7716 nm DFB Quantum Cascade Laser, 20 mW (Min)

QD7716HH

Description

The QD7716HH 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, and the lasing wavelength can be tuned through 7716 nm, making this laser ideal for Nitrous Oxide (N_2O) detection.

The QD7716HH 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 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.

Thermistor Characteristics (T_{CASE} = 25 °C)				
	Symbol	**Min**	**Typical**	**Max**
Thermistor Resistance[a]	R_{th}	-	10 kΩ	-
Steinhart-Hart Coefficients	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:

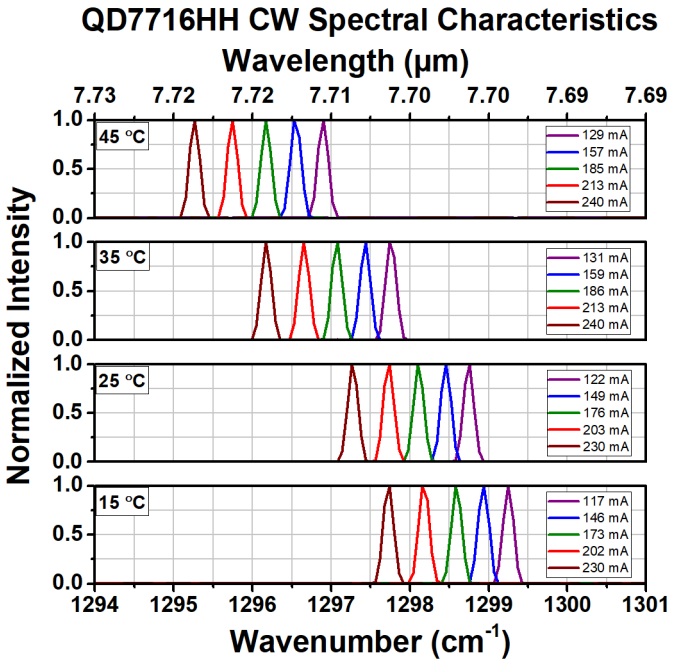
$$\frac{1}{T} = A + B(\ln R_{th}) + C(\ln R_{th})^3$$

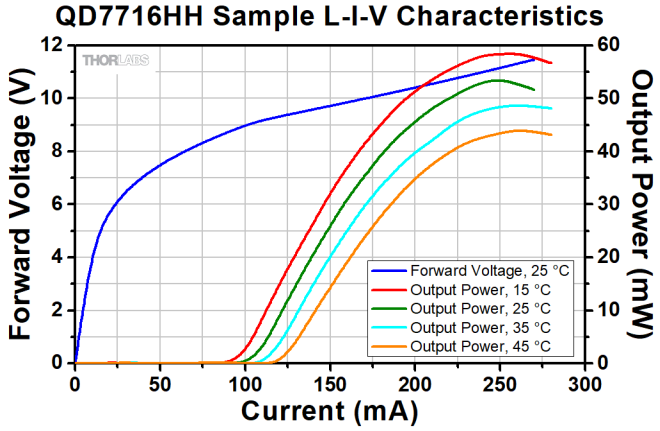
Specifications (Cont.)

Optical Electrical Characteristics (CW Operation)					
		Symbol	Min	Typical	Max
Center Wavelength		λ	-	7.716 µm	-
Operating Temperature		T_{op}	15 °C	-	45 °C
Tuning Range		$\Delta\bar{\nu}$	-	3 cm^{-1}	-
Temperature Tuning		$\Delta\bar{\nu}/\Delta T$	-	-0.08 $cm^{-1}/°C$	-
Side Mode Suppression		SMSR	20 dB	-	-
Optical Output Power		P_{out}	20 mW	30 mW	-
Operating Current		I_{op}	-	-	1000 mA
Threshold Current		I_{th}	-	200 mA	-
Forward Voltage		V_F	-	12 V	14 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

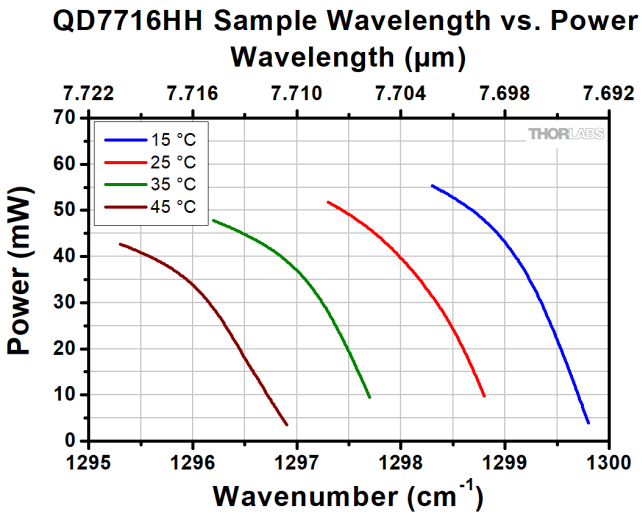
a. For this laser, these terms are defined with respect to the plane of the base plate.
b. Obtained by scanning a razor across the beam and measuring the points where 10% of the total beam intensity and 90% of the total beam intensity are observed.

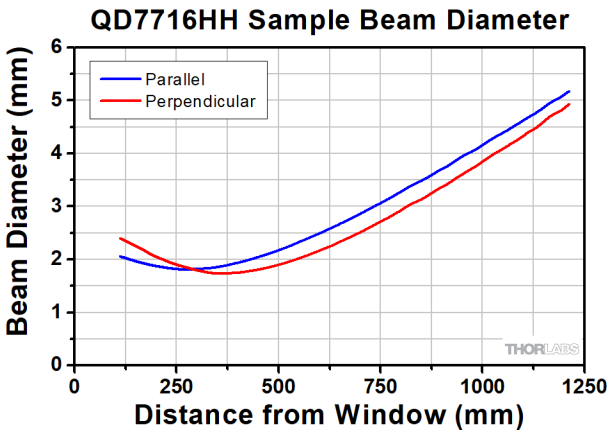
Sample Performance Plots

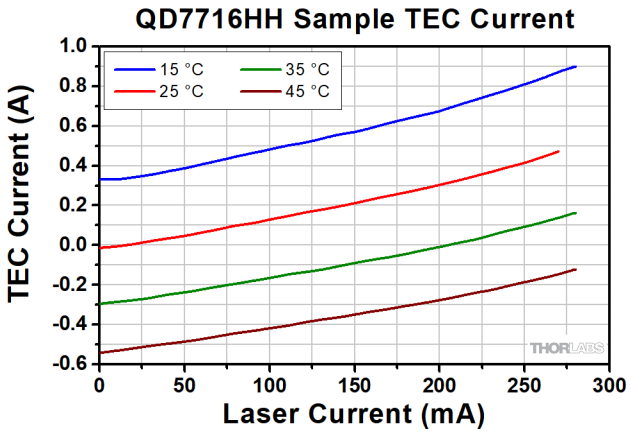


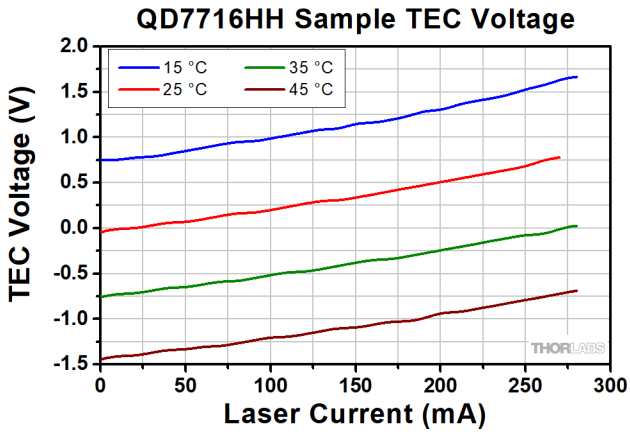


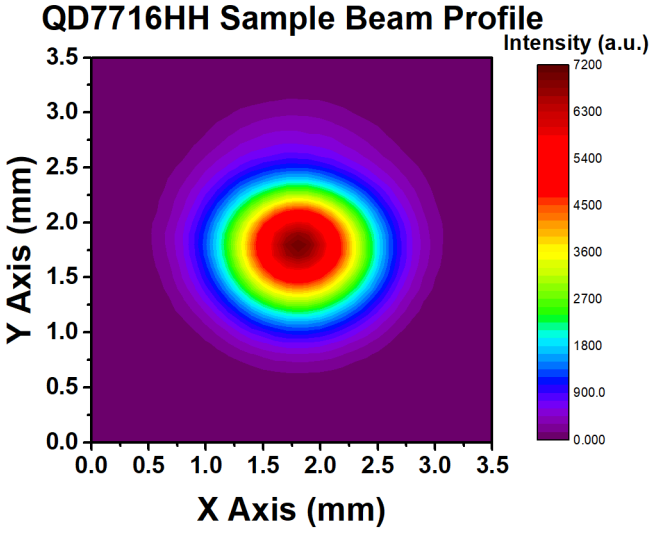
Sample Performance Plots (Cont.)



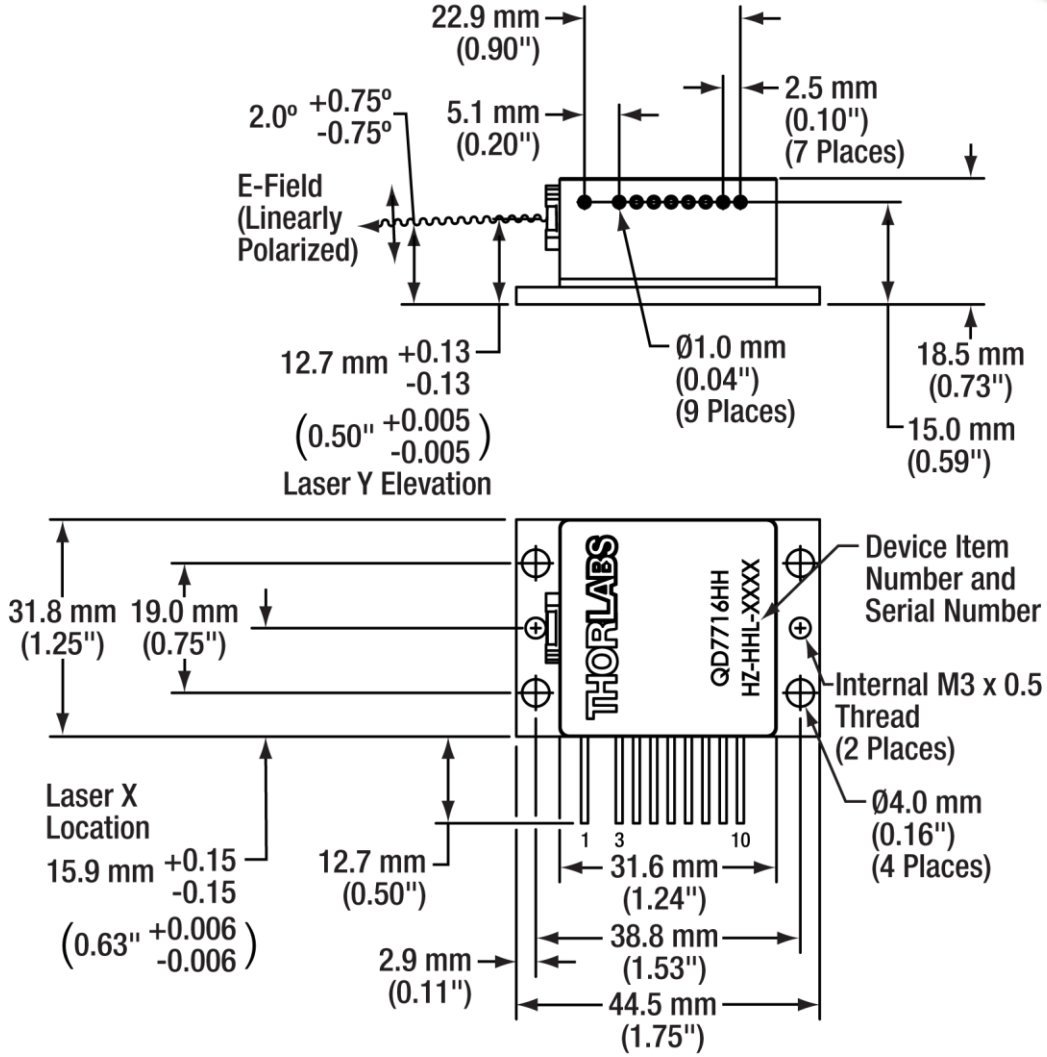








Drawing for QD7716HH



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 (+)