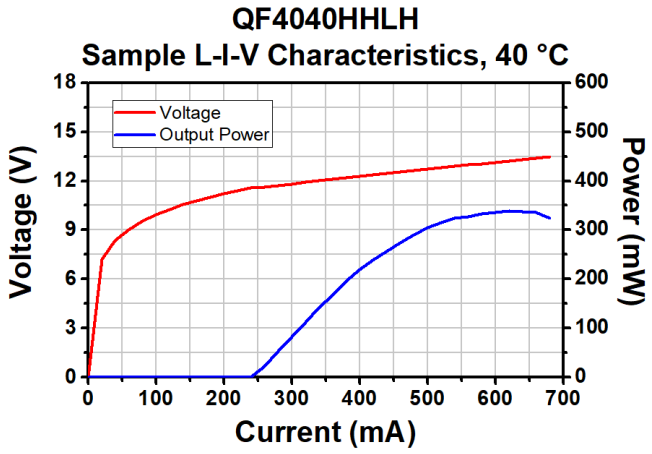
Optical Electrical Characteristics (T_{chip} = 25 °C, CW Operation)					
		Symbol	Min	Typical	Max
Center Wavelength		λ	3.975 µm	4.04 µm	4.1 µm
Spectral Bandwidth (5 – 95% Integrated Power)		Δλ	-	60 nm	-
Optical Output Power		P_{out}	320 mW	-	-
Operating Current		I_{op}	-	0.4 A	1.1 A
Threshold Current		I_{th}	-	0.2 A	-
Forward Voltage		V_F	-	13 V	15 V
Beam Pointing	Parallel[a]	-	-0.6°	0°	+0.6°
	Perpendicular[a]	-	-2.6°	-2.0°	-1.4°
Beam Divergence Angle (FWHM)	Parallel[a]	$\theta_{\parallel}$	3 mrad	6 mrad	10 mrad
	Perpendicular[a]	$\theta_{\perp}$	3 mrad	6 mrad	10 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.

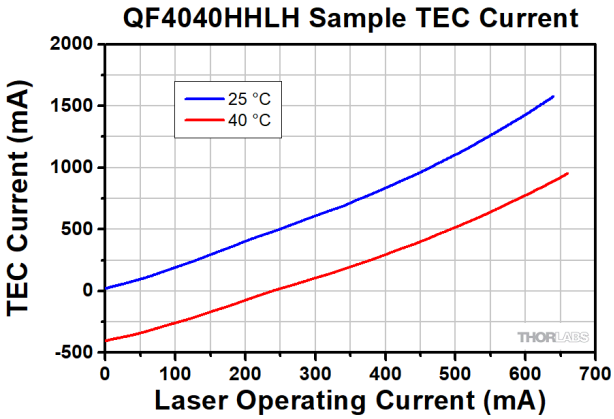
Sample Performance Plots

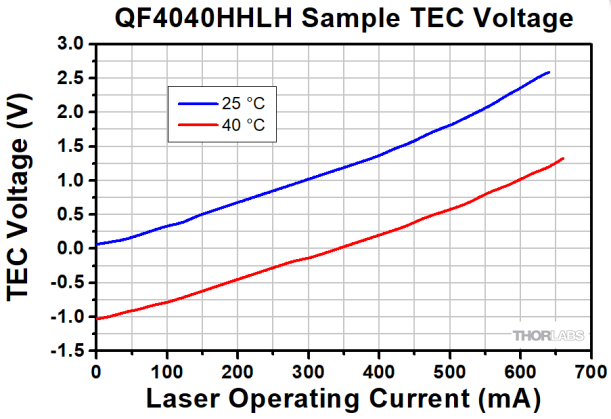




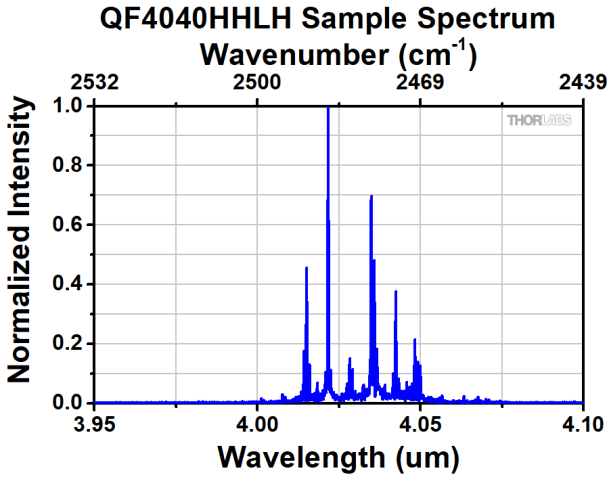
The temperatures given in the graph titles are for the chip.

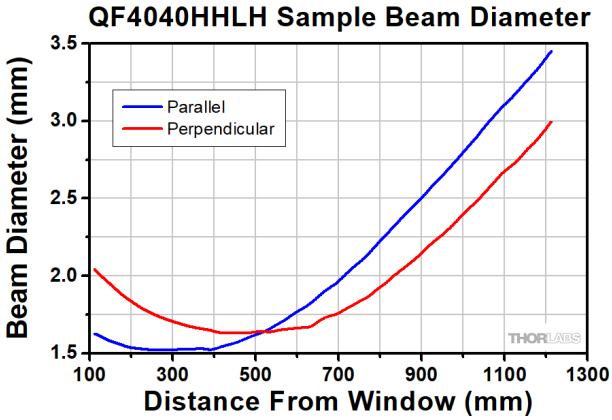
Sample Performance Plots (Cont.)

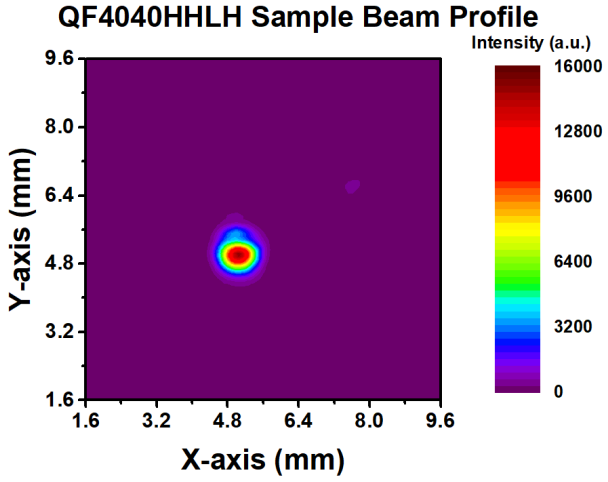




The data above is given at T_{CHIP}.

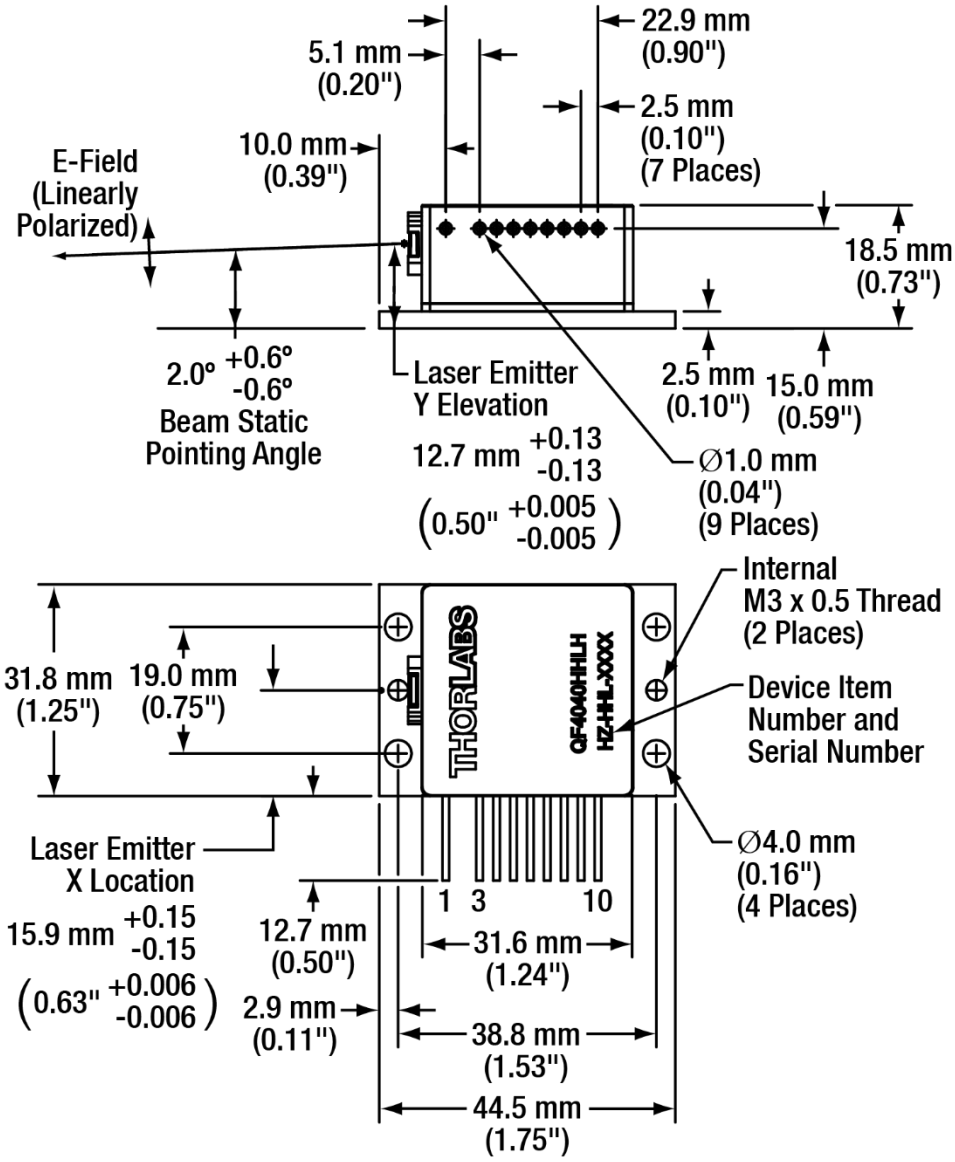






The beam profile was taken 310 mm from the sample.

Drawing for QF4040HHLH



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	No Connection
9	No Connection
10	TEC (+)