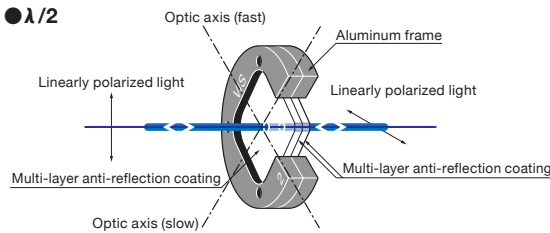
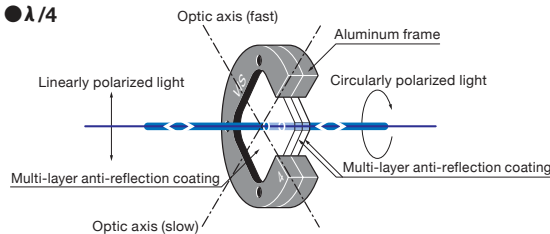


Air spaced two piece waveplates are suitable for use with high-energy lasers (no optical contact occurs). These products utilize birefringence of quartz and give phase difference of  $\lambda/4$  ( $\pi/2$ ,  $90^\circ$ ) or  $\lambda/2$  ( $\pi$ ,  $180^\circ$ ) to the input beams.  $\lambda/4$  retarders convert linearly polarization to circularly and circularly polarization to linearly.  $\lambda/2$  retarders convert the direction of polarization arbitrarily.

- Air spaced type waveplates are zero-order (first-order) retardation plates (phase plates) which are assembled from pairs of crystalline quartz plates and are mounted on aluminum frames.



## Schematic

●  $\lambda/2$ ●  $\lambda/4$ 

## Specifications

Material	Optical grade crystalline quartz, MgF <sub>2</sub>
Material of frame	Aluminum Finishing: Black anodized
Clear aperture	14×14mm
Transmitted wavefront distortion	$\lambda/4$ (per one surface)
Angular deviation of beam	<5"
Coating	Both surfaces: Narrowband multi-layer anti-reflection coating (Four surfaces)
Transmittance	> Average 98%
Surface Quality (Scratch-Dig)	20-10

## Guide

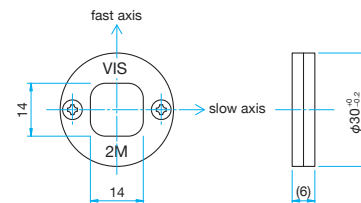
- ▶ Custom-made air spaced broadband quartz waveplates for other wavelengths are also available, contact our Sales Division with you requests.
- ▶ Standard thickness of Aluminum frame is 6mm (subject to differ without notice).
- ▶ Optical axis is parallel to the edge of 14mm squared plate.

## Attention

- ▶ These products can be used for the beams which wavelengths are in  $\pm 1\%$  of rated wavelength.
- ▶ The surface flatness is the reflected wavefront distortion of the surface before coating.
- ▶ Be sure to wear laser safety goggles when checking optical path and adjusting optical axis.

## Outline Drawing

(in mm)



## Visible

Part Number	Type	Wavelength Range $\lambda$ [nm]	Theoretical retardation [nm]				Laser Damage Threshold* [J/cm <sup>2</sup> ]
			$\lambda=400\text{nm}$	$\lambda=500\text{nm}$	$\lambda=600\text{nm}$	$\lambda=700\text{nm}$	
WPQW-VIS-2M	$\lambda/2$	400 – 700	184.6	259.0	300.3	328.9	4
WPQW-VIS-4M	$\lambda/4$	400 – 700	92.8	130.0	150.6	164.9	4

## 650 – 780nm

Part Number	Type	Wavelength Range $\lambda$ [nm]	Theoretical retardation [nm]				Laser Damage Threshold* [J/cm <sup>2</sup> ]
			$\lambda=650\text{nm}$	$\lambda=700\text{nm}$	$\lambda=750\text{nm}$	$\lambda=800\text{nm}$	
WPQW-65/78-2M	$\lambda/2$	650 – 780	325.3	352.7	376.9	398.8	7
WPQW-65/78-4M	$\lambda/4$	650 – 780	162.2	175.9	188.0	198.9	7

## 700 – 1000nm

Part Number	Type	Wavelength Range $\lambda$ [nm]	Theoretical retardation [nm]				Laser Damage Threshold* [J/cm <sup>2</sup> ]
			$\lambda=700\text{nm}$	$\lambda=800\text{nm}$	$\lambda=900\text{nm}$	$\lambda=1000\text{nm}$	
WPQW-NIR-2M	$\lambda/2$	700 – 1000	344.8	402.0	450.4	494.4	7
WPQW-NIR-4M	$\lambda/4$	700 – 1000	172.4	201.0	225.2	247.2	7

## 1000 – 1600nm

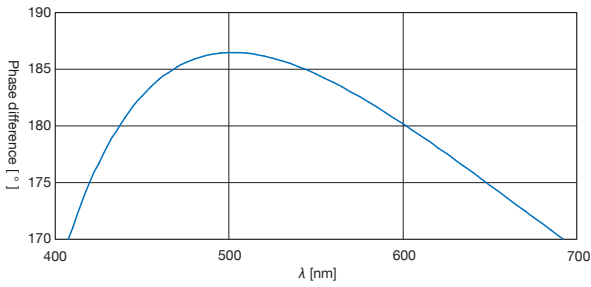
Part Number	Type	Wavelength Range $\lambda$ [nm]	Theoretical retardation [nm]				Laser Damage Threshold* [J/cm <sup>2</sup> ]
			$\lambda=1000\text{nm}$	$\lambda=1200\text{nm}$	$\lambda=1400\text{nm}$	$\lambda=1600\text{nm}$	
WPQW-IR-2M	$\lambda/2$	1000 – 1600	510.2	595.4	696.3	814.3	7
WPQW-IR-4M	$\lambda/4$	1000 – 1600	255.1	297.7	348.1	407.1	7

\* Laser pulse width 10ns, repetition frequency 20Hz

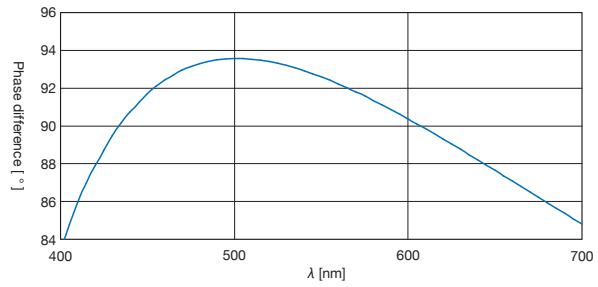


**Typical Angular Field Data**

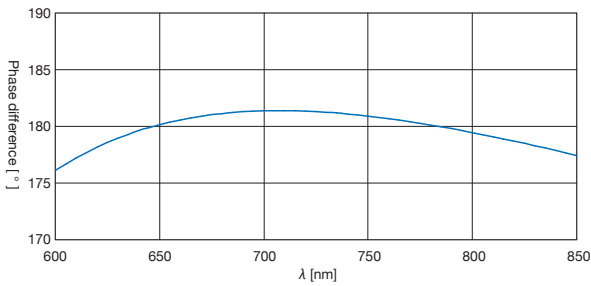
**WPQW-VIS-2M**



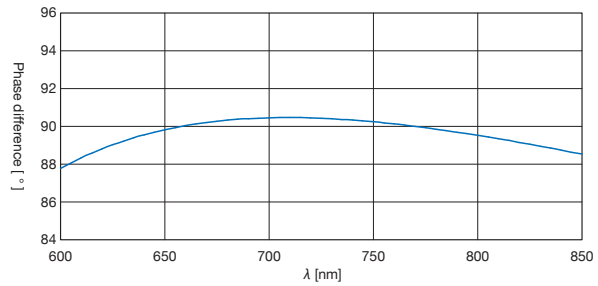
**WPQW-VIS-4M**



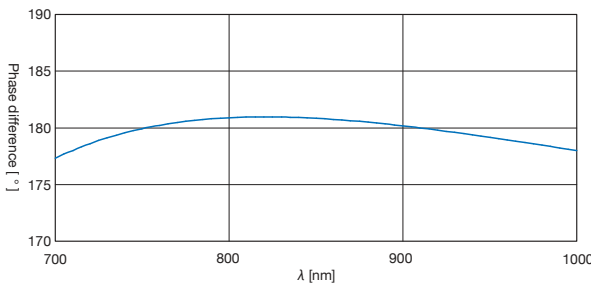
**WPQW-65/78-2M**



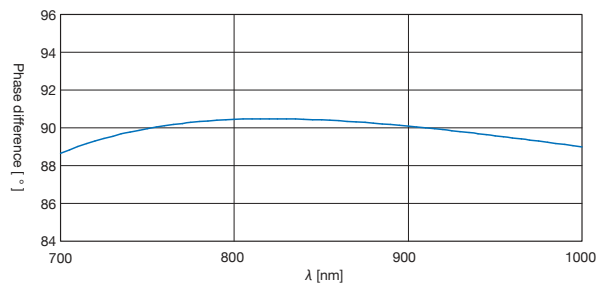
**WPQW-65/78-4M**



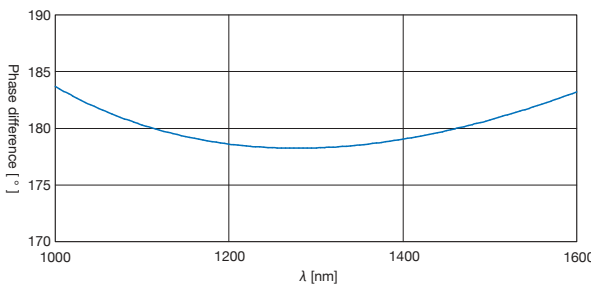
**WPQW-NIR-2M**



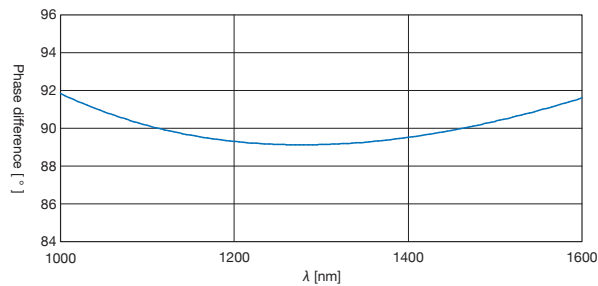
**WPQW-NIR-4M**



**WPQW-IR-2M**



**WPQW-IR-4M**



**Compatible Optic Mounts**

PH-30-ARS / SPH-30-ARS

- Application Systems
- Optics & Optical Coatings**
- Opto-Mechanics
- Bases
- Manual Stages
- Actuators & Adjusters
- MotORIZED Stages
- Light Sources & Laser Safety
- Index
- Guide
- Mirrors
- Beamsplitters
- Polarizers**
- Lenses
- Multi-Element Optics
- Filters
- Prisms
- Substrates/Windows
- Optical Data
- Maintenance
- Selection Guide
- Polarizing Beamsplitters
- Waveplates**
- Polarizers