7901 nm DFB Quantum Cascade Laser, 20 mW (Min)

QD7901HH

Description

The QD7901HH is a single spatial mode, single longitudinal mode, distributed feedback quantum cascade laser contained in a high heat load (HHL) package and is designed and manufactured by Thorlabs. This laser operates in continuous wave (CW) mode at room temperature, and the lasing wavelength can be tuned through 7901 nm, making this laser ideal for Hydrogen Sulfide (H_2S) sensing.

The QD7901HH 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} = 20 °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	15 to 45 °C[b]
Storage Temperature	0 to 85 °C

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 at the target wavelength is guaranteed within this range, with individual operating conditions listed on the device datasheet.

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

c. Thermistor resistance follows the Steinhart-Hart equation:

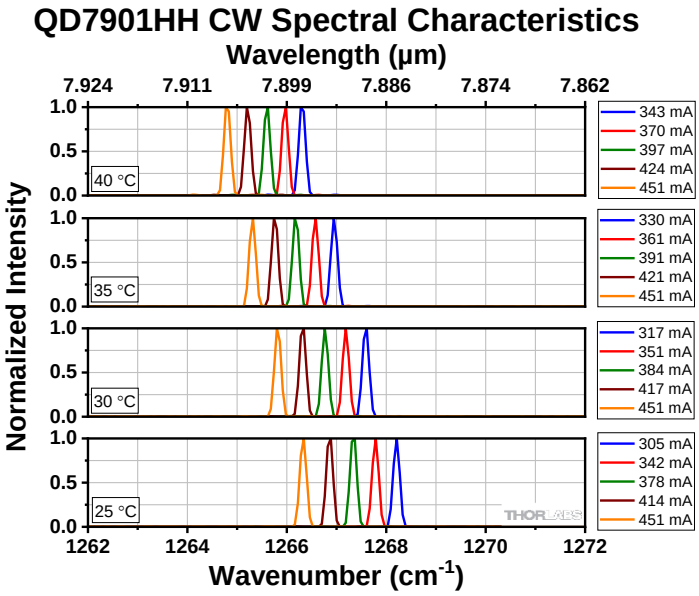
$$\frac{1}{T} = A + B(\ln R_{th}) + C(\ln R_{th})^3$$

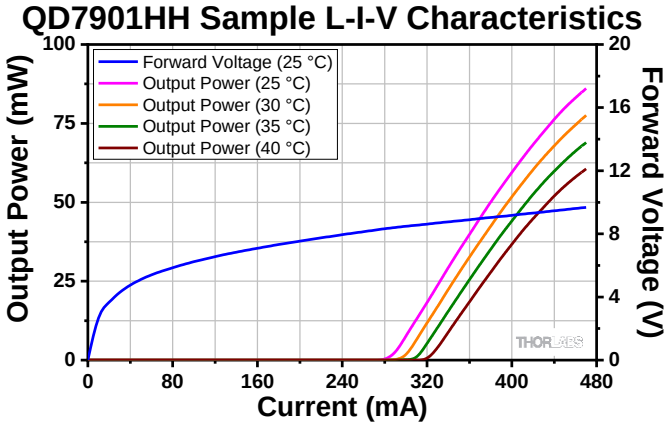
Specifications (Cont.)

Optical Electrical Characteristics (CW Operation)					
		Symbol	Min	Typical	Max
Center Wavelength		λ	-	7.901 µm	-
Operating Temperature		T_{op}	15 °C	-	45 °C
Tuning Range		$\Delta\bar{\nu}$	-	3 cm^{-1}	-
Temperature Tuning		$\Delta\bar{\nu}/\Delta T$	-	-0.1 $cm^{-1}/°C$	-
Side Mode Suppression		SMSR	20 dB	-	-
Optical Output Power		P_{out}	20 mW	50 mW	-
Operating Current		I_{op}	-	-	700 mA
Threshold Current		I_{th}	-	300 mA	-
Forward Voltage		V_F	-	10 V	13 V
Beam Pointing	Parallel[d]	-	-0.75°	0°	+0.75°
	Perpendicular[d]	-	-2.75°	-2.0°	-1.25°
Beam Divergence Angle (FWHM)	Parallel[d]	$\theta_{\parallel}$	3 mrad	6 mrad	11 mrad
	Perpendicular[d]	$\theta_{\perp}$	3 mrad	6 mrad	11 mrad
M^2	Parallel[d]	$M^2_{\parallel}$	1.0	1.1	1.3
	Perpendicular[d]	$M^2_{\perp}$	1.0	1.1	1.3
Minimum Beam Diameter (D4σ Method)[e]		D	0.5 mm	1.5 mm	2.5 mm

d. For this laser, these terms are defined with respect to the plane of the base plate.
e. 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.

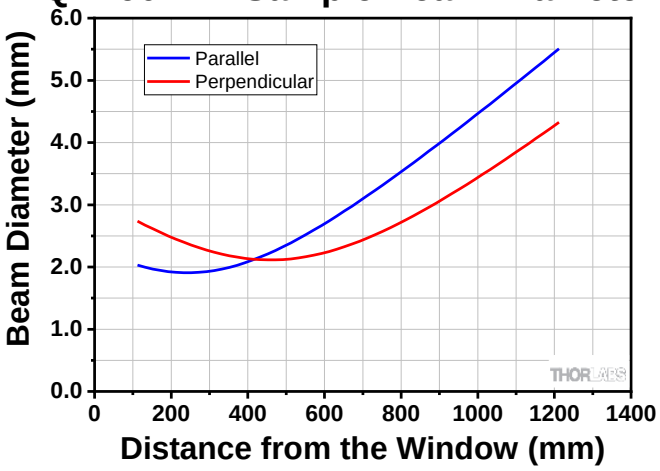
Sample Performance Plots



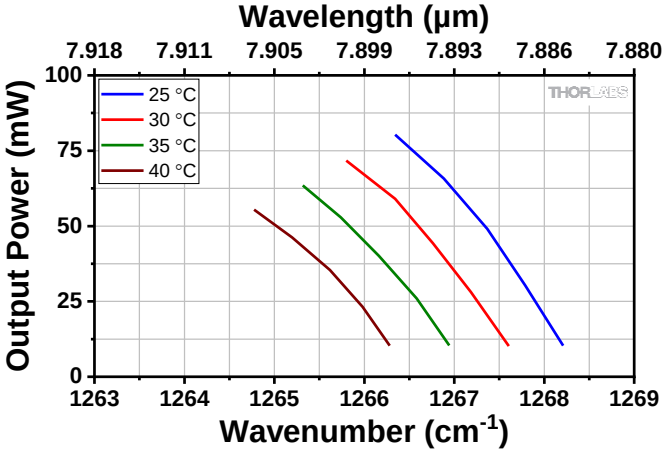


Sample Performance Plots (Cont.)

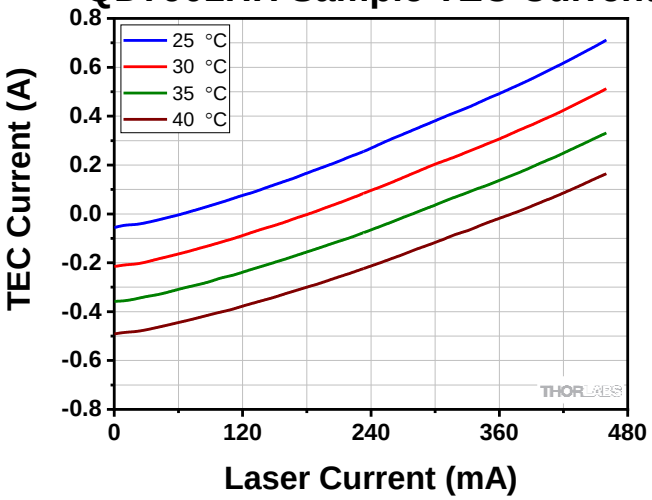
QD7901HH Sample Beam Diameter



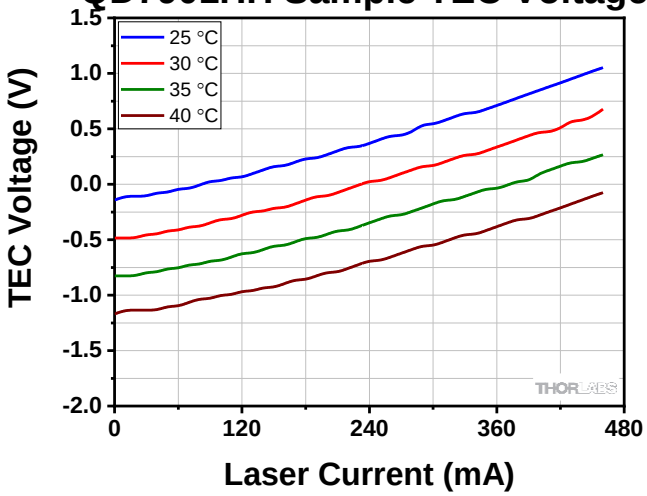
QD7901HH Output Power vs. Wavelength



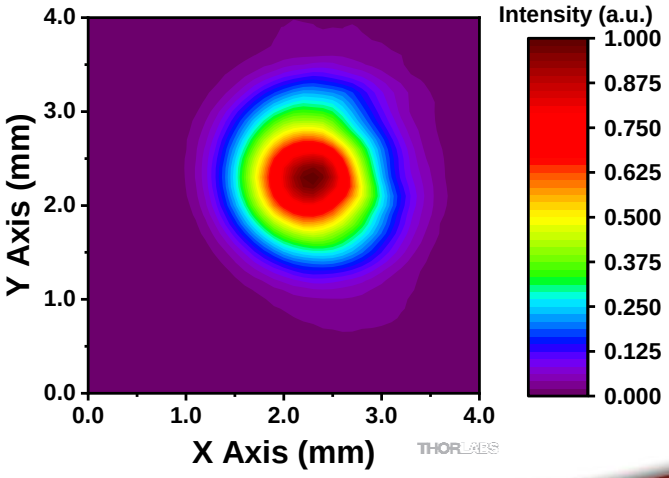
QD7901HH Sample TEC Current



QD7901HH Sample TEC Voltage

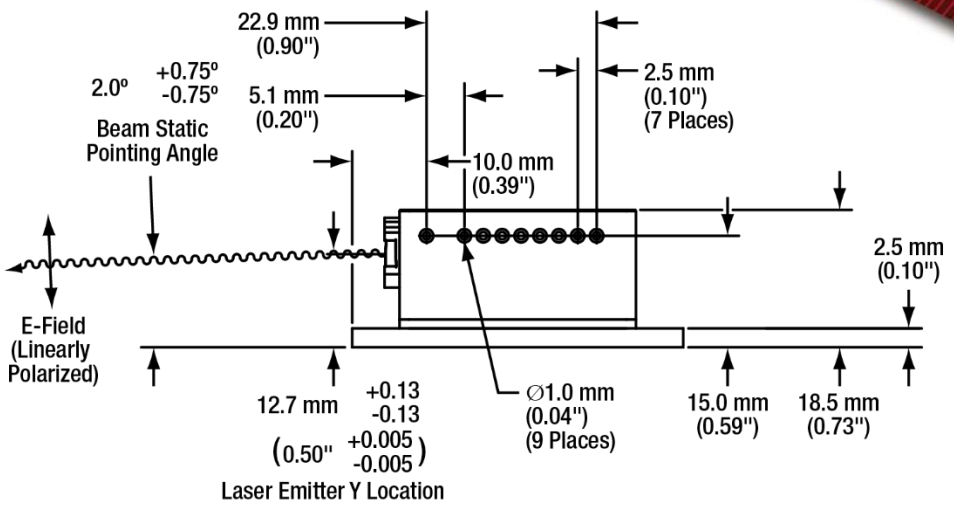


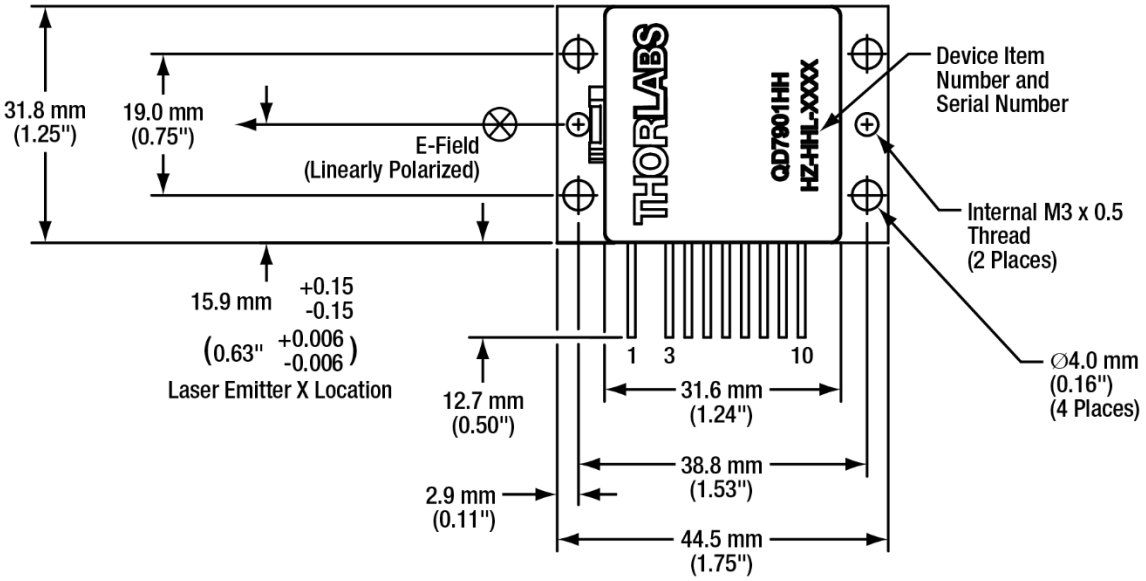
QD7901HH Sample Beam Profile



The sample beam profile was measured at a distance of 310 nm from the laser window with a pyroelectric camera that had 100 µm square pixels.

Drawings for QD7901HH





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

a. This device contains an EEPROM with stored laser operation points, including max current, threshold current, operation temperature, and operation current, for future use. For individuals with user- supplied, third-party solutions capable of reading EEPROMs, please contact Tech Support for more information.