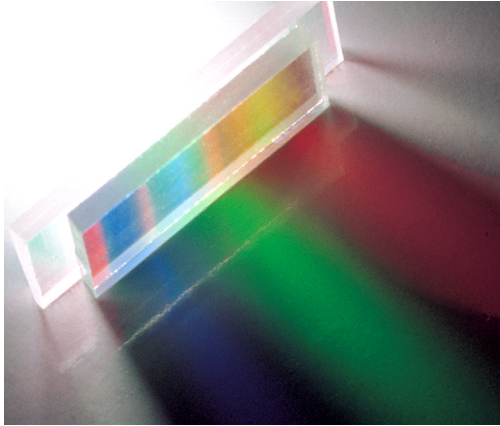
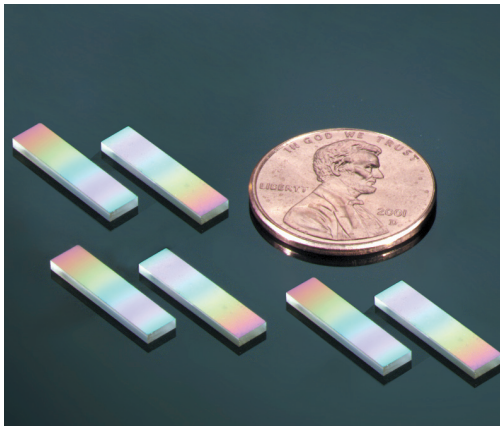


Linear Variable Filters



- Key Features**
- Continuously variable wavelength selection in one filter
 - Rugged, durable, and easily cleanable filters cannot be knocked out of alignment
 - Allows instrument design flexibility and versatility
 - Can be used as order sorter for gratings
 - Performance can be custom-designed to your particular system requirements
 - High volume manufacturing



Linear Variable Filters

A JDS Uniphase Linear Variable Filter (LVF) is a bandpass filter coating that has been intentionally wedged in one direction. Since the bandpass' center wavelength (CWL) is a function of the coating thickness, the peak wavelength transmitted through the filter will vary in a linear fashion in the direction of the wedge. The variation in CWL can be maintained to within $\pm 0.5\%$ of virtually any monotonic function (e.g. linear or logarithmic).

A specific wavelength may be selected by simply adjusting the filter to the appropriate linear position. Movement of the filter in front of a source, or raster scanning, will provide a continuous rapid scan of the total wavelength range of the filter.

The LVF coating can be manufactured in any wavelength range from ~ 300 nm in the VIS region of the spectrum up to ~ 20 μm in the IR. The specified wavelength range for a typical LVF is $\sim 2\times$ the beginning wavelength of the filter. For example, if the required starting wavelength of the LVF is 380 nm, the ending wavelength can be ~ 760 nm. The LVF design allows multiple filters to be placed together to provide wavelength coverage greater than 2:1 spread.

The resolution of LVFs has typically been specified between 1-2% of CWL. Higher (or lower) resolutions are possible. In a specific instance, we produced an LVF with 0.005% resolution, corresponding to $\sim 1\text{\AA}$ in the NIR. Our LVFs can be customized to meet specific resolution requirements for particular applications.

Applications engineering support and optical assembly capabilities are available to assist you with the design and systems integration of linear variable filters.

Applications

- Air Pollution Instruments
- Gas Analyzers
- Grating Order Sorters
- Monochromators
- Radiometers
- Rapid Scan Spectrometers
- Reflectometers
- Remote Sensing
- Spectroscopy
- Visual and Infrared Astronomy



LVFs are ideally suited for use in compact, non-dispersive instruments where high-resolution measurements of a spectrum are involved, or where information is desired at a number of specific wavelengths in that spectrum.

JDS Uniphase LVFs are deposited on a rectangular substrate. Film thickness, and therefore wavelength, vary linearly with spatial position, making the filter easy to calibrate. The linearity of the transmittance band vs. physical spacing is within two percent of a straight line.

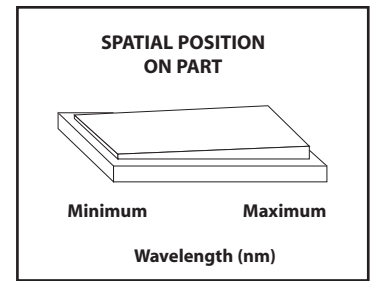
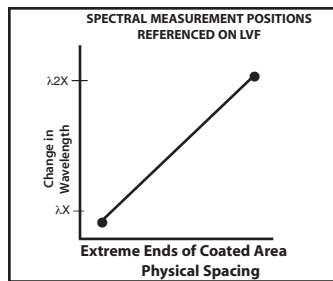
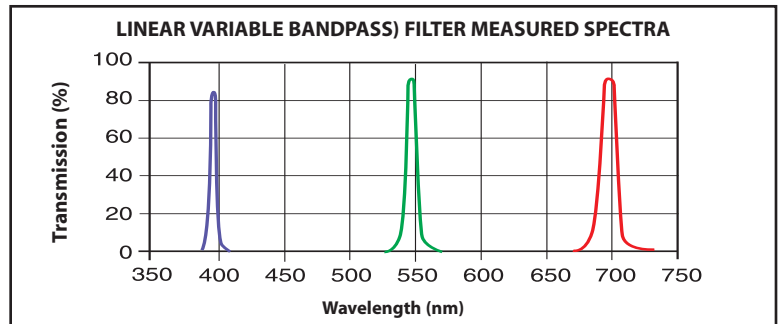
Our LVFs are physically durable and will withstand the rigors of industrial and military environments. They are resistant to abrasion and humidity, and can be cleaned by conventional optical cleaning techniques. In addition, they are capable of being operated at temperatures as low as 4 Kelvin.

Examples of LVF Wavelength Ranges

- 380nm - 720nm
- 600nm - 1100nm
- 0.9 μ m - 1.7 μ m
- 1.3 μ m - 2.6 μ m
- 5.5 μ m - 11 μ m
- 8 μ m - 14 μ m

Typical Attributes

- 2:1 CWL change across part
- 1-2% resolution
- Linear or log variation
- 1-4cm in length
- \pm 0.5% linearity



Sample LVF

Visible

- Spectral range: 400nm to 700nm
- Half bandwidth: 2.5% or less
- Transmission (in band): \geq 60%
- Attenuation: 0.1% Average transmission or less from 400nm to 700nm

Near Infrared

- Spectral range: 600nm to 1100nm
- Half bandwidth: 2% or less
- Transmission (in band): \geq 60%
- Attenuation: 0.1% Average transmission or less from 600nm to 1100nm

Infrared

- Spectral range: Customer choice 1 μ m to 20 μ m
- Half bandwidth: Customer choice 1% to 10%
- Transmission (in band): Varies with design selected. Typically greater than 70%
- Attenuation: Level and spectral range specified by user

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