

7416 nm DFB Quantum Cascade Laser, 20 mW (Min)

QD7416HH



Description

The QD7416HH 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 7416 nm, making this laser ideal for Sulfur Dioxide (SO₂) detection.

The QD7416HH 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 (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	-40 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 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 (T _{CASE} = 25 °C)	A	-	1.129 × 10 ⁻³ K ⁻¹	-
	B	-	2.341 × 10 ⁻⁴ K ⁻¹	-
	C	-	0.878 × 10 ⁻⁷ K ⁻¹	-

- Thermistor resistance follows the Steinhart-Hart equation:

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

Specifications (Cont.)

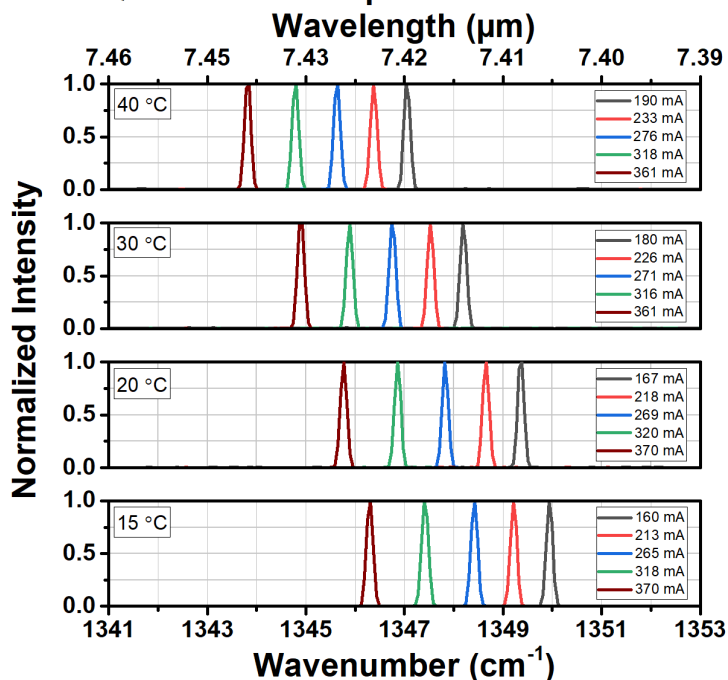
Optical Electrical Characteristics (CW Operation)				
	Symbol	Min	Typical	Max
Center Wavelength	λ	-	7.416 μm	-
Operating Temperature	T_{op}	15 °C	-	45 °C
Tuning Range	$\Delta\bar{\nu}$	-	3 cm^{-1}	-
Temperature Tuning	$\Delta\bar{\nu}/\Delta T$	-	-0.08 $\text{cm}^{-1}/^{\circ}\text{C}$	-
Side Mode Suppression	SMSR	20 dB	-	-
Optical Output Power	P_{out}	20 mW	100 mW	-
Operating Current	I_{op}	-	-	1000 mA
Threshold Current	I_{th}	-	300 mA	-
Forward Voltage	V_F	-	12 V	-
Beam Pointing	Parallel ^d	-	-0.75°	0°
	Perpendicular ^d	-	-2.75°	-2.0°
Beam Divergence Angle (FWHM)	Parallel ^d	$\theta_{\parallel}$	3 mrad	6 mrad
	Perpendicular ^d	$\theta_{\perp}$	3 mrad	6 mrad
M^2	Parallel ^d	$M^2_{\parallel}$	1.0	1.1
	Perpendicular ^d	$M^2_{\perp}$	1.0	1.1
Minimum Beam Diameter (D4 σ 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.

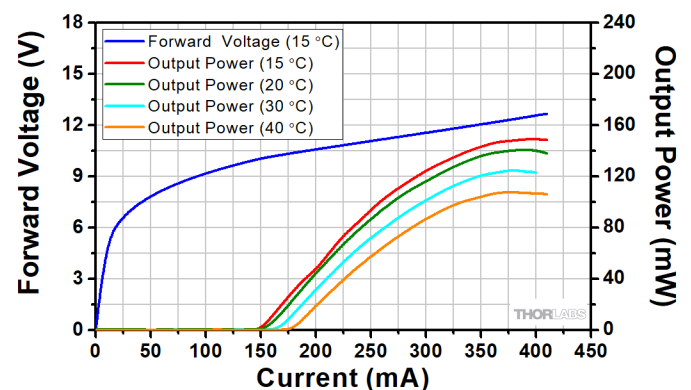
e. Obtained by scanning a razor across the beam and measuring the points where 10% of the total beam intensity and 90% of the total beam intensity are observed.

Sample Performance Plots

QD7416HH CW Spectral Characteristics

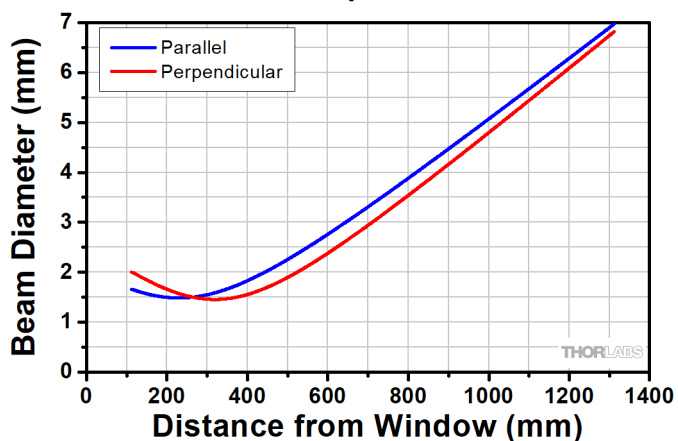


QD7416HH Sample L-I-V Characteristics

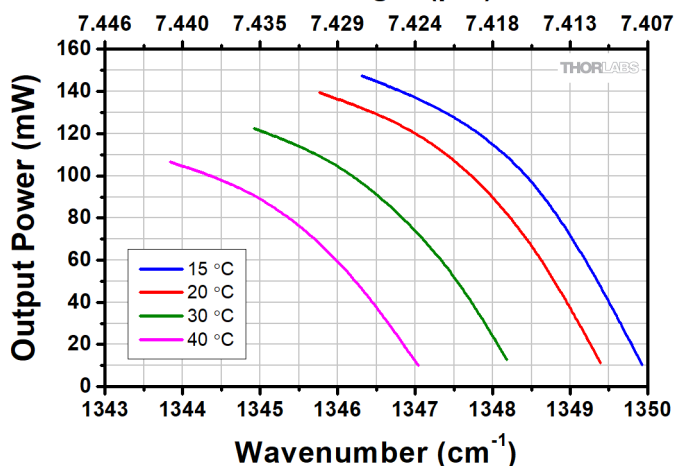


Sample Performance Plots (Cont.)

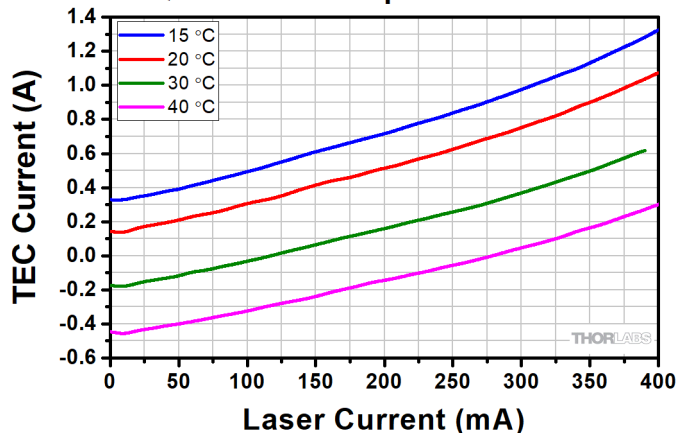
QD7416HH Sample Beam Diameter



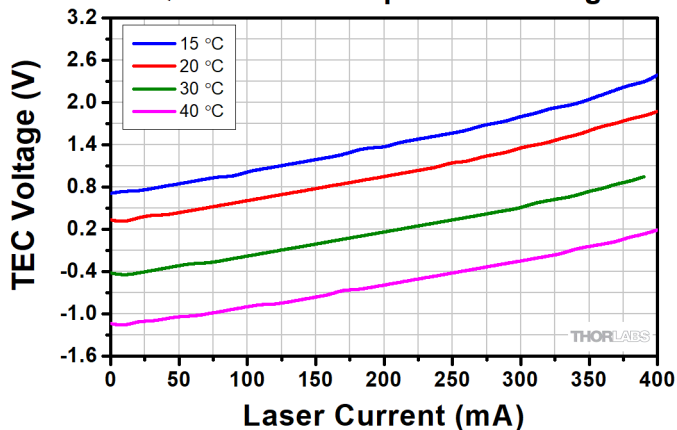
QD7416HH Output Power vs. Wavelength



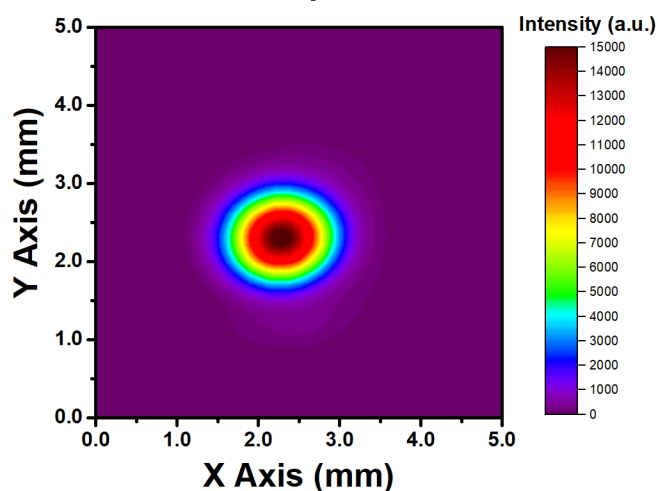
QD7416HH Sample TEC Current



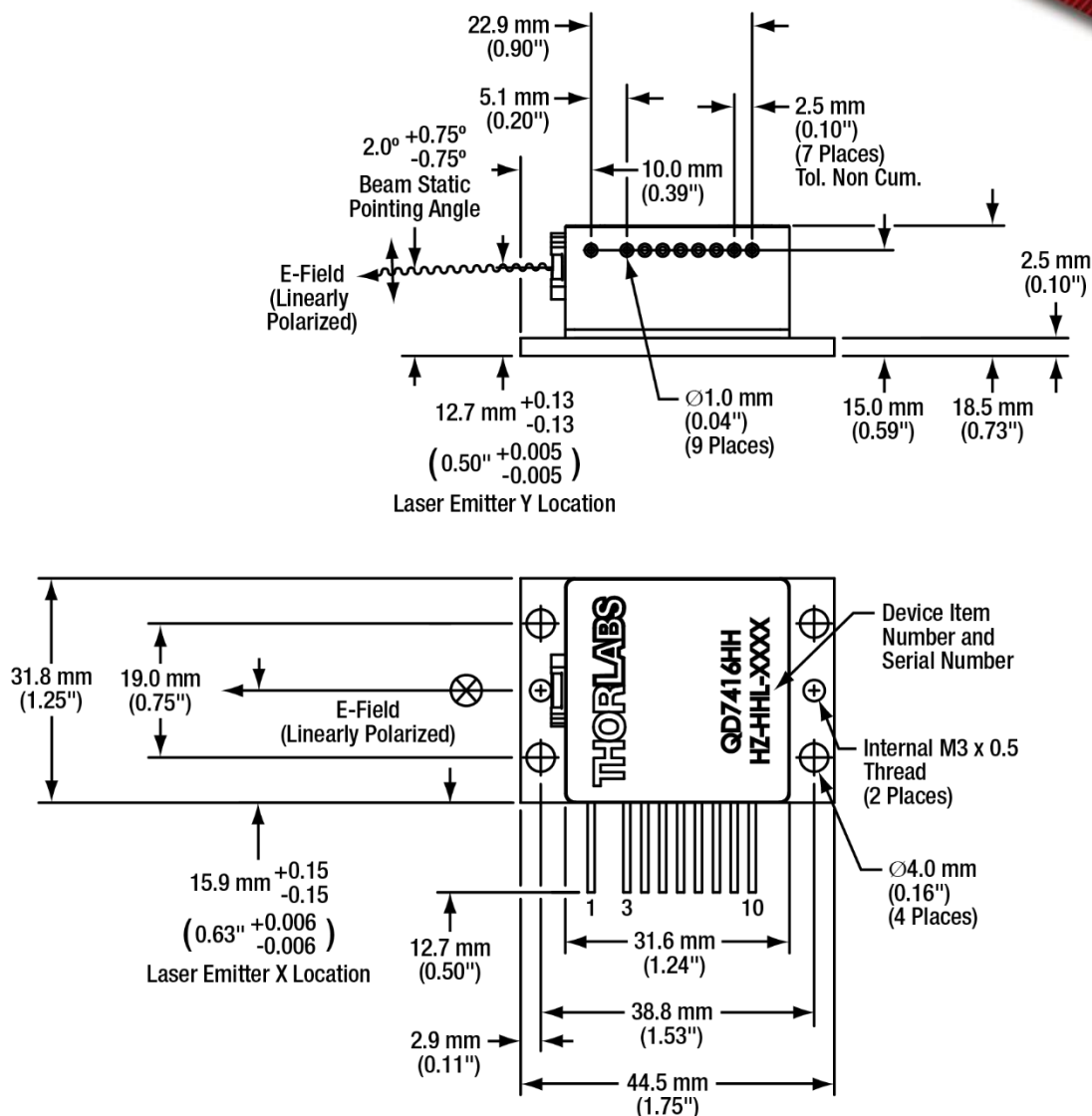
QD7416HH Sample TEC Voltage



QD7416HH Sample Beam Profile



Drawings for QD7416HH



Pin	Description	Pin	Description
1	TEC (-)	6	Thermistor, 10 k Ω
2	Not Present	7	Laser Cathode (-)
3	N/C	8	EEPROM ^a (+)
4	Laser Anode (+)	9	EEPROM ^a (-/Ground)
5	Thermistor, 10 k Ω	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.