



torus

Single frequency CW lasers



- CW 532nm up to 750mW
- CW 660nm up to 200mW
- Extremely low noise
- TruLoQ™ Active mode lock technology



Overview

The **torus** is the only actively locked single longitudinal mode laser commercially available. The **torus** is available at 532nm (50mW to 750mW) and at 660nm (50mW to 200mW), making it ideal for applications such as holography, Brillouin scattering and high resolution Raman spectroscopy. The pump diode MTF is manufacturer-specified as >100,000 hours at full power, but Laser Quantum de-rates the diode to further increase its lifetime, giving the **torus** itself industry leading lifetimes.

Despite the inherent single frequency operation of the **torus**, mode-drift and eventual mode-hop will occur if the laser cavity changes length due to ambient air temperature variation. To mitigate this, the digital power supply receives a signal from the laser which reports the exact position of the laser mode in frequency space. The power supply then feeds back a control signal which maintains the position of the mode. This active feedback control loop eliminates the risk of mode-hop and leads to a highly stable output. (Fig.1 and 2).

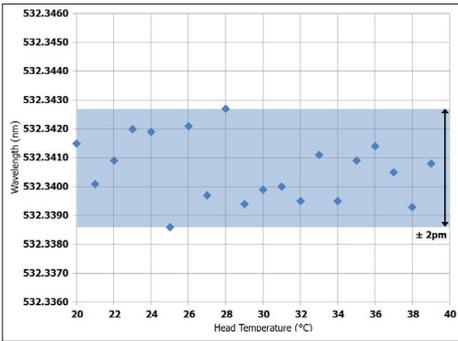


Fig.1 Typical wavelength stability versus head temperature of **torus** laser.

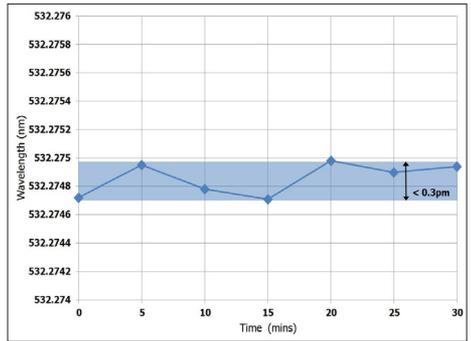


Fig.2 Typical wavelength stability versus time of **torus** laser.

Using a Fabry-Perot interferometer (JRS Scientific Instruments) the **torus** laser shows high spectral purity with side bands <-110dB compared with the central mode. (Fig.3)*

See Laser Quantum whitepaper "**torus** spectral purity" for further information.

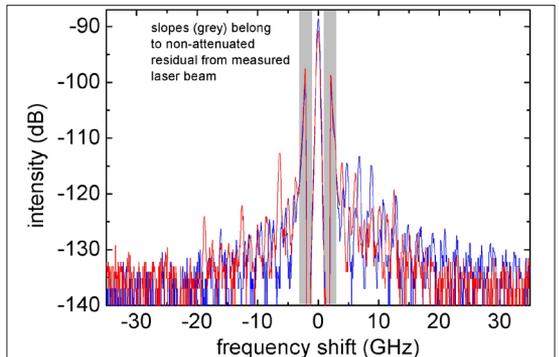


Fig.3

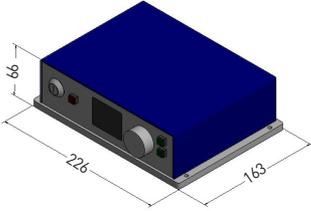
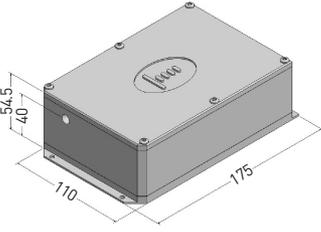
* Measured by a customer and does not represent a Laser Quantum specification.

 Using **TruLoQ™** technology, the effects of temperature change on the laser such as mode-drift and mode-hop are minimised.

 The **torus** can be controlled across the internet via the RemoteApp™ software that also allows connection to the Laser Quantum support team for monitoring laser performance, diagnosing opportunities for and carrying out laser optimisation.

 Every **torus** laser has been subjected to a 1200g drop-test to check that all components are correctly fitted prior to its extended 300 hour test period. This rigorous testing regime ensures long operational lifetimes.

Dimensions (mm)



Other information

- Umbilical length: 1.5m
- Laser head weight: 1.2kg
- Cooling options available
- Horizontal polarisation on request
- Fibre coupling available
- LabView drivers available
- 2 years unlimited hours warranty for scientific users



Drawings are for illustrative purposes only, please contact Laser Quantum for complete engineer's drawings.

Specifications*

	torus 532	torus 660
Wavelength	532nm	660nm
Power	50 to 750mW	50 to 200mW
Beam diameter ¹	1.7mm±0.2mm	
Spatial Mode	TEM ₀₀	
Ellipticity	<1:1.1	
Bandwidth	1MHz	
Divergence	<0.4mrad	
M-squared	<1.1	
Power stability ²	<1.0% RMS	
Beam pointing stability	<10µrad	
RMS noise	<0.25%	<0.5%
Noise bandwidth	10Hz to 100MHz	10Hz to 50kHz
Polarisation ratio	>100:1	
Polarisation direction ³	vertical	
Coherence length	>100m	
Beam angle ⁴	<1mrad	
Operating temperature	15°C to 35°C	
Warm-up time	<30 minutes	
Applications	Raman spectroscopy, holography, interferometry, Brillouin scattering	

* Laser Quantum operates a continuous improvement programme which can result in specifications being improved without notice.

¹ Beam diameter defined as the average of major and minor 1/e² beam size measured at 25cm from exit port, at specified power.

² Test duration 100hrs at constant temperature.

³ Horizontal polarisation available on request.

⁴ Tolerance relative to head orientation.

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