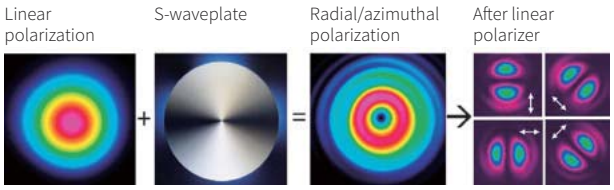
S-waveplates

Description

S-waveplate is a super-structured waveplate which converts incident linear polarization to radial or azimuthal polarization. S-waveplate can also be used to convert incident circular polarization to a beam carrying optical angular momentum. Product is unique for its high damage threshold at least 100 times exceeding alternative liquid crystal devices. S-waveplate is fabricated inside UVFS bulk.



Incident Gauss beam. S-waveplate in cross-polarized light. Radial/azimuthal polarization intensity distribution after passing S-waveplate.Radial polarization intensity distributions at different polarizer angles(white arrows show polarizer transmission axis).

Features

- Converts linear polarization to radial or azimuthal polarization
- Generates optical vortex (if incident polarization is circular)
- High damage threshold
- 50-90% transmission (dependable on wavelength, AR coatings applicable)
- Large aperture possible (up to 15 mm; standard 6 mm)
- No segment stitching

Applications

- STED microscopy
- Micromachining
- Microdrilling high-aspect-ratio channels
- Generate cylindrical vector beams
- Multiple particle trapping
- Micro-mill driven by optical tweezers
- Intracavity element to generate radial polarization
- Photonic spin Hall effect observation
- Realization of polarization evolution on higher-order Poincaré sphere
- Engineering of novel optical material
- Addition and subtraction of optical orbital angular momentum
- Hybrid classical-quantum communication

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Crystalline Quartz Waveplates

Features

- Waveplates are made from excellent quality laser grade crystalline quartz material
- We specialize in air-spaced zero-order waveplates
- Dual wavelength waveplates are also available

Standard specifications

Material	Crystalline quartz
Diameter tolerance	+0/-0.2 mm
Thickness tolerance	±0.2 mm
Surface quality	20-10 S-D
Transmitted wavefront distortion (TWD)	<λ/10 @ 632.8 nm
Retardation tolerance	λ/300 @ 20°C
Parallelism error	<3 arcsec
Coatings	AR (R<0.2%) on each surface
Laser induced damage threshold	>10 J/cm² for 10 ns pulses @ 1064 nm
Mounting	Mounted in Ø25.4x6 mm black anodized metal mount

Description

Altechna is offering a wide range of zero order (ZO) and low order (LO) waveplates for UV, VIS, NIR range (for any wavelength in 240-2600 nm range). All waveplates we provide are made from excellent quality laser grade crystalline quartz material.

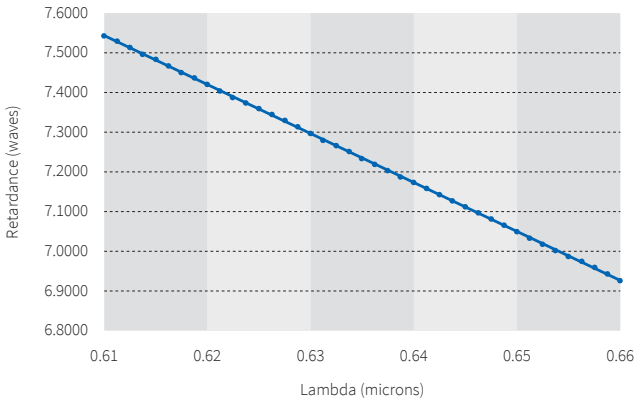
ZO waveplate is constructed by two quartz plates with their fast axes crossed. The difference in thickness between the two plates determines the retardance. ZO waveplates offer a substantially lower dependence on temperature, angle and wavelength change than conventional monolithic LO waveplates.

To suit different applications, air-spaced or optically contacted ZO compensated phase retardation waveplates are available from Altechna.

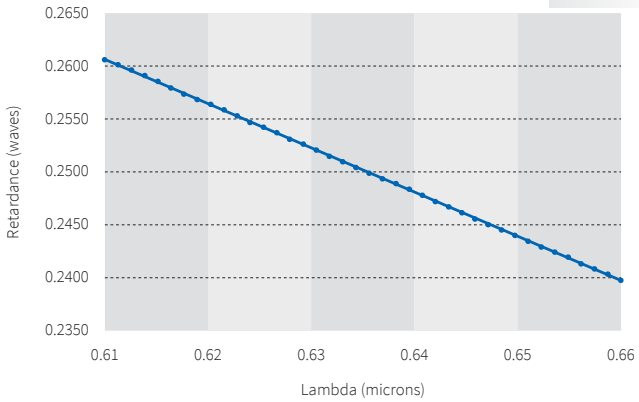
The air-spaced construction enables to use the waveplate for high power laser applications. The damage threshold is more than 10 J/cm² for 10 ns pulses @ 1064 nm.

Retardation vs. wavelength for ZO and LO crystalline quartz waveplates

7.25 wave LO waveplate @ 633 nm



0.25 wave ZO waveplate @ 633 nm



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High Energy Waveplates

Description

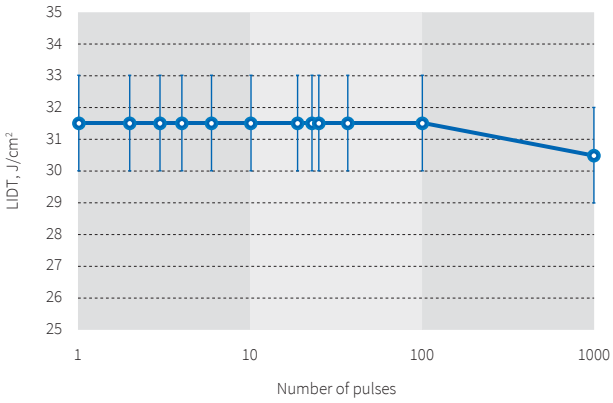
Epoxy free waveplates for high energy applications withstand energy density up to >20 J/cm^2 @ 1064 nm for 10 ns pulses with 10 Hz pulse repetition rate. Unique design minimizes adjustment sensitivity because of wide acceptance angle. Since usage temperature bandwidth is more than 200 K, waveplate can be used in hazardous conditions with no additional losses. Waveplate order depends on design wavelength and retardation.

Features

- High damage threshold
- High extinction ratio
- Wide acceptance angle
- Wide temperature bandwidth
- Wide spectral bandwidth
- Extremely useful in UV applications

Standard specifications

Material	Crystalline quartz or MgF_2
Diameter tolerance	+0/-0.2 mm
Thickness tolerance	±0.2 mm
Surface quality	20-10 S-D
Transmitted wavefront distortion (TWD)	<λ/10 @ 632.8 nm
Retardation tolerance	λ/300 @ 20°C
Acceptance angle	11°
Parallelism error	<3 arcsec
Coatings	AR (R<0.2%) on each surface
Laser induced damage threshold	>20 J/cm^2 for 10 ns pulses @ 1064 nm
Mounting	Mounted in Ø25.4x6 mm black anodized metal mount



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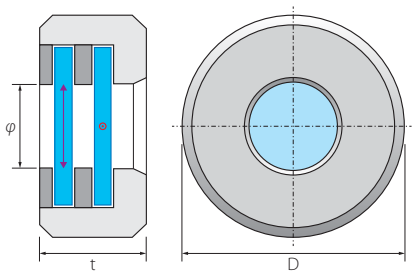
Achromatic (Broadband) Waveplates



Description

An achromatic waveplate (AWP) is a pair of crystal quartz and magnesium fluoride plates.

Because of the difference in dispersion in these uniaxial positive crystals it is possible to calculate thickness of each plate so that birefringent phase shift in assembly changes very slowly over a certain wavelength range. This is a way to obtain achromatic zero order waveplates. Such AWPs are necessary for various devices and may replace a number of ordinary quartz waveplates operating at a single wavelength only. We can offer series of Achromatic Waveplates with phase shifts shown in graphs below.

Features

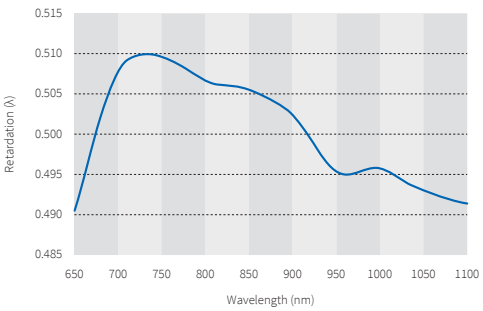
- Operates over broad wavelength range
- We specialize in air-spaced achromatic waveplates
- All waveplates are BBAR coated and mounted by default

Standard specifications

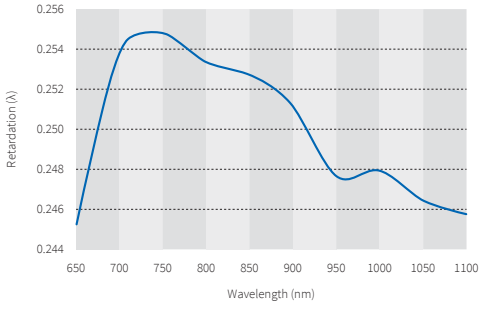
Material	Crystalline quartz and MgF_2
Diameter tolerance	+0/-0.2 mm
Thickness tolerance	±0.2 mm
Surface quality	40-20 S-D
Transmitted wavefront distortion (TWD)	<λ/4 @ 632.8 nm
Retardation tolerance	λ/100 @ 20°C
Parallelism error	<10 arcsec
Coatings	BBAR on each surface
Laser induced damage threshold	>5 J/cm² for 10 ns pulses @ 1064 nm
Mounting	Mounted in Ø25.4x6 mm black anodized metal mount

Typical Retardation Curves for 650-1100 nm Achromatic Waveplates

Retardation for 2-APW-L2-012C



Retardation for 2-APW-L4-012C



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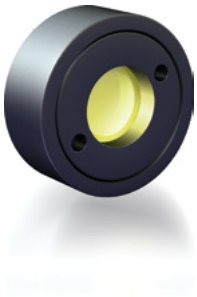
Mid-IR Waveplates



Standard specifications

Diameter tolerance	+0/-0.2 mm
Clear aperture	>10 mm
Surface quality	60-40 S-D
Transmitted wavefront distortion (TWD)	<λ/4 @ 632.8 nm
Retardation tolerance	λ/100 @ 20°C
Parallelism error	<3 arcmin
Mounting	Mounted in Ø25.4 mm aluminum mount
Coatings	AR on each surface

Description

We offer Zero Order half (λ/2) waveplates and quarter (λ/4) waveplates with clear aperture from 10 mm up to 18 mm for the range 2.8 - 9.0 µm.

Waveplates are coated with dielectric AR layers for the Mid-IR range in order to reduce losses caused by Fresnel reflection. Characteristic plates thickness is 0.2 - 1.0 mm. Generally, Mid-IR waveplates are mounted into the metal holder for easier handling and adjustment.

Features

- ZO waveplates for Mid-IR applications (2.8-9.0 µm)
- Custom size available

Miscellaneous

- Custom design waveplates are available in small and mass production quantities

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