

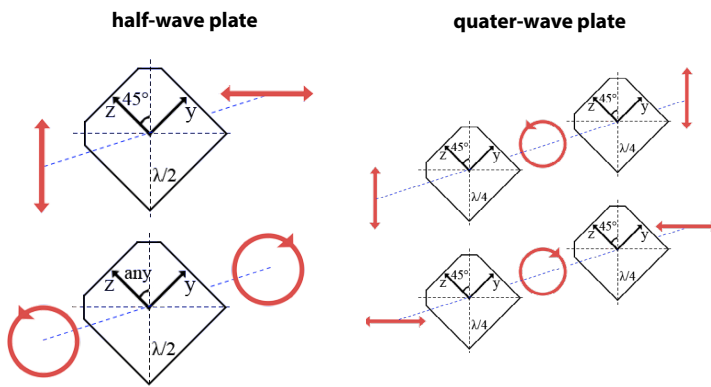
# THz Waveplates

Polarimetry technique is important diagnostic tool in analyzing the THz beams (divergence, spatial or frequency modes, and profiles). The key component in polarimetry is polarization modulator, which ideally allows for the clear identification and characterization of polarized signal.



Plano-plano plates made of birefringent material are used for modifying the polarization state of radiation. A waveplate works by shifting the phase between two perpendicular polarization components of the wave. The most common types of waveplates are half-wave plate ( $\lambda/2$  plate) and quarter-wave plate ( $\lambda/4$  plate).  $\lambda/2$  plate gives phase delay  $\pi$  and  $\lambda/4$  plate  $-\pi/2$ . Half-wave plate changes the polarization direction of linear polarized light. Quarterwave plate changes linearly polarized light to circular and vice versa. Rotation of the waveplate between an observer and a source results in the modulation of only polarized components. Waveplate won't change the polarization of linearly polarized beam if the polarization direction is along to one of waveplate axes.

Operating principle of half-wave and quarter-wave plates is shown below.



Tydex offers the THz waveplates for single operation wavelength.

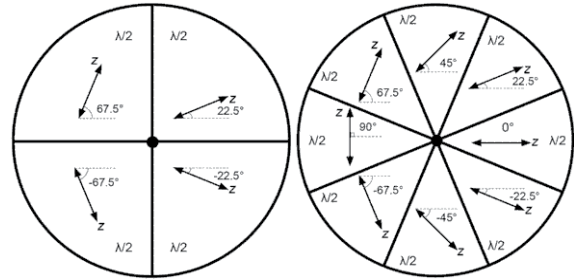
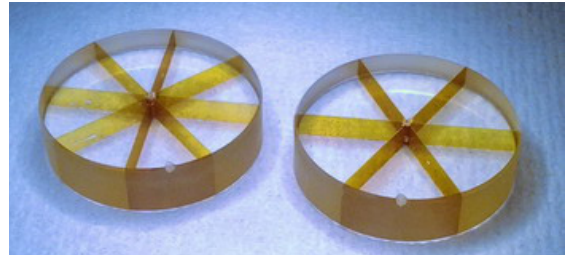
Common specification:

| Material                                  | THz grade crystal quartz |
|---|--------------------------|
| Retardation type, $\lambda$               | 1/2, 1/4                 |
| Operation wavelength range, $\mu\text{m}$ | 40-1000                  |
| Material                                  | THz grade crystal quartz |
| Orientation                               | x-cut                    |
| Orientation tolerance, arc. min           | $\pm 10$                 |
| Standard dimensions, mm                   | 20x20, 50x50             |
| Maximal dimensions, mm                    | 60x60                    |
| Dimensions tolerance, mm                  | $\pm 0.25$               |
| Thickness tolerance, $\mu\text{m}$        | $\pm 5.0$                |
| Clear aperture, %                         | $\geq 90$                |
| Parallelism, arc. min                     | 5                        |
| Surface quality, scr/dig                  | 60/40                    |
| TWD, $\lambda$ @633nm                     | 1/2                      |

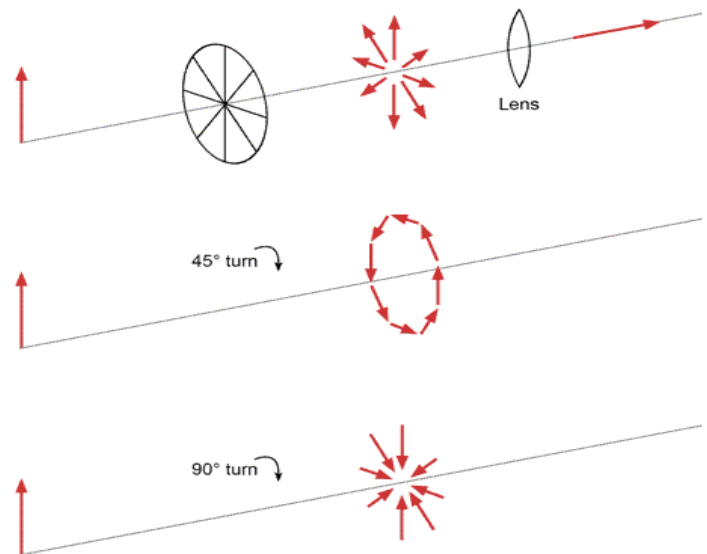
Availability in stock can be checked at the chapter Optics stock.

Manufacturing of custom-made monochromatic THz waveplates is also acceptable.

Segmented waveplate consisting of several specially oriented half-wave plates allows getting radiation with radial and azimuthal polarization from linearly polarized one.



Operating principle of segmented waveplates:



Radial polarization can be changed to azimuthal one by rotating segmented waveplate at 45 degrees. Direction of radial polarization becomes the opposite one by rotating the waveplate at 90 degrees.

Combination of segmented waveplate with positive lens gives radiation polarized along to its propagation direction. Segmented waveplates are manufactured upon request. For price quotation and delivery please fax or e-mail us.