Air-cooled, diode-pumped, wavelength-tunable Q-switched laser

Q TUNE-G

Q-TUNE-G laser head

Q-TUNE-G is an air-cooled, wavelength-tunable laser integrating an Optical Parametric Oscillator (OPO) and its pump source. The pump source is a Q-switched DPSS laser from the Q2 series. A pulse duration of less than 4 ns and a pulse repetition rate of up to 100 Hz make Q-TUNE-G a suitable coherent light source for photoacoustic imaging, nonlinear and time-resolved spectroscopy, and metrology.

Q2 series lasers feature water-free laser crystal pumping technology that enables generation of a high-quality laser beam with pulse energies up to 80 mJ. The advanced laser design results in a compact, user-friendly turnkey system requiring minimal maintenance. No external chillers or bulky power supplies are required, as all laser electronics are integrated into the Q-TUNE-G housing. The only external module is a mains adapter providing 12 or 28 VDC, 50 – 150 W (depending on model).

Both the pump laser and the OPO are controlled through a single Ethernet port via a built-in web server. There is no need to install control software – any computer or mobile device with a modern web browser can control Q-TUNE-G. An API is also provided for integration with user devices.

In addition to the tunable output, Q-TUNE-G provides two additional ports for access to the pump laser beams.

FEATURES

- Seamless laser and Optical Parametric Oscillator (OPO) integration
- Turnkey performance due to the water-free pump laser design
- Microprocessor controlled operation with self-optimization, self-calibration capability
- Guaranteed > **2 G shot** pump-diode lifetime
- Hands-free automated tuning from **680 to 2300 nm**
- Up to **100 Hz** pulse repetition rate
- Up to **11 mJ** pulse energy in near-IR range.
- **10 – 15 cm^{-1}** typical linewidth (broadband version available by request)
- Internal or external triggering modes
- Separate output ports for access to the pump laser wavelengths
- Low power consumption – from 50 to 150 W depending on model

OPTIONAL EQUIPMENT

- Compact spectrometer for monitoring of OPO wavelength and linewidth
- Motorized attenuator for VIS or NIR range
- OPO pulse energy monitor
- Fiber coupled OPO output
- Air-purging unit for long lifetime of optics

APPLICATIONS

- Photo-acoustics imaging
- Photo-acoustics microscopy
- Nonlinear laser spectroscopy
- Metrology

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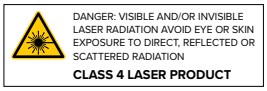
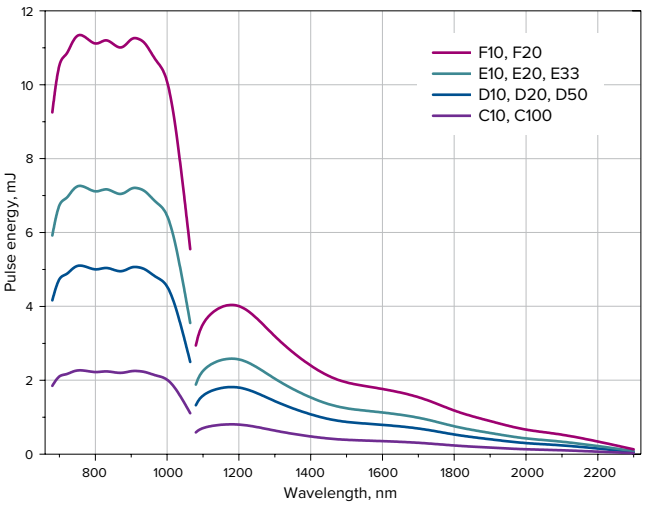
SPECIFICATIONS [1)]

Model	Q-TUNE-G								
	-C10	-C100	-D10	-D20	-D50	-E10	-E20	-E33	-F10
Wavelength range	680 – 2300 nm								
Pulse repetition rate [2)]	10 Hz	100 Hz	10 Hz	20 Hz	50 Hz	10 Hz	20 Hz	33 Hz	10 Hz
Pulse energy [3)]	> 2 mJ		> 4.5 mJ			> 7 mJ			> 11 mJ
Linewidth [4)]	< 10 cm^{-1}					< 15 cm^{-1}			
Pulse duration [5)]	< 4 ns								
Pulse-to-pulse stability [6)]	< 3 % RMS								
Power drift [7)]	± 3.0 %								
Polarization									
Signal	horizontal								
Idler	vertical								
Typical beam diameter [8)]	3 mm		4 mm			5 mm			6 mm
Typical beam divergence [9)]	< 3 mrad					< 5 mrad			
Jitter [10)]	< 0.5 ns RMS								
Pump laser outputs [11)]									
Max pulse energy at [12)]									
Fundamental	15 mJ		32 mJ			60 mJ			80 mJ
2nd harmonic	7 mJ		16 mJ			30 mJ			40 mJ
Dimensions									
Laser head (W×L×H)	390 × 620 × 153 mm^3								
Power adapter (W×L×H) [13)]	192 × 178 × 46 mm^3								
Air-purging unit (APU) (W×L×H) [14)]	482 × 460 × 106 mm^3								
Operating requirements									
Cooling requirements	air-cooled (water-free)								
Ambient temperature	15 – 25 °C								
Relative humidity (non-condensing)	10 – 80 %								
Mains voltage [15)]	90 – 230 VAC, single phase, 47 – 63 Hz								
Average power consumption	50 – 150 W		80 – 150 W			< 100 W		< 150 W	

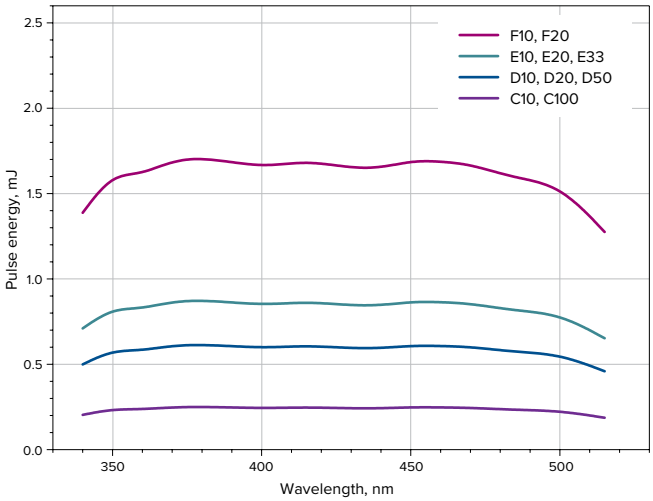
1. Due to continuous improvements all specifications are subject to change. Unless stated otherwise all specifications are measured at 800 nm and max pulse repetition rate. The parameters marked typical are not specifications. They are indications of typical performance and will vary with each unit we manufacture.
2. Factory-set pulse repetition rate in internal triggering mode. In internal triggering mode repetition rate can be divided by integer number down to f/2, f/3, f/4, ... 1 Hz.
3. Measured at 800 nm output. See tuning curves for pulse energies at other wavelengths. Optical components are optimized for best performance in 700 – 1000 nm range, when optimized for SWIR pulse energies are 25 – 40 % higher in 1400 – 2000 nm range. Inquire for tuning curve for -SWIR option.
4. Broadband version is available by request. Linewidth is in 20 – 200 cm^{-1} range.
5. FWHM level at 800 nm, measured with 350 ps rise time photodiode.
6. Measured during 30 seconds operation after warm-up.
7. Over 8 hour period after 20 minutes of warm-up, when ambient temperature variation is less than ± 2 °C. Power value is calculated once per second.
8. Beam diameter is measured 20 cm from laser output at the 4σ level.
9. Full angle measured at the 4σ level.
10. In respect to falling edge of pump-diode triggering pulse.
11. Laser pulse energy is optimized for OPO pumping and may differ from stand-alone laser specifications.
12. Outputs can be configured for simultaneous or non-simultaneous with OPO operation. Values indicated here are for non-simultaneous operation.
13. Power adapter size depends on the model.
14. APU is optional. APU provides power for Q-TUNE-G, additional power adapter is not required.
15. Laser can be powered from an appropriate 12 or 28 VDC power source, depending on model. Please inquire for details.



PERFORMANCE



Q-TUNE-G tuning curves



Q-TUNE-G-SH tuning curves

PART NUMBERS

Q-TUNE-G-F10-SH-AT/IR

Model

G → OPO pump wavelength 527/532 nm

Pulse energy at 800 nm

no letter → < 1 mJ
C → > 1 mJ
D → > 3 mJ
E → > 5 mJ
F → > 8 mJ

Default pulse repetition rate in Hz

Optional items

EM/BB → pulse energy monitor for OPO output
AT/NIR → motorized attenuator for 700 – 1100 nm
AT/IR → motorized attenuator for 1200 – 1800 nm
SPM2 → wavelength monitoring
FC/NIR → fiber coupler for NIR range
FC/IR → fiber coupler for IR range
APU2 → air-purging unit

Optional tuning range extension

SH → 350 – 500 nm
BB → broadband output in 900 – 1200 nm range

OPTIONAL ITEMS

WF	Stand-alone wireless router for wireless laser control
RS	Stand-alone adapter for laser control via RS-232 port
PC	Laptop computer for laser control
EXP	Stand-alone pulse generator for variable repetition rate
CT19	19” mounted controller with integrated AC/DC power supply
CTA19	19” mounted controller with air-purging unit
CTBR	Front/rear panel with brackets for standard controller
PS19	19” form factor AC/DC power supply
APU2	Stand-alone air-purging unit with integrated AC/DC power supply
CST	Custom model

Fiber coupler FC

Motorized attenuator AT

Pulse energy monitor EM/BB

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IMAGES

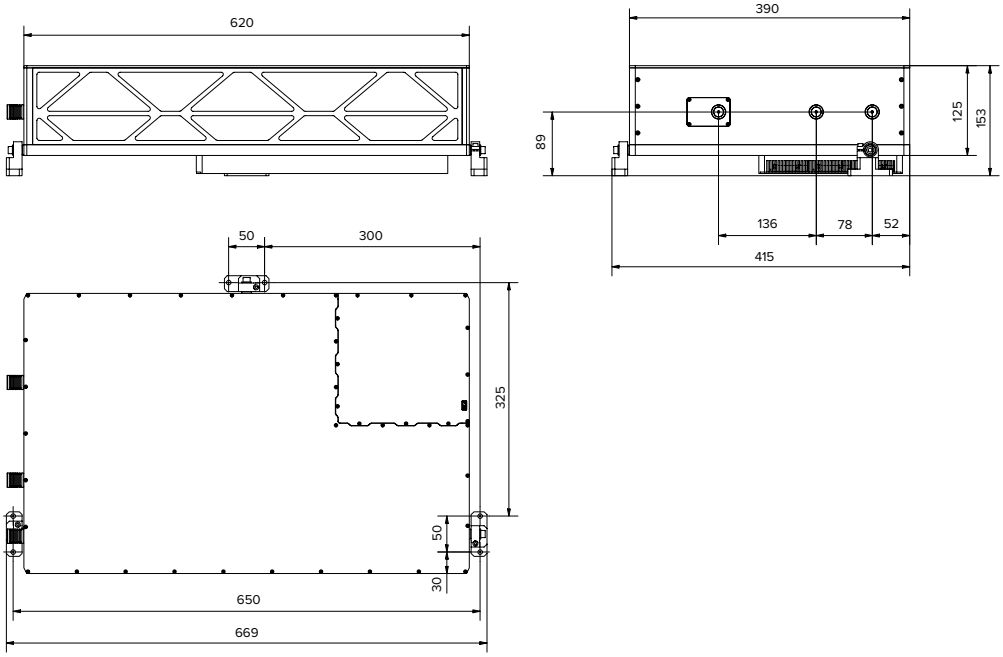
Front view of Q-TUNE laser head

Rear view of Q-TUNE laser head

Front view of air-purging unit APU2

Rear view of air-purging unit APU2

DRAWINGS



Outline drawings of Q-TUNE-G laser head
(dimension in mm)