WaveTrain® 3D

External Cavity Frequency Doubler For CW Lasers

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WaveTrain 3D is an advanced stand-alone device that provides simple frequency doubling of single frequency CW laser beams. With greater efficiency than traditional intra-cavity or extra-cavity methods, this product can be used to generate the second harmonic of the output of Matisse® series lasers, as well as to generate harmonics of the output from MixTrain and WaveTrain modules.

WaveTrain 3D utilizes a ring cavity to achieve efficiencies greater than 35%. Unlike conventional bow-tie cavities, WaveTrain 3D is based on a patented triangle-shaped cavity configuration called the DeltaConcept™, which allows the cavity length to be adjusted with no effect whatsoever on output beam position, direction or beam astigmatism.

Output stability is further enhanced by the use of a lightweight piezo-activated prism to optimize the cavity length, making the WaveTrain 3D especially resistant to vibrations and acoustic noise. This inherent beam stability enables the fully digital control hardware to automatically lock the cavity for maximum doubling efficiency during both fixed frequency and scanned operation.

Ease of access and the use of pre-mounted modular optics and crystals insure maximum wavelength flexibility, enabling the WaveTrain 3D to be operated effectively over the entire 412–1600 nm input wavelength range.

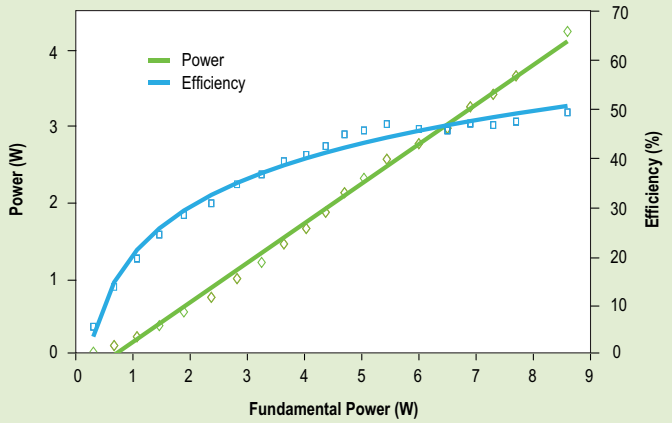
The WaveTrain 3D Advantage

- Input wavelength range 412 to 1600 nm
- Fast servo loop ensures power stability
- Continuous scans of 65 GHz at 10 GHz per second
- Sealed cavity block and body with external adjustments prevent contamination of optics
- Only two pre-mounted mirrors for quick change of wavelength ranges
- Low cavity losses and high doubling efficiencies
- Fully digital control electronics for ease of use andautomation

Applications

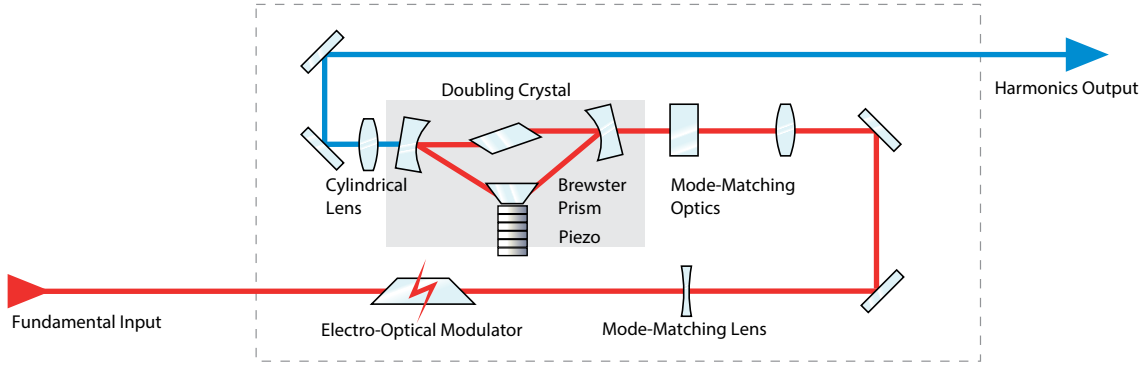
- High-resolution UV spectroscopy
- Atom cooling and magneto-optic trapping
- Tunable UV experiments
- Bose-Einstein condensates
- Atomic clocks
- Holography
- Metrology

WaveTrain 3D Efficiency Performance[1, 2]

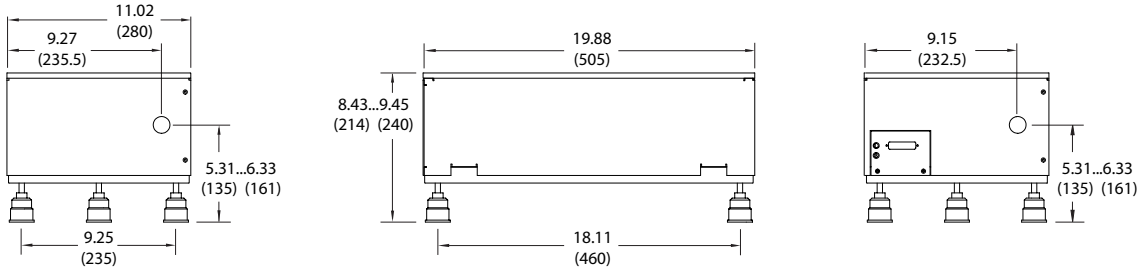


1. Typically measured performance; not a guaranteed or warranted specification.
2. Taken with LBO crystal at 754 nm.

WaveTrain 3D Optical Layout



WaveTrain 3D Dimensions



Dimensions in inch (mm)

WaveTrain 3D Specifications[1, 5]

Wavelength Range	670–1050 nm	550–780 nm	412–550 nm	1050–1600 nm
Automated Scan Range	>40 GHz	>65 GHz	>65 GHz	>40 GHz
Phase-Match Tuning[2, 3]	±25 nm @ 800 nm	±15 nm @ 660 nm	Contact factory	Contact factory
Maximum Scan Rate	10 GHz/sec (fundamental)			
Efficiency[4]				
Input Power				
300–600 mW	>6%	>4%	4–10%	>12%
600–1300 mW	>15%	>10%	4–10%	>12%
1300–3000 mW	>25%	>15%	4–10%	>12%
3000–10000 mW	>35%	>15%	4–10%	>12%
Requirements				
Pump Laser	TEM_{00}, M^2<1.1, single frequency laser Linewidth <10 MHz, linear polarized			
Ambient Conditions	Constant temperature in the 20–25°C range			
Laboratory	Vibrational isolated optical table, dust-free air (flow box)			
Voltage	115/230 V, single phase, 50/60 Hz			
Physical Characteristics				
Size (L × W × H)	19.88 x 11.02 x 8.43–9.45 in (505 x 280 x 214–240 mm)			

1. Due to our continuous product improvement program, specifications are subject to change without notice.
2. Phase-match tuning is defined by an intensity reduction of 50% in the SHG.
3. Crystal cut wavelength may vary by 1%.
4. Specifications for 670–1050 nm and 550–780 nm tuning range only with Matisse Ti:Sapphire and dye lasers.
5. **The WaveTrain 3D 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.**

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