

UHG Series

Ultrafast Harmonic Generator for
Femtosecond and Picosecond Lasers

mks | Spectra-Physics

Spectra-Physics' UHG series is a user-friendly Ultrafast Harmonic Generator (UHG) module capable of second, third, and fourth harmonic generation for femtosecond and picosecond oscillators such as the Spectra-Physics InSight®, Mai Tai® and Tsunami®. The UHG series is also available with optional pulse selection and automated tuning.

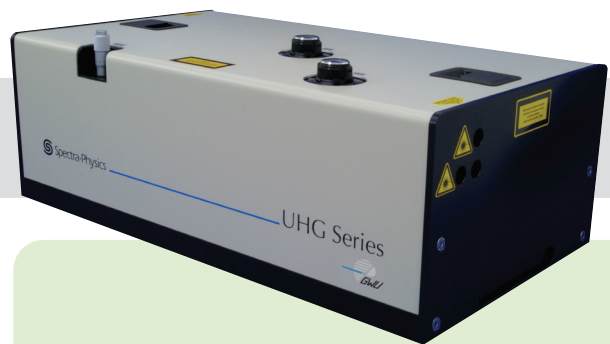
The UHG Series for InSight provides virtually gap free tuning from 340 nm to 1300 nm when combined with the fundamental output. It provides high efficiency second harmonic generation (SHG) output that exceeds 40% efficiency when combined with the InSight X3™. The UHG series for InSight can be fully automated and tunes both the fundamental and second harmonic wavelengths.

Pulse selection is available from 340 nm to 1100 nm at repetition rates from single shot to 40 MHz. The pulse selector can be used in high contrast ratio mode, or high efficiency mode depending on the needs of the experiment. For both modes of operation, the pulse selector module is positioned before all harmonic stages to offer the highest contrast ratio.

The UHG Series for Mai Tai and Tsunami has been designed to handle input power levels of more than 4 W and deliver efficiencies exceeding 40% for SHG. The UHG series is a compact, flexible system that is easy to use and suitable for a broad range of scientific applications.

The UHG Series Advantage

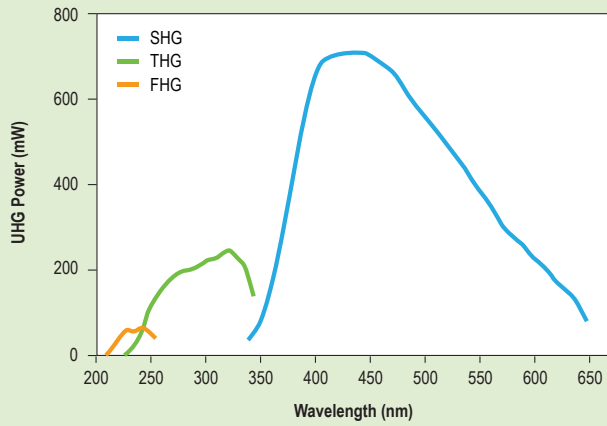
- High conversion efficiency
- Single broadband optics set
- Motorized tuning option
- Pulse selector option
- Compact housing



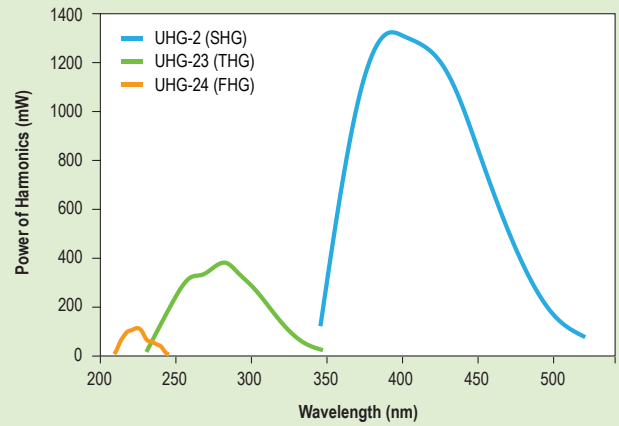
Applications

- Nonlinear spectroscopy
- Quantum optics
- Biochemistry
- Biophotonics

GWU-UHG Typical Performance with InSight¹



GWU-UHG Typical Performance with Mai Tai HP¹



1. Typically measured performance; not a guaranteed or warranted specification.

UHG for InSight Specifications^{1, 4}

	Fundamental	SHG
Second Harmonic Generation		
Input Wavelength	680–1300 nm	
Output Wavelength	680–1300 nm	340–650 nm
Conversion Efficiency (@ 900 nm, 80 MHz)	40%	
Power with InSight X3+/X3 ²	3000/2000 mW	1200/800 mW
Pulse Selection		
Wavelength	680–1100 nm	340–550 nm
Diffraction Efficiency ³	30% @ 900 nm, 45% @ 800 nm	
Power with InSight X3+/X3 ²	90 mW/60 mW @ 900 nm 108 mW/72 mW @ 800 nm	9 mW/6 mW @ 450 nm 11 mW/7 mW @ 400 nm

1. Due to our continuous product improvements, specifications are subject to change without notice.

2. InSight X3+ specification 3 W at 900 nm. InSight X3 specification 2 W at 900 nm.

3. 80 MHz laser repetition rate with 8 MHz pulse picking.

4. The UHG is a Class IV – High Power Laser, whose beam is, by definition, a safety and fire hazard. Take precautions to prevent exposure to the direct and reflected beams. Diffuse as well as specular reflections can cause severe skin or eye damage.

UHG for Mai Tai and Tsunami Specifications^{1,9}

	SHG	SHG (in THG) ²	THG	FHG
Femtosecond Operation				
Input Wavelength	680–1080 nm			836–968 nm
Output Wavelength	340–540 nm		226–360 nm	209–242 nm
Conversion Efficiency ³	40%	25%	10%	4%
Power with Mai Tai HP ⁴	1000 mW	625 mW	250 mW	80 mW
Power with Tsunami HP ⁵	1080 mW	675 mW	270 mW	100 mW
Picosecond Operation				
Input Wavelength	680–1080 nm			836–968 nm
Output Wavelength	340–540 nm		226–360 nm	209–242 nm
Conversion Efficiency ³	15%	10%	4%	0.1%
Power with Tsunami HP ^{5,7}	435 mW	290 mW	87 mW	2.5 mW
Pico HE option	25%	20%	12%	1%
Pico HE with Tsunami HP ^{5,7}	725 mW	580 mW	348 mW	25 mW

UHG Pulse Selector Specifications^{1,9}

Stand Alone Pulse Selector (Femtosecond and Picosecond Operation)				
Input Wavelength	680–1080 nm			
Diffraction Efficiency ⁸	45%			
Power with Mai Tai HP ⁴	112 mW			
Power with Tsunami HP ⁵	108 mW			
Contrast Ratio ⁸ (adjacent pulse)	80:1			
Contrast Ratio ⁸ (non-adjacent pulse)	400:1			
Repetition Rate	Adjustable: 40 MHz to single shot			
Pulse Selector with Harmonic Generation	SHG	SHG (in THG) ²	THG	
Femtosecond Operation				
Output Wavelength	340–540 nm		226–360 nm	
Conversion Efficiency ^{3,6}	10%	8%	5%	
Power with Mai Tai HP ⁴	8.5 mW	7 mW	4 mW	
Power with Tsunami HP ⁵	9.5 mW	7.5 mW	4.5 mW	
Picosecond Operation				
Output Wavelength	340–540 nm		226–360 nm	
Conversion Efficiency ^{3,6}	3%	2.5%	1%	
Power with Tsunami HP ⁷	3 mW	2.5 mW	1 mW	

1. Due to our continuous improvement program, specifications are subject to change without notice.

2. SHG when THG is detuned.

3. Conversion efficiency given at 800 nm for SHG and THG, 900 nm for FHG. Minimum input power of 2 W required for specified efficiencies.

4. 2.5 W @ 800 nm, 8 MHz pulse picking.

5. 2.7 W @ 800 nm, 8 MHz pulse picking.

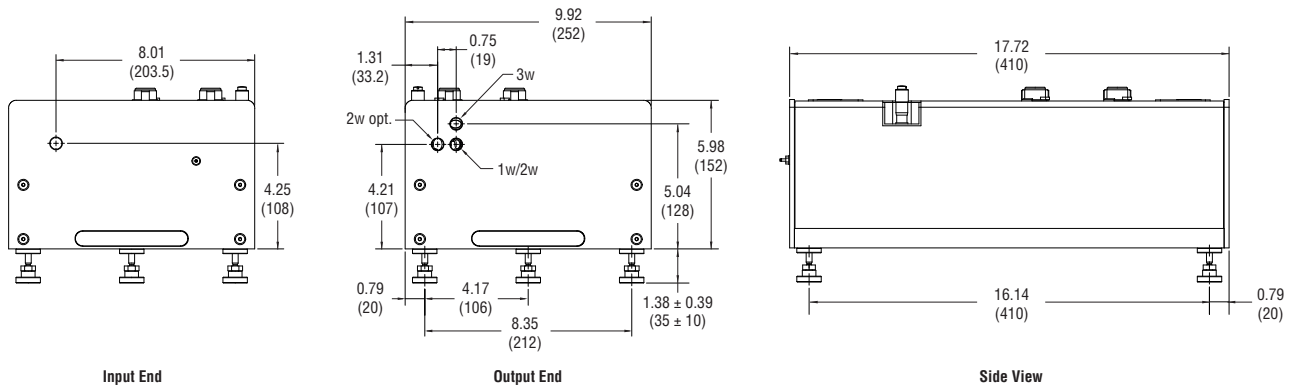
6. In relation to diffracted fundamental power @ 8 MHz.

7. 2.9 W @ 800 nm, 8 MHz pulse picking, 1–2 ps.

8. Values for 800 nm, 80 MHz laser repetition rate with 8 MHz pulse picking.

9. The UHG is a Class IV – High Power Laser, whose beam is, by definition, a safety and fire hazard. Take precautions to prevent exposure to the direct and reflected beams. Diffuse as well as specular reflections can cause severe skin or eye damage.

UHG Series Dimensional Drawing



Dimensions in inch (mm)



Manufactured by GWU



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