

# Pulse Stretcher/Compressor Filters



Ondax's PicoPulse™ pulse stretcher/compressor filters enable high peak power in femtosecond pulsed laser systems, with a distortion-free round output beam. Free space operation in PicoPulse™ filters allows larger input beams to be used with many orders of magnitude higher power than chirped Fiber Bragg Gratings (FBGs).

Ondax's proprietary packaging is designed to minimize the spatial chirp commonly found in chirped volume holographic gratings (CVHGs). This robust, compact format is less complex than equivalent dispersive diffraction grating pairs, which require multiple components with precise alignment adjustment. The output is stable over a wide range of temperatures, with nearly diffraction limited beam quality.

## Features:

- Use as a stretcher or compressor by flipping the input facet 180°
- Compact and easy to align
- Low scatter and loss
- Environmentally stable at high temperature and humidity
- No degradation over time even under high power illumination conditions:
  - >several kW/cm<sup>2</sup> average power
  - >170MW/cm<sup>2</sup> peak power (fluence of 3.8 J/cm<sup>2</sup>) at 1064nm
- Free space diffraction efficiency >90%
- Low spatial chirp
- No stitching errors
- Highly repeatable performance
- Near diffraction limited beam quality

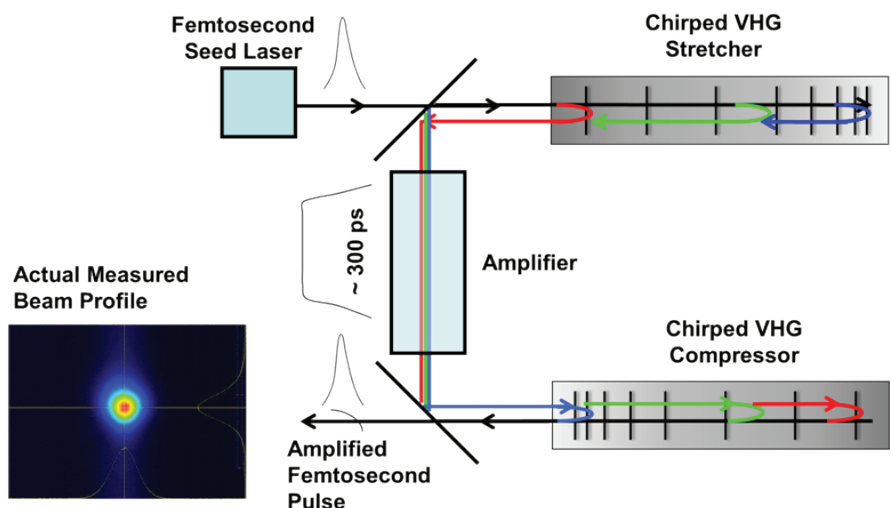
## Specifications:

Parameter	PicoPulse™ Filter Performance
Center Wavelength Range	Standard: 1029-1064, 400nm to 2000+nm available
Dispersion Rate	Standard: 50ps/nm, 10/100ps/nm available
Spectral Bandwidth	Typical: 1-10nm, others available
Stretched Pulse Length	Typical: 200-300ps
Diffraction Efficiency	>90% in free space
Fiber Coupling Efficiency	Typical: >70% into 6/125 μm single mode fiber
Measured M <sup>2</sup> Beam Quality	<1.2 after stretching/compressing femtosecond pulses
Grating Length	1mm to 30mm
Aperture Size	Standard: 2mm x 5-15mm

## Applications:

- Temporal Stretching/Compression of Ultrafast Optical Pulses

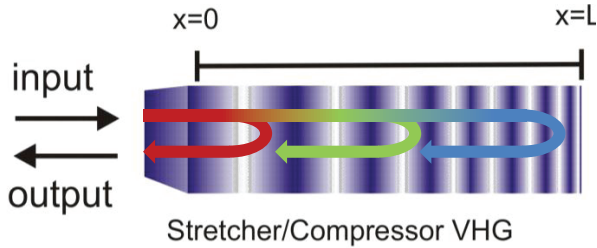
## Chirped Pulse Amplification System with 2 PicoPulse™ Filters



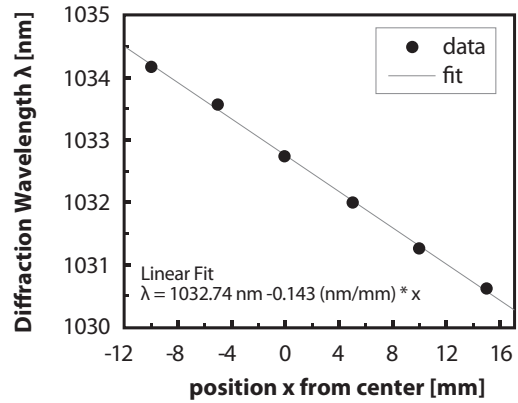
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## Principle of Operation

As with FBGs, short and long spectral components of the pulse are diffracted at different points within the CVHG due to the smooth grating chirp, creating a linearly varying group delay.

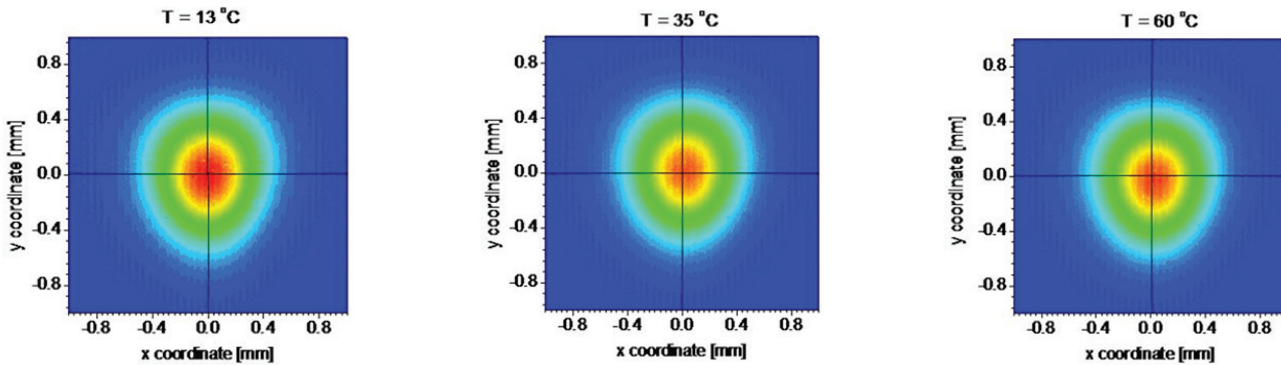


## Smoothly Varying Linear Chirp

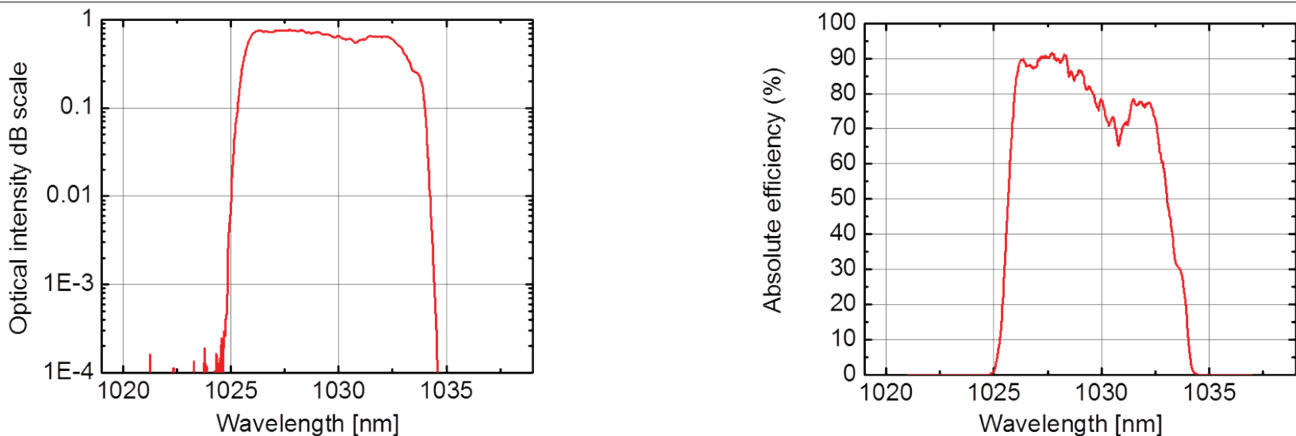


## Stable Output Profile Across a Wide Range of Temperatures

Robust packaging ensures excellent quality of the stretched, amplified and recompressed beam. Measured data after 1.5m of free space propagation at 13°C, 35°C and 60°C is shown below.



## Example of Output Coupling into a Single Mode Fiber (6/125 μm) with >70% Efficiency



Ondax PicoPulse™ pulse stretcher/compressor filters are produced in a proprietary glass designed for long lifetime, high efficiency and low loss. Ondax's fabrication process is highly stabilized to ensure excellent part-to-part repeatability.

