

Catalogue



- **Ten Thousands of Stocked Bandpass Filters and Beam Splitter Cubes**
- **Free Sample Available upon Request for Stored Items**

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Company Introduction



Shanghai Mega-9 Optoelectronic Co., Ltd., founded in 2006, is a leading technology manufacturer in optical band pass filters and beam splitter cubes in China. Mega-9 has excellent fabricating facilities, including advanced coaters, ultrasonic cleaning line, high accuracy spectrophotometers, and super clean rooms. We have over 29 years coating research and developing experience, and the technical supporting or total solution providing is one of our strong points. Mega-9 is an ISO9001:2015 approved company, especially Mega-9 is honored as "State high and new enterprise" approved by state scientific and technological commission since 2012.

Mega-9 focuses on fabricating high end optical filters, including narrow band pass filters, polarizing beam splitter cubes, non-polarizing beam splitter cubes, solar simulation filters, high temperature filters and other edge filters. Mega-9's band pass filters are thin film Fabry-Perot interferometer structure formed by ion beam assist E-beam evaporation deposition technique. The blocking depth can be achieved up to OD 6 according to the application needs. The wavelength position of the band pass filters does not shift due to the proper ion assist process. For imaging system, to improve the imaging quality, most of mega-9's filters do not use absorptive glass to assist the blocking, but use all-dielectric multilayer coatings. A low auto-fluorescence substrate is adopted for fluorescence application fields. The narrowest bandwidth can be achieved is 2nm at present.

The typical feature for Mega-9's polarizing beam splitter cubes is the high contrast ratio between the P and S polarization, generally it is bigger than 1000:1 over specified broad wavelength range. And the feature for non-polarizing beam splitter cubes is the small separation of P and S polarization over the entire wavelength range. It is regularly smaller than 5% for the difference P and S polarization

transmission or reflection.

The application fields of Mega-9's filters include PCR fluorescence, enzyme label, biochemical analysis, gel-imaging, intelligent car, drone, astronomy observation, laser interferometer, and other optical instruments.

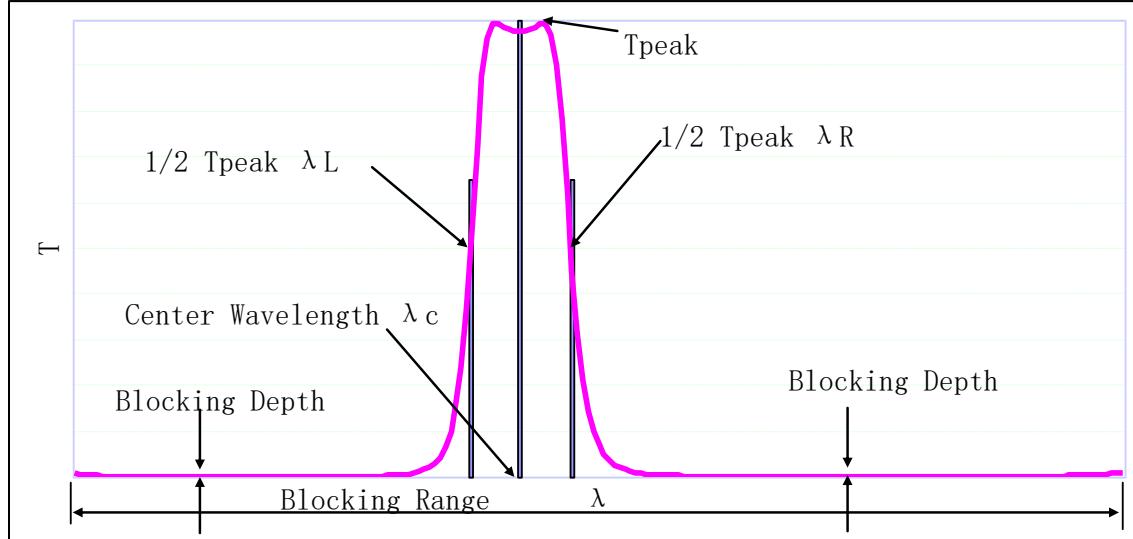
Most Mega-9's products are exported to USA, Germany, UK, Israel, South Africa, Japan and France.

Mega-9 has ten thousands of stocked filters or prism cubes for customers to select. Free sample is available upon request. Fast delivery, high quality and expertise technical service is your best choice.

Historical Events:

- 2006, Founded at Songjiang, Shanghai
- 2009, Won state innovation funds project of "Monitoring and Security Filters Built in CCD Sensors"
- 2010, The BP850/20K project of converting advanced new technological achievements into productivity was accredited
- 2011, ISO 9001:2008 approved
- 2012, Be awarded as state high and new tech enterprize
- 2013, Won state innovation funds project of "Machine vision filters"
- 2014, Setup a machine vision laboratory
- 2014, Successfully developed a specific lens with super low distortion and long depth of field, used for Four Wheel Aligner
- 2015, Won Songjiang technological progress award for project of "Monitoring and Security Filters Built in CCD Sensors"
- 2016, Won Songjiang technological progress award for project of "Machine Vision Filters"
- 2016, Successfully developed a professional machine vision filters with no ghost imaging
- 2016, Successfully developed optical modules for PCR, POCT, Biochemical Analyzer
- 2017, Mega-9 is awarded as "specialized, fined, peculiar and new" enterprize by government
- 2017, Second production base is set up in Jiangxi province
- 2018, continuouly was awarded as "State high and new tech enterprize"
- 2019, successfully developed super narrow bandpass filter with less than 2nm bandwidth
- 2020, was awarded as patent model enterprise in Songjiang
- 2021, extended the bandpass filter wavelength to far IR range

General Specifications for Mega-9's Filters



- 1) Center wavelength for bandpass filter: $\lambda_c = \frac{\lambda_L + \lambda_R}{2}$, where λ_L and λ_R , as shown on the above figure, is for the half maximum transmission points on the left and right, respectively. The tolerance for center wavelength is about 20% of bandwidth in general.
- 2) Full Width at Half Maximum(Bandwidth): $FWHM = \lambda_R - \lambda_L$
- 3) Peak transmission: T_{peak} , maximum transmission point in pass band
- 4) Blocking depth: the blocking level in the rejection bands, it is usually indicated by optical density(OD), where OD is the logarithm of transmittance. The transmission of the worst point in blocking ranges(except for pass band) is defined as the blocking level.
 $OD = -\log_{10}(T)$, for example, $T < 0.01\%$, that is $T < 0.0001$, then $OD > 4$
- 5) Blocking range: the overall wavelength range from the shortest blocking wavelength to the longest blocking wavelength except for the pass band.
- 6) Center wavelength at tilt incidence:

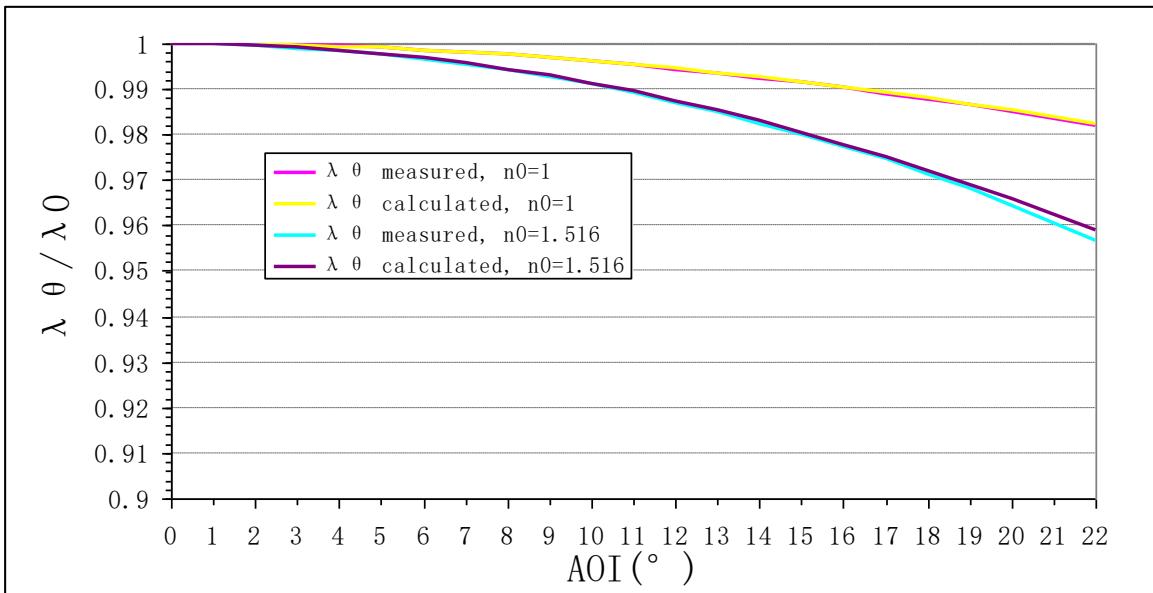
$$\lambda_\theta = \lambda_0 \sqrt{1 - \frac{n_0^2}{n_{eff}^2} \sin^2 \theta},$$

λ_θ is the central wavelength at angle of incidence θ

n_0 is the refractive index of the medium surrounding the filter, generally $n_0 = 1$, as the filter coating is faced to air.

n_{eff} is the effective refractive index for the filter, $n_{eff} \approx 2$ for most of Mega-9's bandpass filters.

The following figure gives a comparison for measured center wavelengths and calculated center wavelengths at different incidence angles. $n_{eff} = 2$ in the calculation.



Ratio of $\lambda_\theta / \lambda_0$ variation with AOI increasing

- 7) Environmental stability: Except for the wavelength below 300nm, such as 220nm, 254nm, 266nm and 280nm etc., Mega-9's bandpass filters are made with ion assist technology, the center wavelength will not change with time. For the short UV bandpass filters, they are metal-dielectric combination multilayer, Mega-9 uses its patented technology to seal, and get an excellent environmental stability as well as long lifetime. For visible and NIR wavelength range filters, they are produced with high energy ion beam assisted E-beam evaporation technology, the wavelength position will not shift with time.
- 8) Cut on wavelength for LPF: The wavelength at which a long pass filter transmits 50%, not 50% Tpeak.
- 9) Cut off wavelength for SPF: The wavelength at which a short pass filter transmits 50%, not 50% Tpeak.
- 10) Substrates for fluorescence filters: To minimize the scattering effect from coating surfaces, most of Mega-9's bandpass filters choose UV graded fused silica glass or BF33 glass from German Schott.

Product Category

1 Optical filters for machine vision

Machine vision is the ability of a machine to 'see'. A machine vision system acts like a human eyes and brain, it can look and tell what it is. An image acquisition, image analysis and an operation action all are necessary units in a machine vision system.

Machine vision is used in various industrial and medical applications. Examples include:

- Electronic component analysis
- Signature identification
- Optical character recognition

- Handwriting recognition
- Object recognition
- Pattern recognition
- Materials inspection
- Currency inspection
- Medical and Life Science
- Distance measurement
- Intelligence transportation
- Food safety monitoring

To obtain a high quality image at the first stage is very important for the recognition efficiency and accuracy improvement. The machine vision filters function as getting rid of unwanted light and keep the useful signals.

There are several specifications which may influence the imaging quality, such as center wavelength, bandwidth, peak transmission, blocking range and blocking depth, and incident angles etc. Generally, to avoid big angular incidence happen, the machine vision filter are required to install between lenses array and sensor. So a thin thickness is preferred to decrease the de-focusing effect and distortion.

In most machine vision system, there are active light illuminations including LEDs or lasers. The typical wavelengths for machine vision system may be 365nm, 405nm, 470nm, 532nm, 635nm, 650nm, 785nm, 808nm, 850nm, 940nm, 980nm, and 1064nm and so on.

The following list is our regular machine vision filters which our clients are using, the size may be different for different users, which can be customized.

| Part No. | Center Wavelength (nm) | Bandwidth (nm) | Tpeak (%) | Blocking | Blocking | Dimension (Mounted, 6mm thickness default) |
|-----------|---------------------------|----------------|-----------|------------|----------|--|
| | | | | Range (nm) | Depth | |
| BP470/25K | 470±5 | 25±5 | >80 | 200-1100 | OD3 | Φ 12.7 / Φ 25.4 |
| BP520/30K | 520±5 | 30±5 | >70 | 400-1100 | OD3 | Φ 12.7 / Φ 25.4 |
| BP650/30K | 650±5 | 30±5 | >70 | 200-1100 | OD3 | Φ 12.7 / Φ 25.4 |
| BP780/20K | 780±3 | 20±3 | >75 | 200-1200 | OD3 | Φ 12.7 / Φ 25.4 |
| BP813/30K | 813±5 | 30±5 | >80 | 400-1100 | OD3 | Φ 12.7 / Φ 25.4 |
| BP830/15K | 830±3 | 15±3 | >80 | 400-1100 | OD3 | Φ 12.7 / Φ 25.4 |
| BP850/30K | 850±5 | 30±5 | >90 | 400-1100 | OD3 | Φ 12.7 / Φ 25.4 |
| BP850/50K | 850±8 | 50±8 | >90 | 400-1100 | OD3 | Φ 12.7 / Φ 25.4 |
| BP905/20K | 905±3 | 20±3 | >80 | 400-1100 | OD4 | Φ 12.7 / Φ 25.4 |
| BP908/66K | 908±4 | 66±4 | >95 | 300-1100 | OD4 | Φ 12.7 / Φ 25.4 |
| BP940/30K | 940±5 | 30±5 | >70 | 400-1100 | OD3 | Φ 12.7 / Φ 25.4 |
| BP950/50K | 950±8 | 50±8 | >75 | 400-1100 | OD3 | Φ 12.7 / Φ 25.4 |
| BP950/80K | 950±8 | 80±8 | >75 | 400-1100 | OD3 | Φ 12.7 / Φ 25.4 |
| BP980/30K | 980±5 | 30±5 | >75 | 400-1200 | OD3 | Φ 12.7 / Φ 25.4 |
| BP980/40K | 980±5 | 40±5 | >70 | 300-1200 | OD3 | Φ 12.7 / Φ 25.4 |

2 Biochemical analyzer filter

A biochemical analyzer is a medical instrument designed to measure different chemicals and other characteristics in blood and other fluids of biological samples. The measured results may be useful in the diagnosis of disease. Biochemical analyzer includes microplate reader, glucometer and water quality analyzer etc.

The main principle of the biochemical analyzer is Beer-Lambert law. One of the key points is the intensity accuracy measured at specific wavelengths. The narrow band pass filters play an important role in obtaining a good monochromaticity. Generally the bandwidth is about 8nm, and the blocking depth is OD5 or more over 300-800nm or 300-1200nm range. The typical wavelengths in biochemical analyzer are 340, 380, 405, 450, 492, 510, 546, 578, 590, 600, 620, 630nm.

The following list is our regular filters which are used in biochemical analyzer.

| Part NO. | Center Wavelength (nm) | Bandwidth (nm) | Tpeak (%) | Blocking Range (nm) | Blocking Depth | Dimension (Mounted, 6mm thickness default) |
|-----------|------------------------|----------------|-----------|---------------------|----------------|--|
| BP340/10K | 340±2 | 10±2 | >50 | 200-1200 | OD6 | Φ 12.7 / Φ 25.4 |
| BP405/8K | 405±2 | 8±2 | >60 | 200-1100 | OD6 | Φ 12.7 / Φ 25.4 |
| BP450/10K | 450±2 | 10±2 | >65 | 200-1100 | OD6 | Φ 12.7 / Φ 25.4 |
| BP492/10K | 492±2 | 10±2 | >70 | 200-1100 | OD6 | Φ 12.7 / Φ 25.4 |
| BP510/10K | 510±2 | 10±2 | >70 | 200-1100 | OD6 | Φ 12.7 / Φ 25.4 |
| BP546/10K | 546±2 | 10±2 | >70 | 200-1100 | OD6 | Φ 12.7 / Φ 25.4 |
| BP578/10K | 578±2 | 10±2 | >70 | 200-1100 | OD6 | Φ 12.7 / Φ 25.4 |
| BP630/10K | 630±2 | 10±2 | >70 | 200-1100 | OD6 | Φ 12.7 / Φ 25.4 |
| BP670/10K | 670±2 | 10±3 | >70 | 200-1100 | OD6 | Φ 12.7 / Φ 25.4 |
| BP700/10K | 700±2 | 10±3 | >70 | 200-1100 | OD6 | Φ 12.7 / Φ 25.4 |
| BP800/10K | 800±2 | 10±3 | >70 | 200-1100 | OD6 | Φ 12.7 / Φ 25.4 |

3 Fluorescence filter

Fluorescence occurs when a fluorophore or fluorescent dye molecule absorbs a specific light wavelength and then emits a light with longer wavelengths. Fluorescence is widely used in biotechnology and analytical applications due to its extraordinary sensitivity, high specificity, and simplicity.

Most fluorescence instruments, including fluorescence microscopes, fluorescent quantitative PCR, fluorescence immunity analyzer, are based on optical filters. A typical system has three basic filters: an excitation filter, a dichroic mirror and an emission filter. The excitation filter is typically a bandpass filter that passes only the wavelengths absorbed by the fluorophore. The dichroic mirror works typically at 45° of AOI, which reflects the exciting wavelength and passes the emission wavelength. The emission filter

blocks all the wavelengths except for the emission light, especially the excitation light has to be blocked very well. To decrease the interference from the optical filters, a low autofluorescence substrate is necessary.

The advantages of the Mega-9's fluorescence filter lie in zero shift of wavelength, deep blocking(OD6), hard coatings, no absorptive glass and single sheet substrate for most fluorescence filters.

The following list is Mega-9 typical filters used in fluorescence fields.

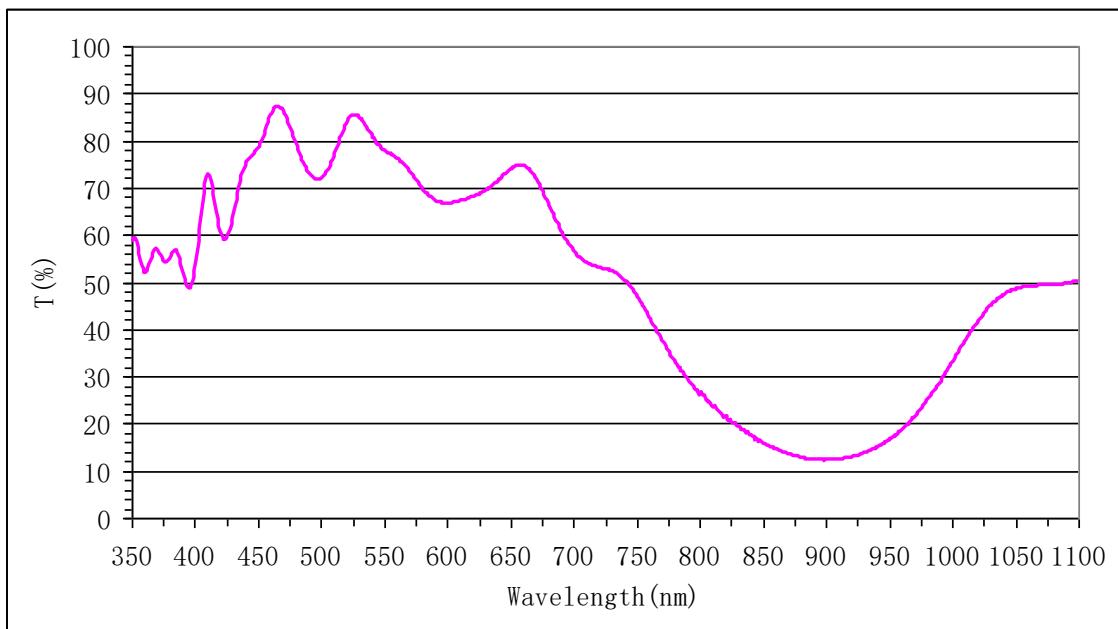
| Part No. | Center Wavelength (nm) | Bandwidth (nm) | Tpeak (%) | Blocking Range (nm) | Blocking Depth |
|-----------|------------------------|----------------|-----------|---------------------|----------------|
| BP470/30K | 470±2 | 30±2 | >70 | 200~800 | OD6 |
| BP525/20K | 525±2 | 20±2 | >70 | 200~800 | OD6 |
| BP523/25K | 523±2 | 20±2 | >70 | 200~800 | OD6 |
| BP564/25K | 564±2 | 20±2 | >70 | 200~800 | OD6 |
| BP543/20K | 543±2 | 20±2 | >70 | 200~800 | OD6 |
| BP584/20K | 584±2 | 20±2 | >70 | 200~800 | OD6 |
| BP571/20K | 571±2 | 20±2 | >70 | 200~800 | OD6 |
| BP612/20K | 612±2 | 20±2 | >70 | 200~800 | OD6 |
| BP624/40K | 624±3 | 40±4 | >70 | 200~800 | OD6 |
| BP692/40K | 692±3 | 40±4 | >70 | 200~800 | OD6 |
| BP635/30K | 635±2 | 30±2 | >70 | 200~800 | OD6 |
| BP683/15K | 683±2 | 15±2 | >70 | 200~800 | OD6 |
| B655/20K | 655±2 | 20±2 | >70 | 200~800 | OD6 |
| BP716/20K | 716±2 | 20±2 | >70 | 200~800 | OD6 |
| BP635/20K | 635±2 | 20±2 | >70 | 200~800 | OD6 |
| BP680/20K | 680±2 | 20±2 | >70 | 200~800 | OD6 |
| B365/10K | 365±2 | 10±2 | >60 | 200~800 | OD6 |
| BP615/20K | 615±3 | 20±3 | >70 | 200~800 | OD6 |

4 Solar simulator filter

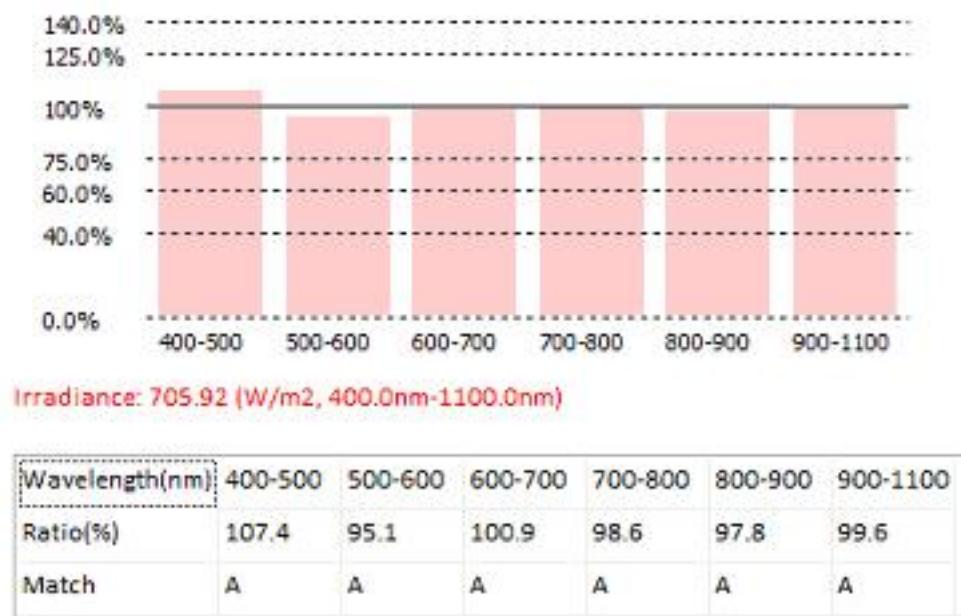
A solar simulator (also artificial sun) is a device that provides illumination approximating natural sunlight. The purpose of the solar simulator is to provide a controllable indoor test facility under laboratory conditions, used for the testing of solar cells, sun screen, plastics, and other materials and devices.

Mega-9's current design of solar simulation filter is only for AM1.5 standards for Xe lamp. Since the final result of the solar simulator depends on both the performance of filter and structure of the optical system. All the solar simulation filters need to be developed by cooperating effort of Mega-9 and clients. The following result shows one of our client who co-works with us and get a good solar simulation in their system.

A typical transmission curve is shown in the following.



A spectral matching result from our client for reference.



5 High temperature filter

In some cases, the light source is very hot, and the filter has to work in the hot surrounding. For example, microwave sulfur lamp, there is a reflector which needs to reflect visible and pass through microwave. The reflector may experience about 600 degree C temperature. A continuously working solar simulator may also need a filter which should stand more than 300 degree C temperature.

The optical filter has to be designed carefully to overcome the crack or peelfoff. Mega-9 has successfully developed the optical coatings which can stand more than 400 degree C, and up to 600 degree C temperature.

6 Astronomical filter



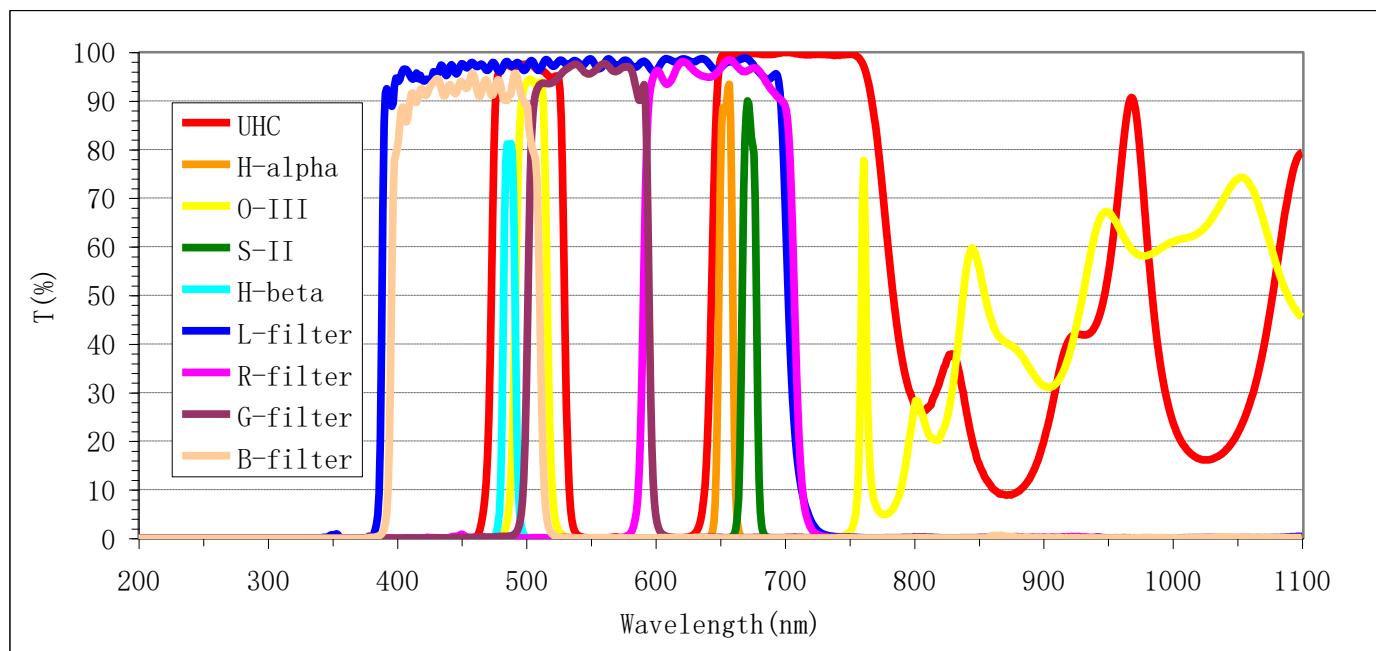
The filters used in astronomical observation are called astronomical filters. An astronomical filter is a telescope accessory used by amateur astronomers to simply enhance the details of celestial objects (much as with amateur photography). Professional astronomers rigorously use filters on telescopes in order to understand the astrophysics (such as stellar classification and placement of a celestial body on its Wien Curve), occurring for the object in a given bandpass via photometry.

Most astronomical filters work by blocking a specific part of the color spectrum above and below a bandpass, significantly increasing the signal to noise of the interesting wavelengths, and so making the object more visible. While the color filters transmit certain colors from the spectrum and are usually used for observation of the planets and the Moon, the polarizing filters work by adjusting the brightness, and are usually used for the Moon. The broadband and narrowband filters transmit the wavelengths that are emitted by the nebulae (by the Hydrogen and Oxygen atoms), and are frequently used for reducing light pollution.

Narrowband filters are astronomical filters which transmit only a narrow band of spectral lines from the spectrum (usually 22 nm or less). It is mainly used for nebulae observation. Emission nebulae mainly

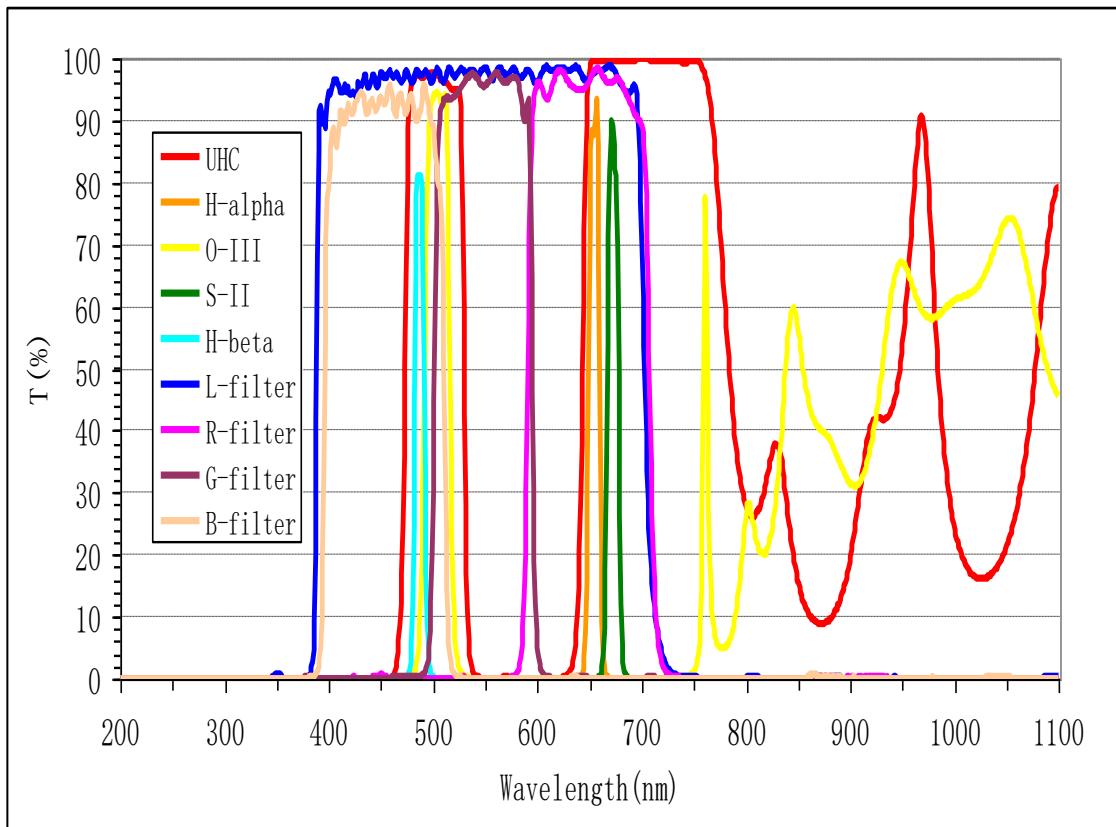
radiate the doubly ionized oxygen in the visible spectrum, which emits near 500 nm wavelength.

These nebulae also radiate weakly at 486 nm, the Hydrogen-beta line. The UHC filters range from 484 to 506 nm. It transmits both the O-III and H-beta spectral lines, blocks a large fraction of light pollution, and brings the details of planetary nebulae and most of emission nebulae under a dark sky.



The following list is the astronomical filters Mega-9 are now fabricating:

- UHC filter
- OIII filter
- H α filter
- H β filter
- LRGB filters
- Neutral density filters



Astronomical filter spectra

There are two size for option, one is 1.25" (mounted) and the other is 2" (mounted).

Partial Stocked Parts List

1 Bandpass filters

The following list is generally in stock for rapid response when our clients place small orders.

| Part NO. | Center Wavelength (nm) | Bandwidth (nm) | Tpeak (%) | Blocking Range (nm) | Blocking Depth | Dimension (Mounted, 6mm thickness default) |
|-----------|------------------------|----------------|-----------|---------------------|----------------|--|
| BP220/10K | 220±2 | 10±2 | >13 | 200-2000 | OD3 | Φ 12.7 / Φ 25.4 |
| BP254/10K | 254±2 | 10±2 | >20 | 200-2000 | OD3 | Φ 12.7 / Φ 25.4 |
| BP260/10K | 260±2 | 10±2 | >20 | 200-2000 | OD3 | Φ 12.7 / Φ 25.4 |
| BP266/10K | 266±2 | 10±2 | >20 | 200-2000 | OD3 | Φ 12.7 / Φ 25.4 |
| BP280/12K | 280±2 | 12±2 | >20 | 200-2000 | OD3 | Φ 12.7 / Φ 25.4 |
| BP302/12K | 302±2 | 12±2 | >20 | 200-2000 | OD3 | Φ 12.7 / Φ 25.4 |
| BP330/12K | 330±2 | 12±2 | >20 | 200-2000 | OD3 | Φ 12.7 / Φ 25.4 |
| BP340/10K | 340±2 | 10±2 | >50 | 200-1200 | OD5 | Φ 12.7 / Φ 25.4 |

| | | | | | | |
|-------------|---------|-------|-----|----------|-----|---------------|
| BP350/8K | 350±2 | 08±2 | >35 | 200–1200 | OD2 | Φ 12.7/Φ 25.4 |
| BP352/10K | 352±2 | 10±2 | >45 | 200–1100 | OD5 | Φ 12.7/Φ 25.4 |
| BP355/8K | 355±2 | 8±2 | >40 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP355/10K | 355±2 | 10±2 | >50 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP355/85K | 355±10 | 85±10 | >90 | 200–1000 | OD3 | Φ 12.7/Φ 25.4 |
| BP358/13K | 358±3 | 13±3 | >55 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP360/10K | 360±2 | 10±2 | >50 | 400–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP360/12K | 360±2 | 12±2 | >50 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP365/10K | 365±2 | 10±2 | >50 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP365/40K | 365±5 | 40±5 | >60 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP365/80K | 365±8 | 80±8 | >85 | 200–800 | OD3 | Φ 12.7/Φ 25.4 |
| BP370/10K | 370±2 | 10±2 | >55 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP375/10K | 375±2 | 10±2 | >55 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP379/12K | 379±2 | 12±2 | >50 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP387/10K | 387±2 | 10±2 | >60 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP395/10K | 395±2 | 10±2 | >50 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP400/10K | 400±2 | 10±2 | >55 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP400/30K | 400±5 | 30±5 | >75 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP405/10K | 405±2 | 10±2 | >55 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP405/20K | 405±3 | 20±3 | >65 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP410/8K | 410±2 | 8±2 | >50 | 400–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP410/20K | 410±3 | 20±3 | >65 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP410/25K | 410±5 | 25±5 | >90 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP410/30K | 410±5 | 30±5 | >85 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP412/10K | 412±2 | 10±2 | >56 | 200–1200 | OD5 | Φ 12.7/Φ 25.4 |
| BP415/10K | 415±2 | 10±2 | >60 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP415/20K | 415±3 | 20±3 | >60 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP415/55K | 415±8 | 55±8 | >85 | 200–800 | OD4 | Φ 12.7/Φ 25.4 |
| BP418/10K | 418±2 | 10±2 | >60 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP420/10K | 420±2 | 10±2 | >50 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP420/22K | 420±5 | 22±5 | >85 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP425/10K | 425±2 | 10±2 | >65 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP427/10K | 427±2 | 10±2 | >70 | 200–1200 | OD5 | Φ 12.7/Φ 25.4 |
| BP435/10K | 435±2 | 10±2 | >55 | 200–1100 | OD5 | Φ 12.7/Φ 25.4 |
| BP440/10K | 440±2 | 10±2 | >65 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP441.6/10K | 441.6±2 | 10±2 | >50 | 200–1200 | OD3 | Φ 12.7/Φ 25.4 |
| BP445/10K | 445±2 | 10±2 | >70 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP447/10K | 447±2 | 10±2 | >50 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP450/10K | 450±2 | 10±2 | >55 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP450/50K | 450±2 | 10±2 | >60 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP450/30K | 450±5 | 30±5 | >90 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP450/50K | 450±8 | 50±8 | >90 | 400–800 | OD3 | Φ 12.7/Φ 25.4 |

| | | | | | | |
|-------------|---------|--------|-----|----------|-----|---------------|
| BP450/100K | 450±10 | 100±10 | >75 | 200–1200 | OD3 | Φ 12.7/Φ 25.4 |
| BP455/10K | 455±2 | 10±2 | >60 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP456/10K | 456±2 | 10±2 | >75 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP460/20K | 460±3 | 20±3 | >85 | 200–1200 | OD3 | Φ 12.7/Φ 25.4 |
| BP465/13K | 465±3 | 13±3 | >60 | 400–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP466/50K | 466±8 | 50±8 | >90 | 200–800 | OD4 | Φ 12.7/Φ 25.4 |
| BP468/48K | 468±8 | 48±8 | >90 | 300–900 | OD4 | Φ 12.7/Φ 25.4 |
| BP470/10K | 470±2 | 10±2 | >70 | 200–1100 | OD5 | Φ 12.7/Φ 25.4 |
| BP470/20K | 470±3 | 20±3 | >65 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP470/25K | 470±5 | 25±5 | >80 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP470/30K | 470±5 | 30±5 | >85 | 200–700 | OD5 | Φ 12.7/Φ 25.4 |
| BP470/35K | 470±5 | 35±5 | >90 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP475/10K | 475±2 | 10±2 | >50 | 400–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP475/15K | 475±3 | 15±3 | >60 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP475/20K | 475±3 | 20±3 | >75 | 200–1200 | OD5 | Φ 12.7/Φ 25.4 |
| BP475/30K | 475±5 | 30±5 | >90 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP475/40K | 475±5 | 40±5 | >85 | 400–700 | OD4 | Φ 12.7/Φ 25.4 |
| BP480/10K | 480±2 | 10±2 | >60 | 200–1100 | OD5 | Φ 12.7/Φ 25.4 |
| BP485/18K | 485±3 | 18±3 | >90 | 400–1000 | OD3 | Φ 12.7/Φ 25.4 |
| BP486.1/10K | 486.1±2 | 10±2 | >50 | 200–1100 | OD5 | Φ 12.7/Φ 25.4 |
| BP488/10K | 488±2 | 10±2 | >70 | 200–1100 | OD5 | Φ 12.7/Φ 25.4 |
| BP490/10K | 490±2 | 10±2 | >65 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP492/10K | 492±2 | 10±2 | >65 | 200–1200 | OD3 | Φ 12.7/Φ 25.4 |
| BP495/10K | 495±2 | 10±2 | >70 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP495/20K | 495±3 | 20±3 | >70 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP496/10K | 496±2 | 10±2 | >60 | 200–1200 | OD3 | Φ 12.7/Φ 25.4 |
| BP498/10K | 498±2 | 10±2 | >60 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP500/10K | 500±2 | 10±2 | >60 | 200–1200 | OD5 | Φ 12.7/Φ 25.4 |
| BP500/30K | 500±5 | 30±5 | >90 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP505/10K | 505±2 | 10±2 | >50 | 400–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP505/16K | 505±3 | 16±3 | >64 | 200–1100 | OD5 | Φ 12.7/Φ 25.4 |
| BP506/25K | 506±5 | 35±5 | >90 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP506/35K | 506±5 | 35±5 | >90 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP508/10K | 508±2 | 10±2 | >80 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP508/15K | 508±3 | 15±3 | >60 | 200–1100 | OD5 | Φ 12.7/Φ 25.4 |
| BP510/10K | 510±2 | 10±2 | >60 | 200–1100 | OD5 | Φ 12.7/Φ 25.4 |
| BP510/15K | 510±3 | 15±3 | >60 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP515/10K | 515±2 | 10±2 | >65 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP515/50K | 515±8 | 50±8 | >85 | 200–1100 | OD5 | Φ 12.7/Φ 25.4 |
| BP517/35K | 517±5 | 35±5 | >90 | 200–800 | OD3 | Φ 12.7/Φ 25.4 |
| BP519/10K | 519±2 | 10±2 | >75 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP520/15K | 520±2 | 10±2 | >70 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |

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| BP520/15K | 520±2 | 10±2 | >70 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP520/10K | 520±2 | 10±2 | >60 | 200–1100 | OD5 | Φ 12.7/Φ 25.4 |
| BP520/20K | 520±3 | 20±3 | >70 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP520/30K | 520±5 | 30±5 | >70 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP520/100K | 520±10 | 100±10 | >90 | 200–800 | OD4 | Φ 12.7/Φ 25.4 |
| BP523/30K | 523±5 | 30±5 | >90 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP525/6K | 525±2 | 6±2 | >85 | 300–900 | OD5 | Φ 12.7/Φ 25.4 |
| BP525/10K | 525±2 | 10±2 | >60 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP525/17K | 525±3 | 17±3 | >75 | 200–1100 | OD5 | Φ 12.7/Φ 25.4 |
| BP525/20K | 525±3 | 20±3 | >85 | 200–1100 | OD5 | Φ 12.7/Φ 25.4 |
| BP525/50K | 525±8 | 50±8 | >90 | 400–800 | OD3 | Φ 12.7/Φ 25.4 |
| BP529/10K | 529±2 | 10±2 | >80 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP530/10K | 530±2 | 10±2 | >70 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP530/20K | 530±3 | 20±3 | >75 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP530/60K | 530±8 | 60±8 | >85 | 400–800 | OD3 | Φ 12.7/Φ 25.4 |
| BP532/8K | 532±2 | 08±2 | >80 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP532/10K | 532±2 | 10±2 | >75 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP532/20K | 532±3 | 20±3 | >75 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP532/30K | 532±5 | 30±5 | >70 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP532/40K | 532±5 | 40±5 | >80 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP532/50K | 532±8 | 50±8 | >90 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP535/8K | 535±2 | 8±2 | >50 | 400–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP535/15K | 535±3 | 15±3 | >60 | 400–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP535/20K | 535±3 | 20±3 | >55 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP540/10K | 540±2 | 10±2 | >60 | 200–1200 | OD5 | Φ 12.7/Φ 25.4 |
| BP542/10K | 542±2 | 10±2 | >54 | 200–1100 | OD5 | Φ 12.7/Φ 25.4 |
| BP545/10K | 545±2 | 10±2 | >75 | 200–1200 | OD5 | Φ 12.7/Φ 25.4 |
| BP546/10K | 546±2 | 10±2 | >75 | 200–1200 | OD5 | Φ 12.7/Φ 25.4 |
| BP546/15K | 546±3 | 15±3 | >60 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP547/10K | 547±2 | 10±2 | >60 | 200–1100 | OD5 | Φ 12.7/Φ 25.4 |
| BP548/35K | 548±5 | 35±5 | >90 | 200–700 | OD3 | Φ 12.7/Φ 25.4 |
| BP550/10K | 550±2 | 10±2 | >75 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP550/40K | 550±5 | 40±5 | >75 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP550/70K | 550±8 | 70±8 | >80 | 300–900 | OD3 | Φ 12.7/Φ 25.4 |
| BP552/10K | 552±2 | 10±2 | >75 | 200–1200 | OD5 | Φ 12.7/Φ 25.4 |
| BP555/15K | 555±2 | 10±2 | >65 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP555/20K | 555±3 | 20±3 | >87 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP555/45K | 555±8 | 45±8 | >80 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP558/12K | 558±2 | 12±2 | >70 | 200–1100 | OD5 | Φ 12.7/Φ 25.4 |
| BP558/80K | 558±8 | 80±8 | >90 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP560/10K | 560±2 | 10±2 | >60 | 200–1200 | OD5 | Φ 12.7/Φ 25.4 |
| BP560/20K | 560±3 | 20±3 | >80 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |

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| BP564/20K | 564±3 | 20±3 | >85 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP565/9K | 565±2 | 9±2 | >50 | 400–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP565/15K | 565±3 | 15±3 | >85 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP565/25K | 565±5 | 40±5 | >80 | 400–1100 | OD5 | Φ 12.7/Φ 25.4 |
| BP565/40K | 565±5 | 40±5 | >80 | 200–1200 | OD5 | Φ 12.7/Φ 25.4 |
| BP570/10K | 570±2 | 10±2 | >60 | 200–1200 | OD5 | Φ 12.7/Φ 25.4 |
| BP570/20K | 570±3 | 20±3 | >90 | 300–900 | OD5 | Φ 12.7/Φ 25.4 |
| BP575/10K | 575±2 | 10±2 | >55 | 400–1100 | OD5 | Φ 12.7/Φ 25.4 |
| BP575/15K | 575±3 | 15±3 | >50 | 400–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP580/10K | 580±2 | 10±2 | >70 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP585/10K | 585±2 | 10±2 | >60 | 400–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP585/130K | 585±10 | 130±10 | >85 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP590/10K | 590±2 | 10±2 | >60 | 200–1200 | OD5 | Φ 12.7/Φ 25.4 |
| BP590/15K | 590±3 | 15±3 | >80 | 400–1100 | OD5 | Φ 12.7/Φ 25.4 |
| BP590/20K | 590±3 | 20±3 | >70 | 400–800 | OD3 | Φ 12.7/Φ 25.4 |
| BP595/10K | 595±2 | 10±2 | >65 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP595/15K | 595±3 | 15±3 | >80 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP590/100K | 595±10 | 100±10 | >90 | 200–1100 | OD5 | Φ 12.7/Φ 25.4 |
| BP600/10K | 600±2 | 10±2 | >60 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP600/15K | 600±3 | 15±3 | >85 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP600/30K | 600±5 | 30±5 | >70 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP600/100K | 600±10 | 95±5 | >90 | 400–800 | OD5 | Φ 12.7/Φ 25.4 |
| BP605/20K | 605±3 | 20±3 | >90 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP610/10K | 610±2 | 10±2 | >80 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP610/20K | 610±3 | 20±3 | >80 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP615/10K | 615±2 | 10±2 | >50 | 400–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP615/20K | 615±3 | 20±3 | >90 | 200–1200 | OD5 | Φ 12.7/Φ 25.4 |
| BP615/35K | 615±5 | 35±5 | >80 | 200–800 | OD4 | Φ 12.7/Φ 25.4 |
| BP620/10K | 620±2 | 10±2 | >68 | 400–1100 | OD5 | Φ 12.7/Φ 25.4 |
| BP620/30K | 620±5 | 30±5 | >95 | 200–800 | OD5 | Φ 12.7/Φ 25.4 |
| BP622/15K | 622±3 | 15±3 | >75 | 200–1100 | OD5 | Φ 12.7/Φ 25.4 |
| BP623/15K | 623±3 | 15±3 | >70 | 200–1100 | OD5 | Φ 12.7/Φ 25.4 |
| BP625/10K | 625±2 | 10±2 | >70 | 200–800 | OD5 | Φ 12.7/Φ 25.4 |
| BP625/15K | 625±3 | 15±3 | >69 | 200–1100 | OD5 | Φ 12.7/Φ 25.4 |
| BP627/15K | 627±3 | 15±3 | >70 | 200–1100 | OD5 | Φ 12.7/Φ 25.4 |
| BP630/8K | 630±2 | 8±2 | >50 | 200–1100 | OD5 | Φ 12.7/Φ 25.4 |
| BP630/10K | 630±2 | 10±2 | >80 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP630/15K | 630±3 | 15±3 | >70 | 200–1100 | OD5 | Φ 12.7/Φ 25.4 |
| BP630/20K | 630±3 | 20±3 | >75 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP630/50K | 630±8 | 50±8 | >75 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP632/10K | 632±2 | 10±2 | >80 | 200–1200 | OD5 | Φ 12.7/Φ 25.4 |
| BP632/15K | 632±3 | 15±3 | >75 | 200–1100 | OD5 | Φ 12.7/Φ 25.4 |

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| BP632/50K | 632±8 | 50±8 | >70 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP635/10K | 635±2 | 10±2 | >65 | 200–1100 | OD5 | Φ 12.7/Φ 25.4 |
| BP635/20K | 635±3 | 20±3 | >75 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP635/44K | 635±8 | 44±8 | >98 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP635/50K | 635±8 | 50±8 | >80 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP640/20K | 640±3 | 20±3 | >80 | 400–1100 | OD5 | Φ 12.7/Φ 25.4 |
| BP643/10K | 643±2 | 10±2 | >62 | 200–1100 | OD5 | Φ 12.7/Φ 25.4 |
| BP645/10K | 645±2 | 10±2 | >65 | 200–1150 | OD4 | Φ 12.7/Φ 25.4 |
| BP645/15K | 645±3 | 15±3 | >75 | 400–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP645/35K | 645±5 | 35±5 | >85 | 400–800 | OD3 | Φ 12.7/Φ 25.4 |
| BP645/40K | 645±5 | 40±5 | >02 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP650/10K | 650±2 | 10±2 | >75 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP650/15K | 650±3 | 15±3 | >60 | 400–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP650/20K | 650±3 | 20±3 | >70 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP650/30K | 650±5 | 30±5 | >70 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP650/35K | 650±5 | 35±5 | >80 | 400–800 | OD3 | Φ 12.7/Φ 25.4 |
| BP650/40K | 650±5 | 40±5 | >75 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP650/160K | 650±10 | 160±10 | >18 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP652/12K | 652±2 | 12±2 | >66 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP653/20K | 653±3 | 20±3 | >80 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP653/40K | 653±5 | 40±5 | >75 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP655/10K | 655±2 | 10±2 | >70 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP655/20K | 655±3 | 20±3 | >70 | 400–1100 | OD5 | Φ 12.7/Φ 25.4 |
| BP655/40K | 655±5 | 40±5 | >90 | 300–950 | OD3 | Φ 12.7/Φ 25.4 |
| BP656/15K | 656±3 | 15±3 | >88 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP656/40K | 656±5 | 40±5 | >85 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP656/100K | 656±10 | 100±10 | >85 | 200–1400 | OD3 | Φ 12.7/Φ 25.4 |
| BP658/40K | 658±5 | 40±5 | >80 | 300–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP658/60K | 658±8 | 60±8 | >90 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP660/10K | 660±2 | 10±2 | >70 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP660/10K | 660±2 | 10±2 | >70 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP660/15K | 660±2 | 12±2 | >75 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP660/20K | 660±3 | 20±3 | >88 | 200–1200 | OD5 | Φ 12.7/Φ 25.4 |
| BP660/30K | 660±5 | 30±5 | >90 | 300–950 | OD3 | Φ 12.7/Φ 25.4 |
| BP660/35K | 660±5 | 35±5 | >85 | 400–800 | OD2 | Φ 12.7/Φ 25.4 |
| BP660/40K | 660±5 | 40±5 | >70 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP663/10K | 663±2 | 10±2 | >70 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP665/10K | 665±2 | 10±2 | >65 | 200–1200 | OD5 | Φ 12.7/Φ 25.4 |
| BP665/10K | 665±2 | 10±2 | >65 | 200–1200 | OD5 | Φ 12.7/Φ 25.4 |
| BP665/20K | 665±3 | 20±3 | >80 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP666/140K | 666±10 | 140±10 | >90 | 350–700 | OD1 | Φ 12.7/Φ 25.4 |
| BP668/20K | 668±3 | 20±3 | >80 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |

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| BP670/10K | 670±2 | 10±2 | >70 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP670/15K | 670±3 | 15±3 | >65 | 200–1200 | OD5 | Φ 12.7/Φ 25.4 |
| BP670/20K | 670±3 | 20±3 | >75 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP670/38K | 670±5 | 38±5 | >85 | 400–800 | OD3 | Φ 12.7/Φ 25.4 |
| BP670/40K | 670±5 | 40±5 | >70 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP675/10K | 675±2 | 10±2 | >60 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP675/15K | 675±3 | 15±3 | >60 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP675/25K | 675±5 | 25±5 | >90 | 300–950 | OD5 | Φ 12.7/Φ 25.4 |
| BP675/40K | 675±5 | 40±5 | >25 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP680/10K | 680±2 | 10±2 | >75 | 200–1200 | OD3 | Φ 12.7/Φ 25.4 |
| BP680/20K | 680±3 | 20±3 | >80 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP680/25K | 680±5 | 25±5 | >80 | 300–900 | OD5 | Φ 12.7/Φ 25.4 |
| BP680/30K | 680±5 | 30±5 | >90 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP680/34K | 680±5 | 34±5 | >85 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP680/40K | 680±5 | 40±5 | >80 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP685/30K | 685±5 | 30±5 | >80 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP685/40K | 685±5 | 40±5 | >90 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP690/20K | 690±3 | 20±3 | >70 | 200–1200 | OD5 | Φ 12.7/Φ 25.4 |
| BP690/40K | 690±5 | 40±5 | >90 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP690/45K | 690±8 | 45±8 | >80 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP695/20K | 695±3 | 20±3 | >70 | 400–1100 | OD5 | Φ 12.7/Φ 25.4 |
| BP695/40K | 695±5 | 40±5 | >80 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP697/20K | 697±3 | 20±3 | >80 | 200–1150 | OD5 | Φ 12.7/Φ 25.4 |
| BP700/10K | 700±2 | 10±2 | >60 | 400–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP700/17K | 700±3 | 17±3 | >60 | 200–1100 | OD5 | Φ 12.7/Φ 25.4 |
| BP700/20K | 700±3 | 20±3 | >60 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP700/25K | 700±5 | 25±5 | >95 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP700/40K | 700±5 | 40±5 | >90 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP707/12K | 707±2 | 12±2 | >64 | 200–1100 | OD5 | Φ 12.7/Φ 25.4 |
| BP710/10K | 710±2 | 10±2 | >75 | 200–1200 | OD5 | Φ 12.7/Φ 25.4 |
| BP710/20K | 710±3 | 20±3 | >80 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP718/10K | 718±2 | 10±2 | >70 | 200–1200 | OD5 | Φ 12.7/Φ 25.4 |
| BP720/12K | 720±3 | 12±3 | >70 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP725/13K | 725±3 | 13±3 | >50 | 400–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP730/10K | 730±2 | 10±2 | >70 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP735/20K | 735±3 | 20±3 | >80 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP740/12K | 740±2 | 12±2 | >50 | 400–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP740/28K | 740±5 | 28±5 | >90 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP740/290K | 740±10 | 290±10 | >90 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP745/10K | 745±2 | 10±2 | >70 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP745/20K | 745±3 | 20±3 | >65 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP748/12K | 748±2 | 12±2 | >63 | 200–1100 | OD5 | Φ 12.7/Φ 25.4 |

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| BP748/20K | 748±3 | 20±3 | >65 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP750/10K | 750±2 | 10±2 | >30 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP750/340K | 750±10 | 340±10 | >90 | 300–900 | OD3 | Φ 12.7/Φ 25.4 |
| BP760/12K | 760±2 | 12±2 | >60 | 400–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP760/20K | 760±3 | 20±3 | >85 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP760/50K | 760±8 | 50±8 | >90 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP760/330K | 760±10 | 330±10 | >90 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP765/50K | 765±8 | 50±8 | >90 | 400–800 | OD3 | Φ 12.7/Φ 25.4 |
| BP766/10K | 766±2 | 10±2 | >80 | 200–1150 | OD4 | Φ 12.7/Φ 25.4 |
| BP770/12K | 770±2 | 12±2 | >85 | 400–1100 | OD5 | Φ 12.7/Φ 25.4 |
| BP780/10K | 780±2 | 10±2 | >65 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP780/20K | 780±3 | 20±3 | >85 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP785/10K | 785±2 | 10±2 | >80 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP788/30K | 788±5 | 30±5 | >90 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP790/15K | 790±3 | 15±3 | >65 | 200–1100 | OD5 | Φ 12.7/Φ 25.4 |
| BP790/30K | 790±5 | 30±5 | >85 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP795/10K | 795±2 | 10±2 | >70 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP795/15K | 795±3 | 15±3 | >60 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP795/20K | 795±3 | 20±3 | >75 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP795/30K | 795±5 | 30±5 | >80 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP798/20K | 798±3 | 20±3 | >75 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP799/30K | 799±5 | 30±5 | >85 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP800/10K | 800±2 | 10±2 | >75 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP800/20K | 800±3 | 20±3 | >75 | 200–1200 | OD3 | Φ 12.7/Φ 25.4 |
| BP800/25K | 800±5 | 25±5 | >90 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP804/20K | 804±3 | 20±3 | >80 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP804/30K | 804±5 | 30±5 | >90 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP805/12K | 805±2 | 12±2 | >80 | 300–900 | OD5 | Φ 12.7/Φ 25.4 |
| BP805/20K | 805±3 | 20±3 | >80 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP805/30K | 805±5 | 30±5 | >75 | 400–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP805/40K | 805±5 | 40±5 | >70 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP808/10K | 808±2 | 10±2 | >65 | 200–1150 | OD3 | Φ 12.7/Φ 25.4 |
| BP808/10K | 808±2 | 12±2 | >80 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP808/15K | 808±3 | 15±3 | >90 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP808/20K | 808±3 | 20±3 | >70 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP808/30K | 808±5 | 30±5 | >90 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP810/11 | 810±2 | 11±2 | >68 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP810/20K | 810±3 | 20±3 | >75 | 200–1200 | OD5 | Φ 12.7/Φ 25.4 |
| BP810/30K | 810±5 | 30±5 | >85 | 200–1200 | OD3 | Φ 12.7/Φ 25.4 |
| BP813/20K | 813±3 | 20±3 | >70 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP813/30K | 813±5 | 30±5 | >80 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP815/20K | 815±3 | 20±3 | >85 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |

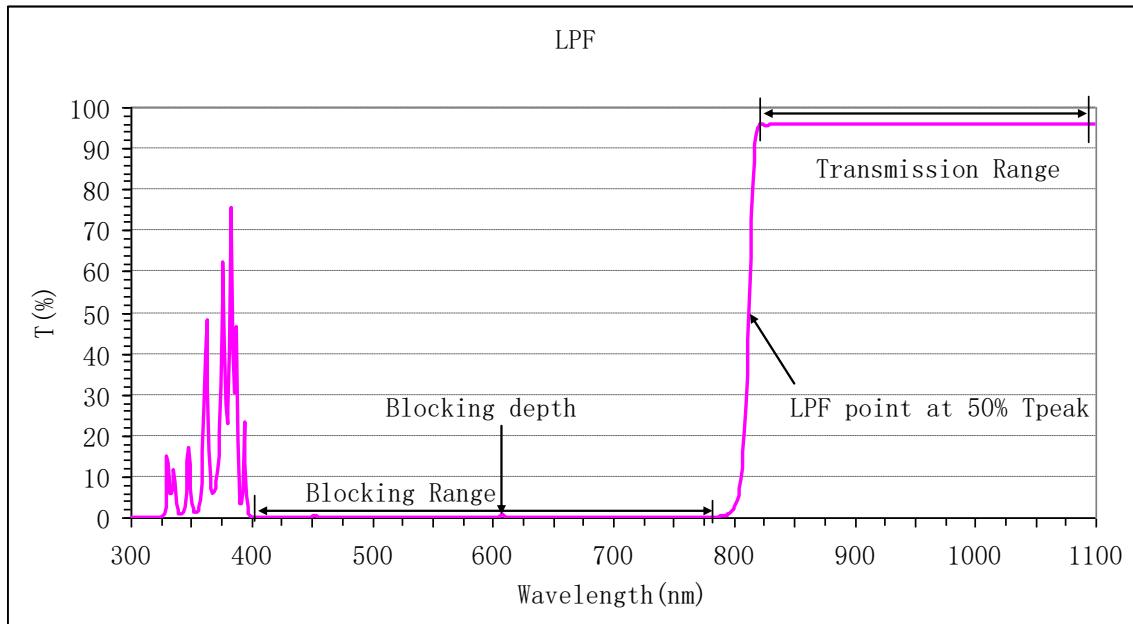
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|------------|--------|--------|-------|----------|-----|---------------|
| BP815/30K | 815±5 | 30±5 | >85 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP815/35K | 815±5 | 35±5 | >85 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP820/20K | 820±3 | 20±3 | >40 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP820/30K | 820±5 | 30±5 | >90 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP820/200K | 820±10 | 200±10 | >90 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP825/10K | 825±2 | 10±2 | >80 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP825/20K | 825±3 | 20±3 | >85 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP830/10K | 830±2 | 10±2 | >80 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP830/20K | 830±3 | 20±3 | >80 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP835/20K | 835±3 | 20±3 | >80 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP840/20K | 840±3 | 20±3 | >80 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP840/30K | 840±5 | 30±5 | 40~50 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP840/50K | 840±8 | 50±8 | >90 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP845/10K | 845±2 | 10±2 | >75 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP845/20K | 845±3 | 20±3 | >75 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP845/30K | 845±5 | 30±5 | 40~50 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP850/10K | 850±2 | 10±2 | >65 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP850/15K | 850±3 | 15±3 | >80 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP850/20K | 850±3 | 20±3 | >80 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP850/30K | 850±5 | 30±5 | >90 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP850/50K | 850±8 | 50±8 | >90 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP850/60K | 850±8 | 60±8 | >85 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP855/10K | 855±2 | 10±2 | >70 | 200–1200 | OD5 | Φ 12.7/Φ 25.4 |
| BP855/20K | 855±3 | 20±3 | 40~50 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP855/30K | 855±5 | 30±5 | >85 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP855/50K | 855±8 | 50±8 | >90 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP860/20K | 860±3 | 20±3 | >86 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP860/40K | 860±5 | 40±5 | >70 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP860/50K | 860±8 | 50±8 | >80 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP865/20K | 865±3 | 20±3 | >80 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP865/25K | 865±5 | 25±5 | >65 | 200–1100 | OD5 | Φ 12.7/Φ 25.4 |
| BP865/30K | 865±5 | 30±5 | >80 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP870/20K | 870±3 | 20±3 | >70 | 400–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP870/30K | 870±5 | 30±5 | >75 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP870/40K | 870±5 | 40±5 | >85 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP875/10K | 875±2 | 10±2 | >80 | 200–1400 | OD4 | Φ 12.7/Φ 25.4 |
| BP875/40K | 875±5 | 40±5 | >80 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP880/10K | 880±2 | 10±2 | >50 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP880/40K | 880±5 | 40±5 | >75 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP885/10K | 885±2 | 10±2 | >60 | 400–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP885/15K | 885±3 | 15±3 | >50 | 400–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP885/40K | 885±5 | 40±5 | >70 | 300–1200 | OD3 | Φ 12.7/Φ 25.4 |

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|------------|--------|--------|-----|----------|-----|---------------|
| BP890/20K | 890±3 | 20±3 | >85 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP890/40K | 890±5 | 40±5 | >90 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP895/15K | 895±3 | 15±3 | >85 | 700–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP900/10K | 900±2 | 10±2 | >75 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP900/20K | 900±3 | 20±3 | >75 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP900/30K | 900±5 | 30±5 | >90 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP905/20K | 905±3 | 20±3 | >80 | 400–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP905/30K | 905±5 | 30±5 | >80 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP910/20K | 910±3 | 20±3 | >85 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP910/30K | 910±5 | 30±5 | >80 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP915/20K | 915±3 | 20±3 | >85 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP915/30K | 915±5 | 30±5 | >85 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP920/10K | 920±2 | 10±2 | >70 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP920/30K | 920±5 | 30±5 | >85 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP920/80K | 920±8 | 80±8 | >90 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP920/195K | 920±10 | 195±10 | >80 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP925/10K | 925±2 | 10±2 | >65 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP925/30K | 925±5 | 30±5 | >75 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP930/10K | 930±2 | 10±2 | >75 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP930/20K | 930±3 | 20±3 | >80 | 200–1100 | OD5 | Φ 12.7/Φ 25.4 |
| BP930/30K | 930±5 | 30±5 | >90 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP935/30K | 935±5 | 30±5 | >80 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP940/12K | 940±2 | 12±2 | >75 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP940/30K | 940±5 | 30±5 | >70 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP940/50K | 940±8 | 50±8 | >90 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP945/10K | 945±2 | 10±2 | >50 | 400–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP945/20K | 945±3 | 20±3 | >60 | 200–1100 | OD5 | Φ 12.7/Φ 25.4 |
| BP945/30K | 945±5 | 30±5 | >80 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP950/10K | 950±2 | 10±2 | >55 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP950/20K | 950±3 | 20±3 | >60 | 400–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP950/30K | 950±5 | 30±5 | >80 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP950/40K | 950±5 | 40±5 | >85 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP950/50K | 950±8 | 50±8 | >75 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP955/30K | 955±5 | 30±5 | >70 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP955/40K | 955±5 | 40±5 | >90 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP958/15K | 958±3 | 15±3 | >60 | 200–1100 | OD5 | Φ 12.7/Φ 25.4 |
| BP960/30K | 960±5 | 30±5 | >80 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP965/16K | 965±3 | 16±3 | >75 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP965/30K | 965±5 | 30±5 | >80 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP970/10K | 970±2 | 10±2 | >60 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP970/20K | 970±3 | 20±3 | >75 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP970/30K | 970±5 | 30±5 | >70 | 400–1200 | OD3 | Φ 12.7/Φ 25.4 |

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| BP970/80K | 970±8 | 80±8 | >90 | 200–1150 | OD3 | Φ 12.7/Φ 25.4 |
| BP975/10K | 975±2 | 10±2 | >60 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP975/30K | 975±5 | 30±5 | >80 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP980/20K | 980±3 | 20±3 | >75 | 200–1150 | OD3 | Φ 12.7/Φ 25.4 |
| BP980/30K | 980±5 | 30±5 | >75 | 400–1200 | OD3 | Φ 12.7/Φ 25.4 |
| BP980/40K | 980±5 | 40±5 | >70 | 300–1200 | OD3 | Φ 12.7/Φ 25.4 |
| BP985/40K | 985±5 | 40±5 | >80 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP990/15K | 990±3 | 15±3 | >70 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP990/30K | 990±5 | 30±5 | >70 | 400–1200 | OD3 | Φ 12.7/Φ 25.4 |
| BP990/40K | 990±5 | 40±5 | >80 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP994/25K | 994±5 | 25±5 | >70 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP1000/10K | 1000±2 | 10±2 | >75 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP1000/15K | 1000±3 | 15±3 | >60 | 200–1200 | OD3 | Φ 12.7/Φ 25.4 |
| BP1005/20K | 1005±3 | 20±3 | >55 | 200–1200 | OD3 | Φ 12.7/Φ 25.4 |
| BP1010/40K | 1010±5 | 40±5 | >55 | 200–1200 | OD3 | Φ 12.7/Φ 25.4 |
| BP1015/20K | 1015±3 | 20±3 | >55 | 200–1200 | OD3 | Φ 12.7/Φ 25.4 |
| BP1015/30K | 1015±5 | 30±5 | >75 | 200–1200 | OD3 | Φ 12.7/Φ 25.4 |
| BP1015/40K | 1015±5 | 40±5 | >60 | 200–1200 | OD3 | Φ 12.7/Φ 25.4 |
| BP1022/10K | 1022±2 | 10±2 | >80 | 200–1200 | OD3 | Φ 12.7/Φ 25.4 |
| BP1025/10K | 1025±2 | 10±2 | >80 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP1030/10K | 1030±2 | 10±2 | >75 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP1040/10K | 1040±2 | 10±2 | >70 | 200–1200 | OD5 | Φ 12.7/Φ 25.4 |
| BP1045/10K | 1045±2 | 10±2 | >75 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP1050/10K | 1050±2 | 10±2 | >60 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP1053/10K | 1053±2 | 10±2 | >80 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP1054/17K | 1054±3 | 17±3 | >65 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP1058/20K | 1058±3 | 20±3 | >50 | 400–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP1060/15K | 1060±3 | 15±3 | >70 | 300–900 | OD3 | Φ 12.7/Φ 25.4 |
| BP1064/10K | 1064±2 | 10±2 | >80 | 200–1200 | OD4 | Φ 12.7/Φ 25.4 |
| BP1064/17K | 1064±3 | 17±3 | >65 | 200–1200 | OD3 | Φ 12.7/Φ 25.4 |
| BP1064/20K | 1064±3 | 20±3 | >70 | 200–1200 | OD3 | Φ 12.7/Φ 25.4 |
| BP1070/10K | 1070±2 | 10±2 | >75 | 400–1200 | OD3 | Φ 12.7/Φ 25.4 |
| BP1070/20K | 1070±3 | 20±3 | >40 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP1075/10K | 1075±2 | 10±2 | >60 | 200–1100 | OD4 | Φ 12.7/Φ 25.4 |
| BP1080/20K | 1080±3 | 20±3 | >45 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP1085/20K | 1085±3 | 20±3 | >42 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP1090/15K | 1090±3 | 15±3 | >45 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP1090/20K | 1090±3 | 20±3 | >45 | 200–1100 | OD3 | Φ 12.7/Φ 25.4 |
| BP1275/70K | 1275±8 | 70±8 | >90 | 200–1800 | OD2 | Φ 12.7/Φ 25.4 |
| BP1475/70K | 1475±8 | 70±8 | >90 | 200–1800 | OD2 | Φ 12.7/Φ 25.4 |
| BP1520/75K | 1520±8 | 75±8 | >70 | 200–1800 | OD3 | Φ 12.7/Φ 25.4 |
| BP1535/70K | 1535±8 | 70±8 | >90 | 200–1800 | OD2 | Φ 12.7/Φ 25.4 |

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|------------|--------|------|-----|----------|-----|-----------------|
| BP1540/60K | 1540±8 | 60±8 | >90 | 200–1800 | OD3 | Φ 12.7 / Φ 25.4 |
| BP1540/75K | 1540±8 | 75±8 | >70 | 200–1800 | OD3 | Φ 12.7 / Φ 25.4 |
| BP1545/80K | 1545±8 | 80±8 | >90 | 200–1800 | OD2 | Φ 12.7 / Φ 25.4 |
| BP1550/60K | 1550±8 | 60±8 | >90 | 200–1800 | OD3 | Φ 12.7 / Φ 25.4 |

2 Long pass filters (LPF)

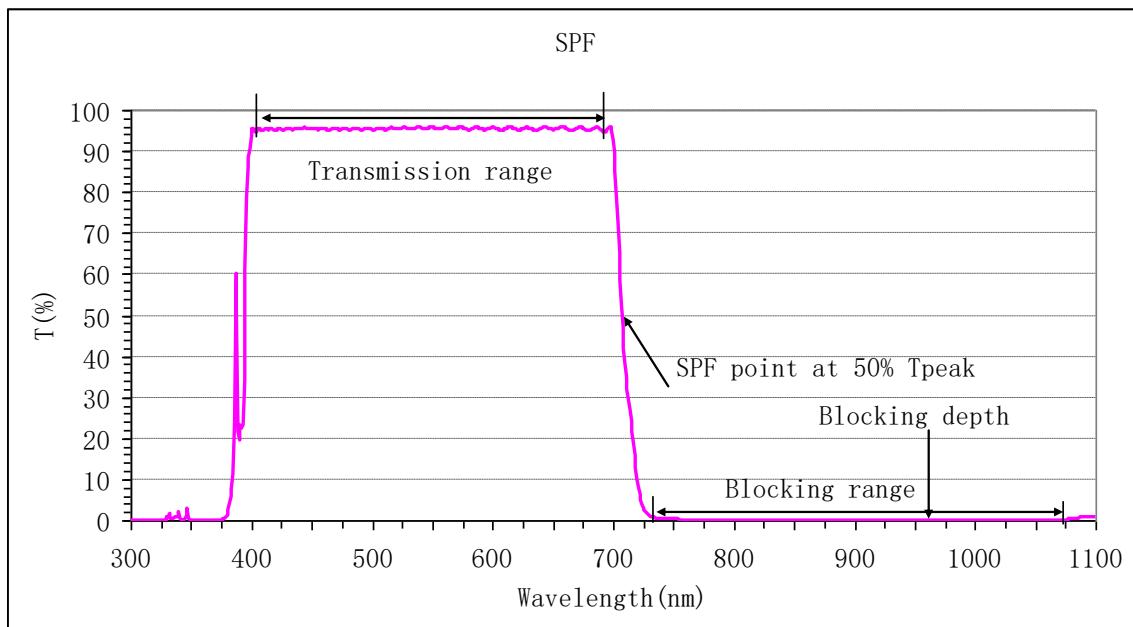


Long pass filter specification indication

| Part No. | Blocking Range (nm) | Blocking Depth | Transmission Range (nm) | Transmittance in Pass band |
|----------|---------------------|----------------|-------------------------|----------------------------|
| LPF400 | 200–375 | >OD2 | 420–1200 | >85% average |
| LPF425 | 200–405 | >OD2 | 445–1200 | >85% average |
| LPF450 | 200–430 | >OD2 | 470–1200 | >85% average |
| LPF475 | 200–455 | >OD2 | 495–1200 | >85% average |
| LPF500 | 200–480 | >OD2 | 520–1200 | >85% average |
| LPF525 | 200–505 | >OD2 | 545–1200 | >85% average |
| LPF550 | 200–530 | >OD2 | 575–1200 | >85% average |
| LPF575 | 200–550 | >OD2 | 600–1200 | >85% average |
| LPF600 | 200–570 | >OD2 | 625–1200 | >85% average |
| LPF625 | 200–595 | >OD2 | 650–1200 | >85% average |
| LPF650 | 200–620 | >OD2 | 675–1200 | >85% average |
| LPF675 | 200–645 | >OD2 | 700–1200 | >85% average |
| LPF700 | 200–670 | >OD2 | 725–1200 | >85% average |
| LPF725 | 200–695 | >OD2 | 750–1200 | >85% average |
| LPF750 | 200–720 | >OD2 | 775–1200 | >85% average |
| LPF775 | 200–745 | >OD2 | 800–1200 | >85% average |

| | | | | |
|---------|----------|------|-----------|--------------|
| LPF800 | 400–770 | >OD2 | 825–1200 | >85% average |
| LPF825 | 400–795 | >OD2 | 850–1200 | >85% average |
| LPF850 | 400–820 | >OD2 | 875–1200 | >85% average |
| LPF875 | 400–845 | >OD2 | 900–1200 | >85% average |
| LPF900 | 400–870 | >OD2 | 930–1200 | >85% average |
| LPF925 | 400–895 | >OD2 | 955–1200 | >85% average |
| LPF950 | 400–910 | >OD2 | 980–1200 | >85% average |
| LPF975 | 400–935 | >OD2 | 1010–1800 | >85% average |
| LPF1000 | 400–960 | >OD2 | 1040–1800 | >85% average |
| LPF1025 | 400–985 | >OD2 | 1070–1800 | >85% average |
| LPF1050 | 400–1010 | >OD2 | 1100–1800 | >85% average |
| LPF1075 | 400–1035 | >OD2 | 1130–1800 | >85% average |
| LPF1100 | 400–1060 | >OD2 | 1160–1800 | >85% average |

3 Short pass filters (SPF)



Short pass filter specification indication

| Part No. | Transmission Range (nm) | Transmittance in Pass band | Blocking Range (nm) | Blocking Depth |
|----------|-------------------------|----------------------------|---------------------|----------------|
| SPF380 | 320–370 | >60% average | 420–1100 | >OD2 average |
| SPF550 | 420–520 | >85% average | 550–1100 | >OD2 average |
| SPF600 | 420–570 | >85% average | 630–1100 | >OD2 average |
| SPF650 | 420–630 | >85% average | 680–1100 | >OD2 average |
| SPF700 | 420–680 | >85% average | 730–1100 | >OD2 average |
| SPF750 | 420–720 | >85% average | 780–1100 | >OD2 average |
| SPF800 | 420–770 | >85% average | 830–1100 | >OD2 average |

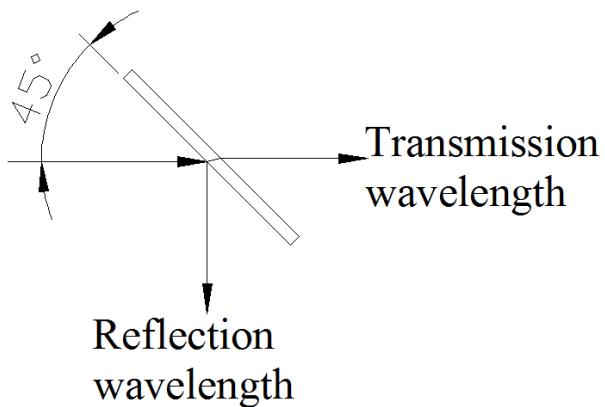
| | | | | |
|---------|---------|--------------|-----------|--------------|
| SPF850 | 420–820 | >85% average | 880–1100 | >OD2 average |
| SPF900 | 420–870 | >85% average | 930–1100 | >OD2 average |
| SPF950 | 420–920 | >85% average | 980–1100 | >OD2 average |
| SPF1000 | 420–970 | >85% average | 1040–1200 | >OD2 average |

4 Dichroic mirrors



A dichroic mirror is a very accurate filter used to selectively pass light of specific wavelengths while reflecting other specific wavelengths.

In fluorescence microscopy or fluorescence immuno analyzer or Raman fluorescence detector, dichroic filters are used as beam splitters to direct illumination of an excitation frequency toward the sample and then at an analyzer to reject that same excitation frequency but pass a particular emission frequency. General incident angle is 45 degree.



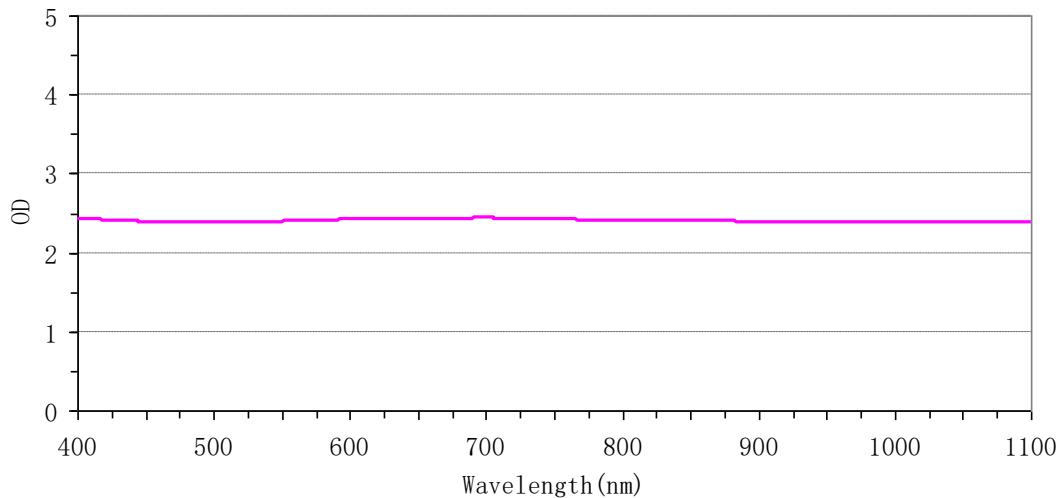
Mega-9 makes various dichroic mirrors for fluorescence instruments, including fluoroimmunoassay and Raman spectroscopy. There are many stocked dichroic mirror for PCR and POCT systems.

5 Neutral density filters



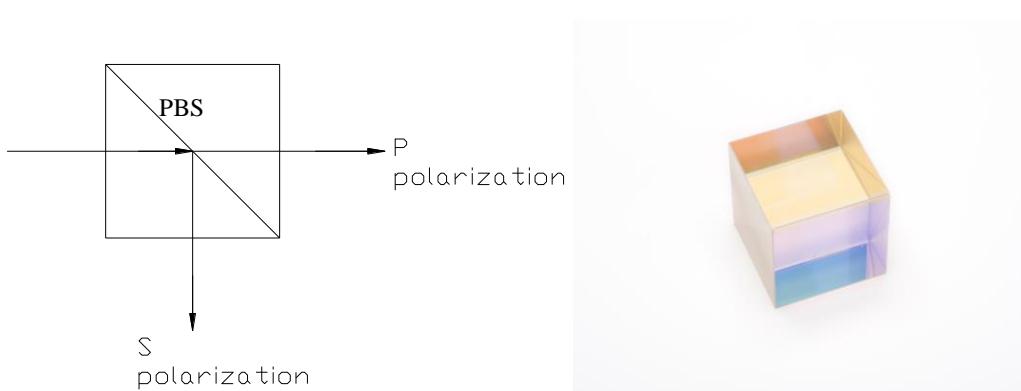
Mega-9 makes fixed OD value neutral density filters by depositing Inconel film on a clear substrate. The advantage of the coated density filter is in the broader band and lower ripple than that of absorptive density filter. The covered wavelength can be extended to 200nm to 1100nm or more. The disadvantage is that there is some reflective light on the filter. The OD value can vary from 0.1 to 5. The OD value is controlled by coating inconel thin film thickness. Regular thickness of the NDFs is 1.1mm or 0.55mm.

Neutral Density Filter



| Part NO. | Wavelength Range(nm) | Optical Density(OD) at 550nm |
|----------|----------------------|------------------------------|
| ND01 | 400—1100 | 0.1 |
| ND02 | 400—1100 | 0.2 |
| ND03 | 400—1100 | 0.3 |
| ND04 | 400—1100 | 0.4 |
| ND05 | 400—1100 | 0.5 |
| ND06 | 400—1100 | 0.6 |
| ND07 | 400—1100 | 0.7 |
| ND08 | 400—1100 | 0.8 |
| ND09 | 400—1100 | 0.9 |
| ND10 | 400—1100 | 1 |
| ND20 | 400—1100 | 2 |
| ND30 | 400—1100 | 3 |
| ND40 | 400—1100 | 4 |
| ND50 | 400—1100 | 5 |

6 Broadband polarizing beam splitter cubes



Substrate Material: H-ZF3

Regular Dimension: 5x5x5, 10x10x10, 12.7x12.7x12.7, 20x20x20, 25.4x25.4x25.4mm

Dimension Tolerance: $\pm 0.2\text{mm}$

Regular Wavelength Bands: 420nm-680nm, 620nm-1000nm, 900nm-1300nm, 1200nm-1600nm

Optical Performance:

Input/Output Surfaces: 0° AOI, $R < 0.5\%$

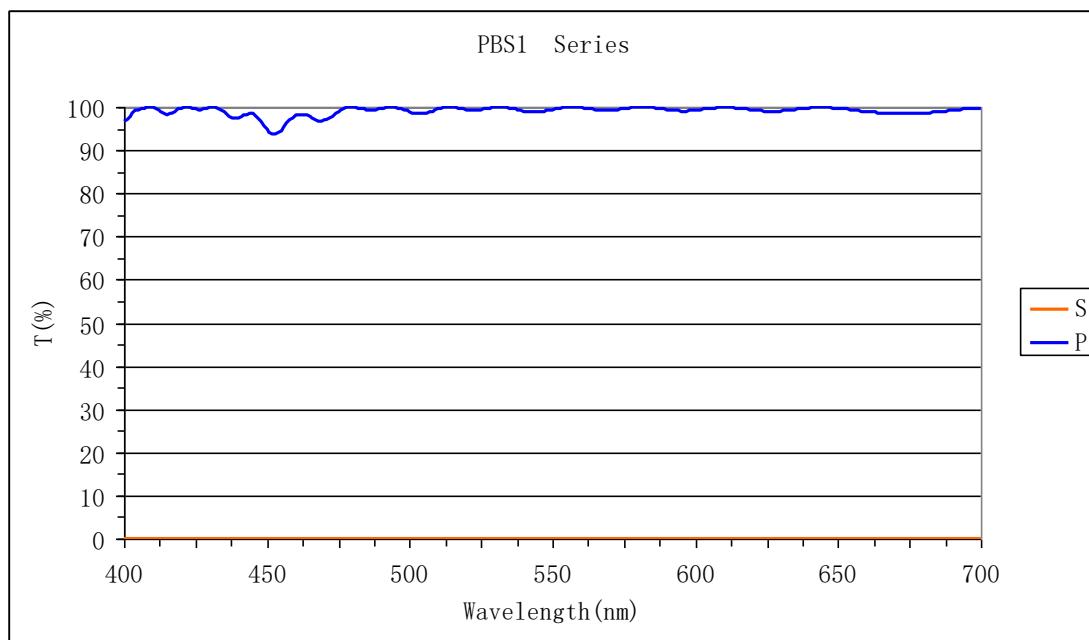
Hypotenuse: 45° AOI, $T_p > 90\%$, $T_s < 0.1\%$, $T_p/T_s > 1000$

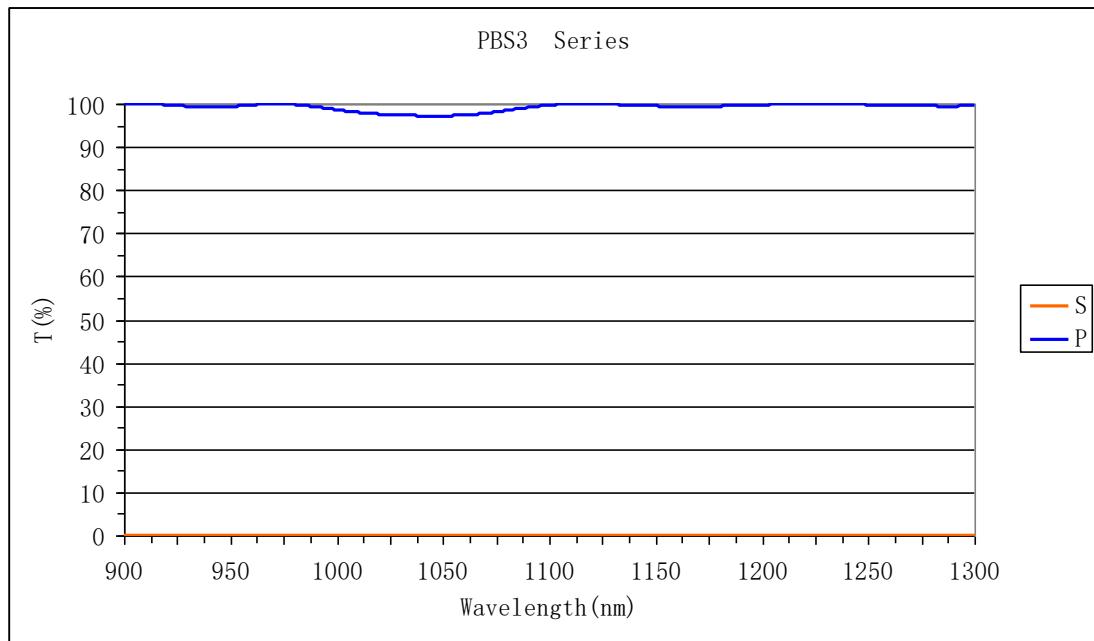
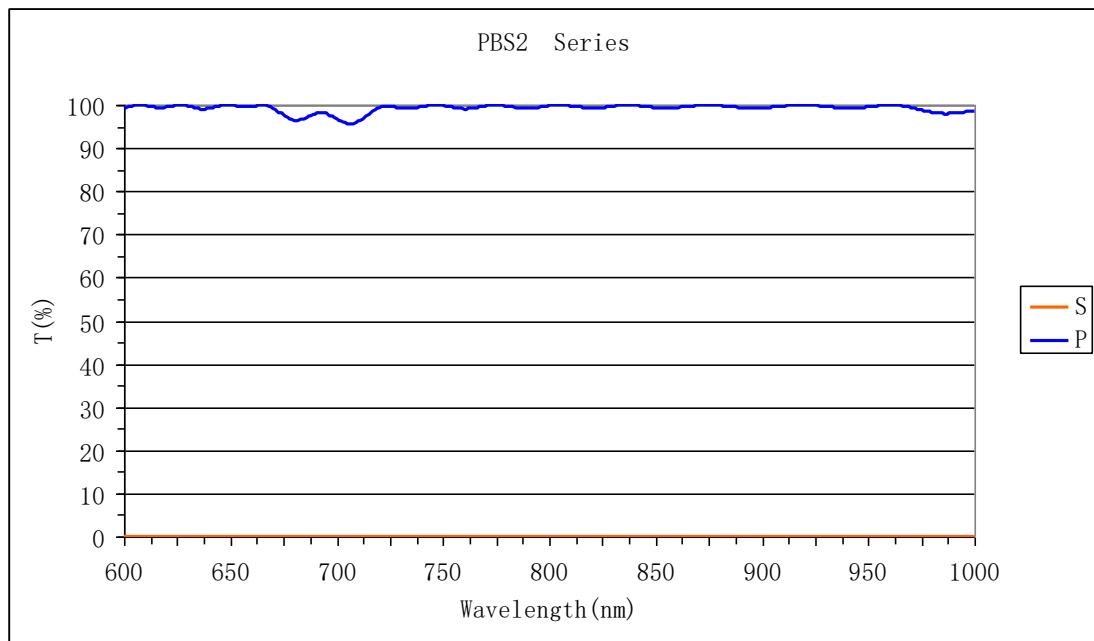
Surface Quality: 60/40

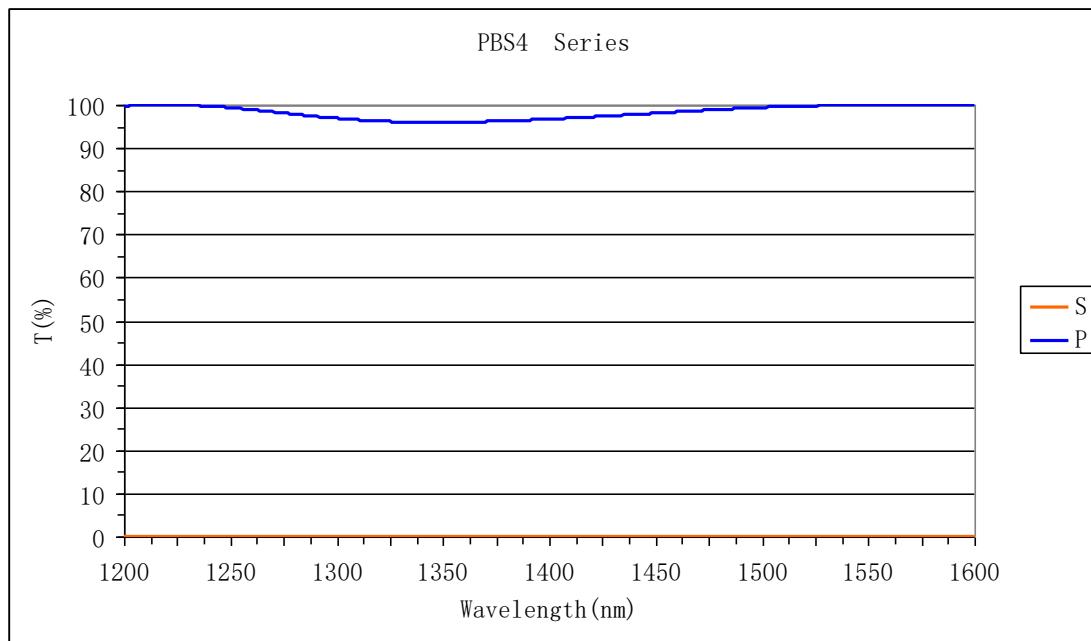
Flatness: $\lambda/10$

Beam Deviation: $< 5'$

Clear Aperture: $> 85\%$ for $> 5 \times 5 \times 5$, $> 80\%$ for $5 \times 5 \times 5$

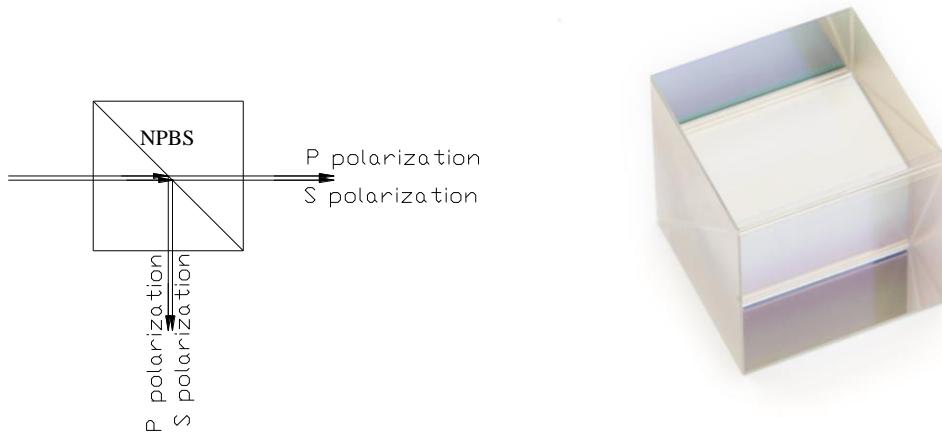






| Part NO. | Dimension(mm) | Wavelength Range(nm) | P pol. Transmission | Extinction of Tp/Ts |
|----------|----------------|----------------------|---------------------|---------------------|
| PBS1-05 | 5X5X5 | 420-680 | >90% | >1000 |
| PBS1-10 | 10X10X10 | 420-680 | >90% | >1000 |
| PBS1-12 | 12.7X12.7X12.7 | 420-680 | >90% | >1000 |
| PBS1-20 | 20X20X20 | 420-680 | >90% | >1000 |
| PBS1-25 | 25.4X25.4X25.4 | 420-680 | >90% | >1000 |
| PBS2-05 | 5X5X5 | 620-1000 | >90% | >1000 |
| PBS2-10 | 10X10X10 | 620-1000 | >90% | >1000 |
| PBS2-12 | 12.7X12.7X12.7 | 620-1000 | >90% | >1000 |
| PBS2-20 | 20X20X20 | 620-1000 | >90% | >1000 |
| PBS2-25 | 25.4X25.4X25.4 | 620-1000 | >90% | >1000 |
| PBS3-05 | 5X5X5 | 900-1300 | >90% | >1000 |
| PBS3-10 | 10X10X10 | 900-1300 | >90% | >1000 |
| PBS3-12 | 12.7X12.7X12.7 | 900-1300 | >90% | >1000 |
| PBS3-20 | 20X20X20 | 900-1300 | >90% | >1000 |
| PBS3-25 | 25.4X25.4X25.4 | 900-1300 | >90% | >1000 |
| PBS4-05 | 5X5X5 | 1200-1600 | >90% | >1000 |
| PBS4-10 | 10X10X10 | 1200-1600 | >90% | >1000 |
| PBS4-12 | 12.7X12.7X12.7 | 1200-1600 | >90% | >1000 |
| PBS4-20 | 20X20X20 | 1200-1600 | >90% | >1000 |
| PBS4-25 | 25.4X25.4X25.4 | 1200-1600 | >90% | >1000 |

7 Broadband non-polarizing beam splitter cubes



Substrate Material: H-K9L

Regular Dimension: 5x5x5, 10x10x10, 12.7x12.7x12.7, 20x20x20, 25.4x25.4x25.4mm

Dimension Tolerance: $\pm 0.2\text{mm}$

Regular Wavelength Bands: 400nm-700nm, 700nm-1100nm, 1100nm-1600nm

Optical Performance:

Input/Output Surfaces: 0° AOI, $R < 0.5\%$

Hypotenuse: 45° AOI, non-polarization beam splitter

Ratio of T/R available: 8/2, 7/3, 6/4, 5/5, 4/6, 3/7, 2/8, 1/9

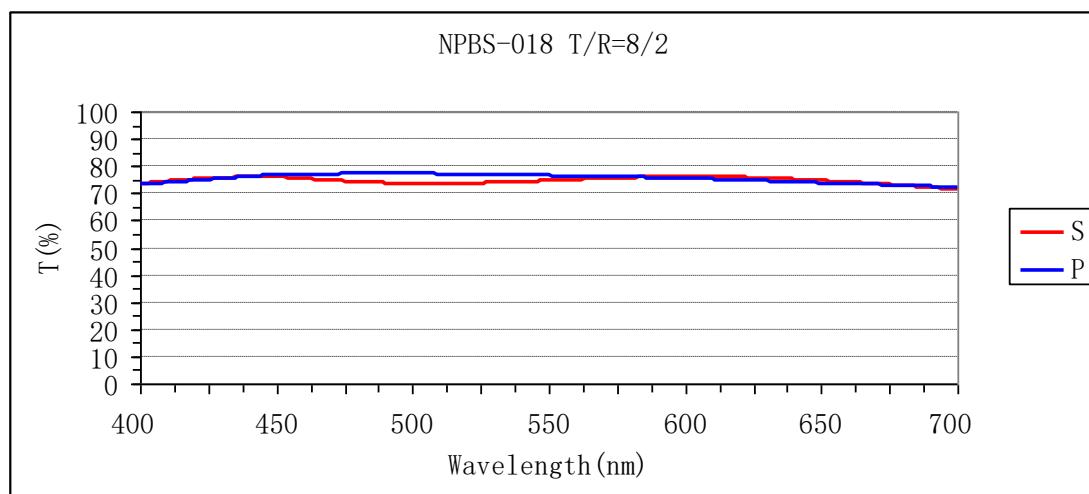
Tolerance of Transmission: $\pm 5\%$ or specified, $|T_p - T_s| < 8\%$

Surface Quality: 40/20

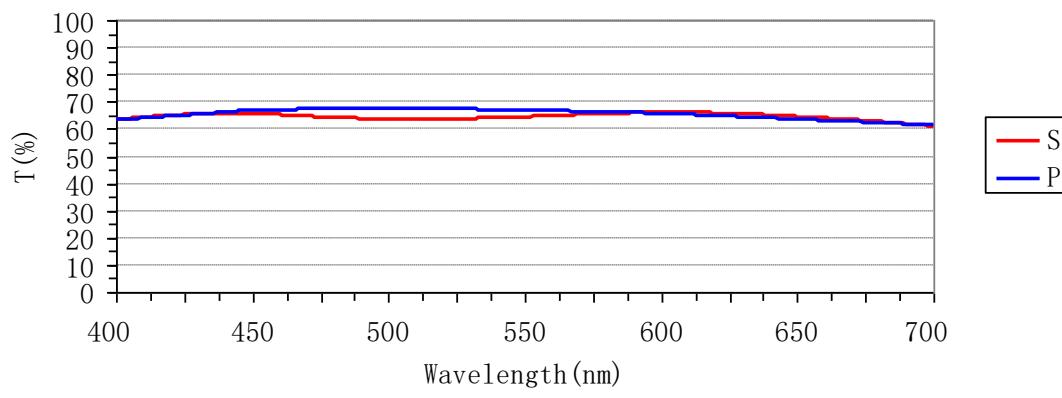
Flatness: $\lambda / 10$

Beam Deviation for Transmission: $< 5'$

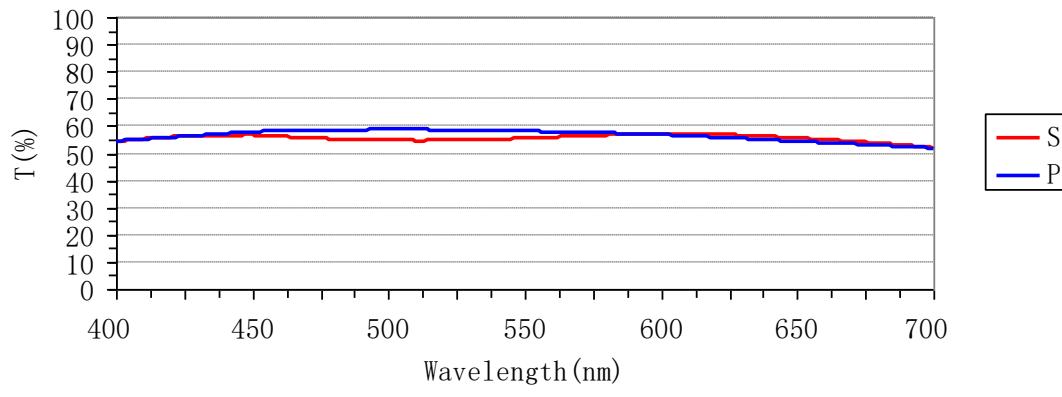
In particular, for the NPBS worked in the wavelength of 400-700nm, the absorption value is not the same at 400-500nm and 500-700nm. It is much bigger at 400-500nm, which is from 20% to 25%. However, it is about 10~15% in the wavelength range of 500-700nm.



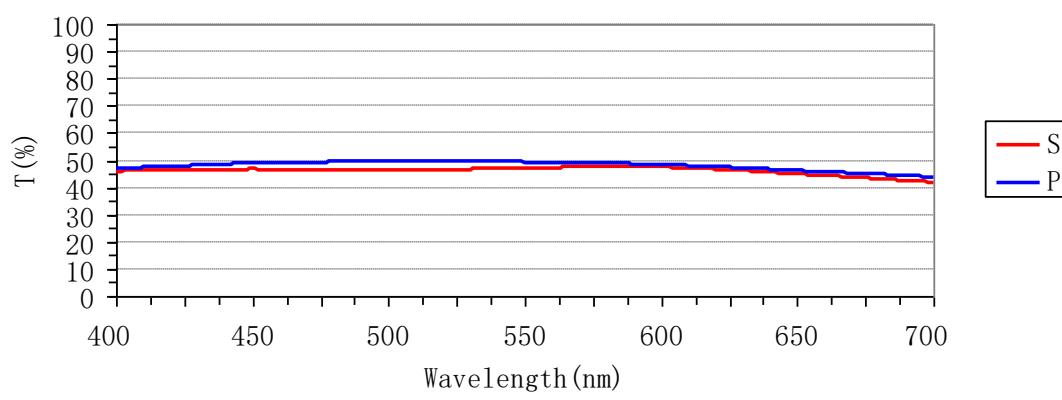
NPBS-017 T/R=7/3



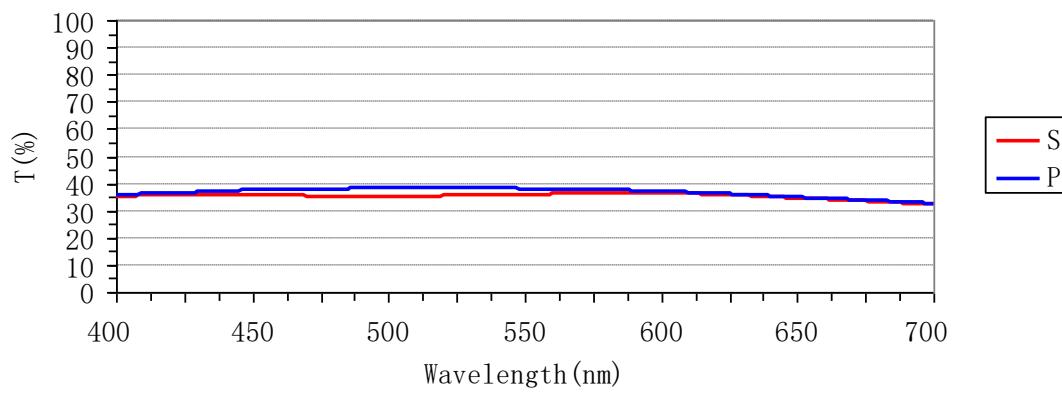
NPBS-016 T/R=6/4



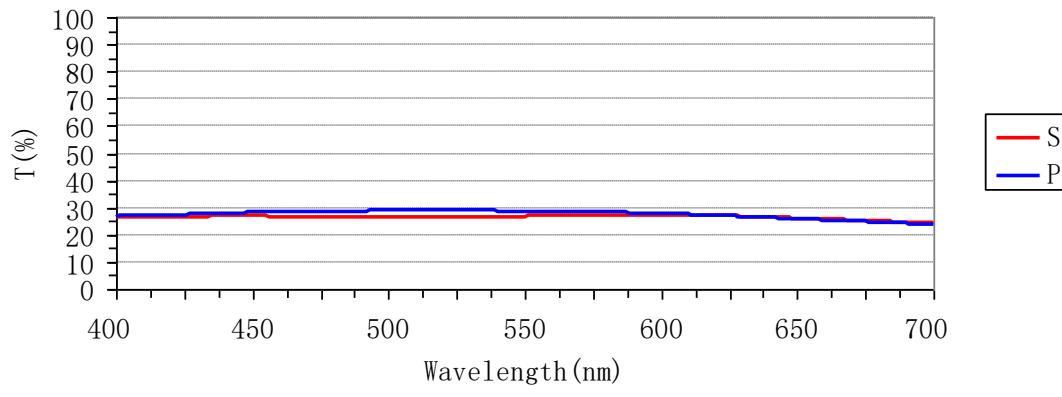
NPBS-015 T/R=5/5



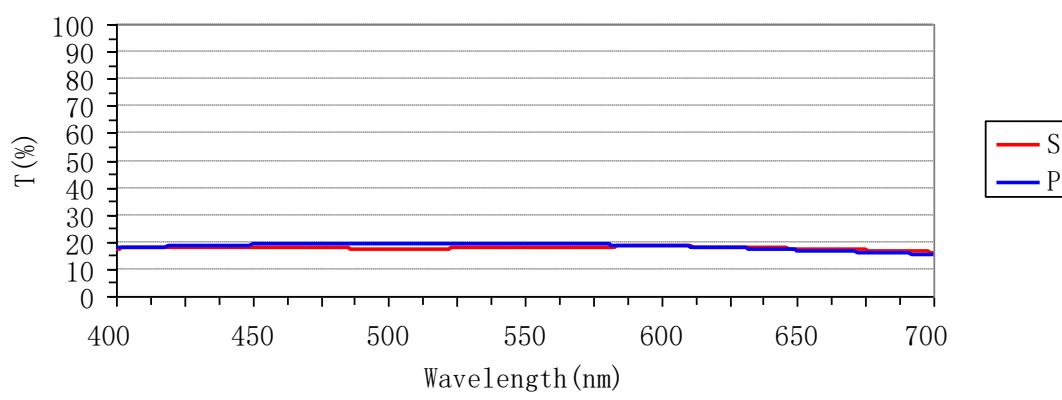
NPBS-014 T/R=4/6

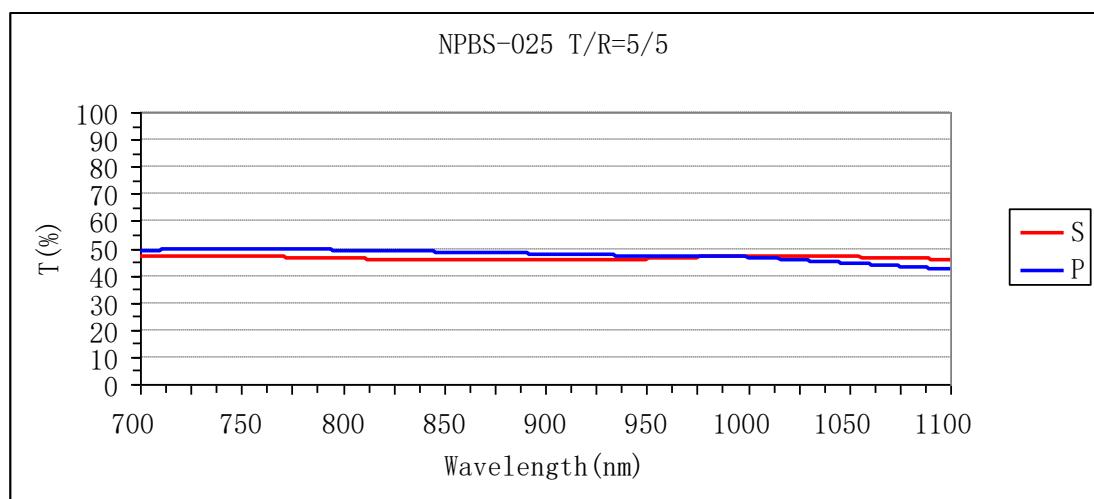
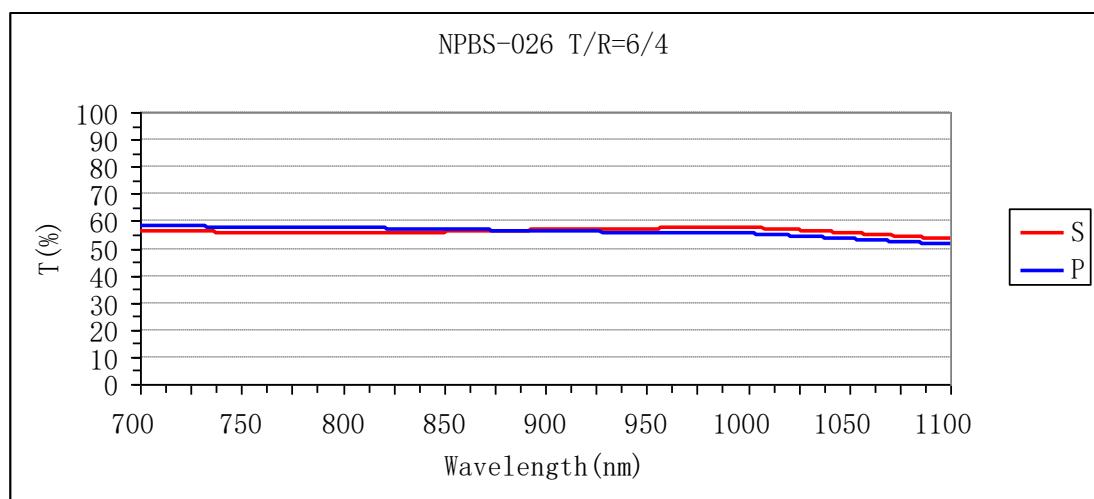
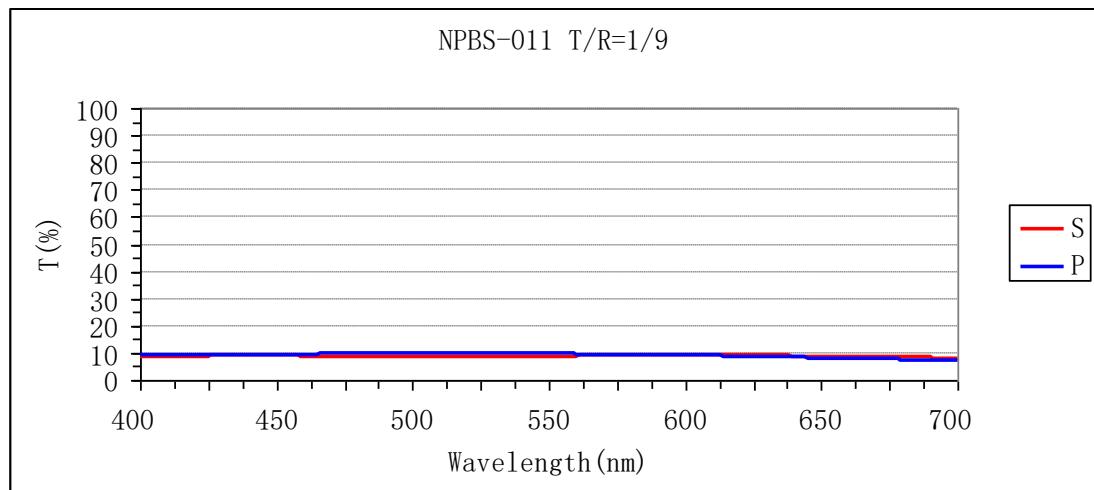


NPBS-013 T/R=3/7

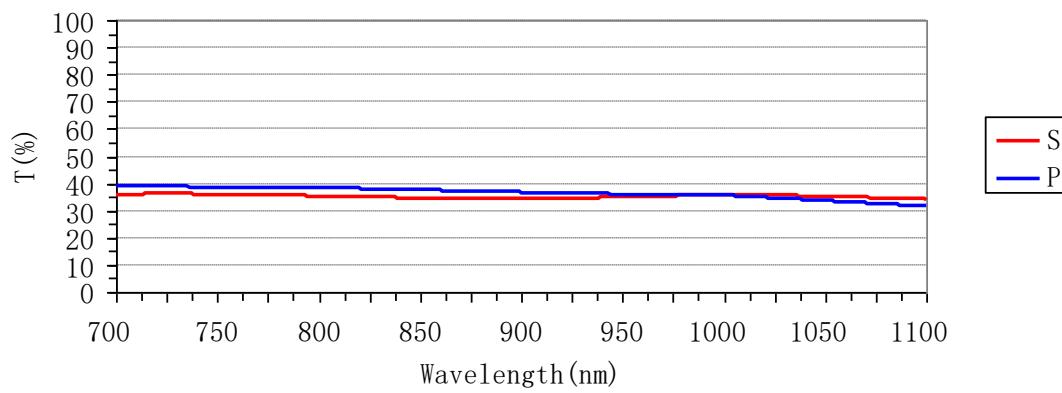


NPBS-012 T/R=2/8

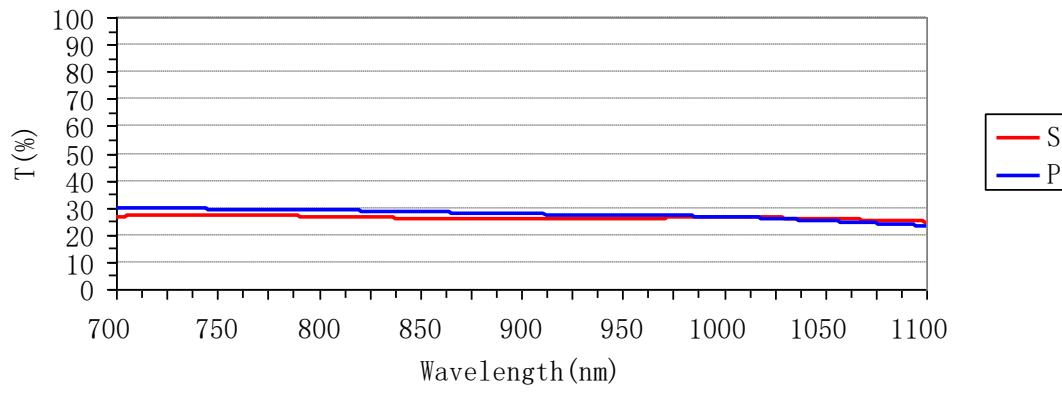




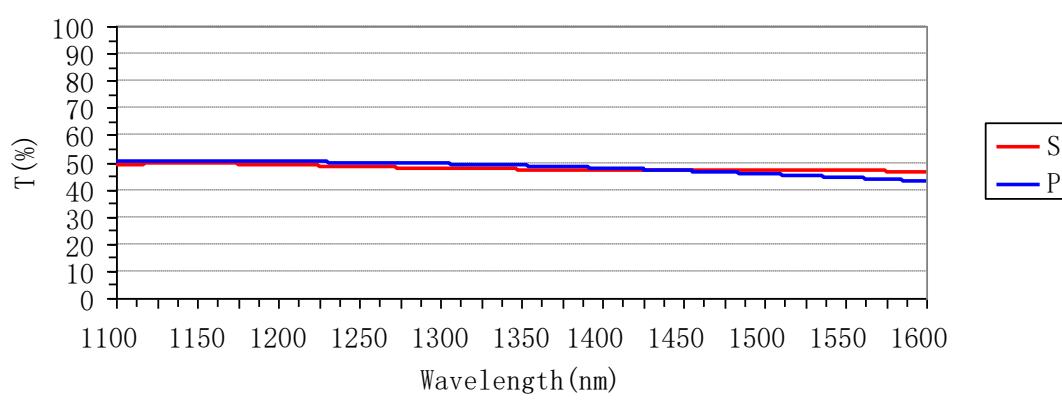
NPBS-024 T/R=4/6

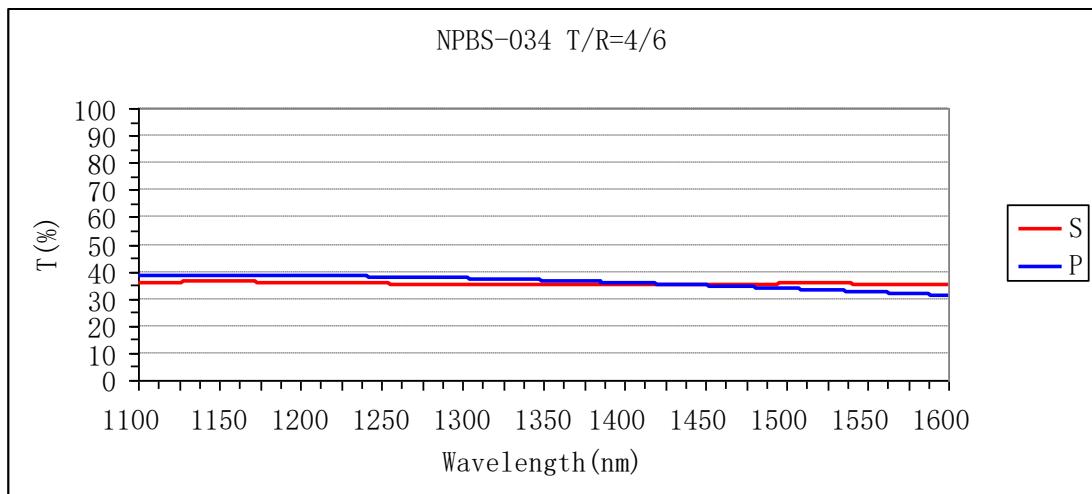


NPBS-023 T/R=3/7



NPBS-035 T/R=5/5

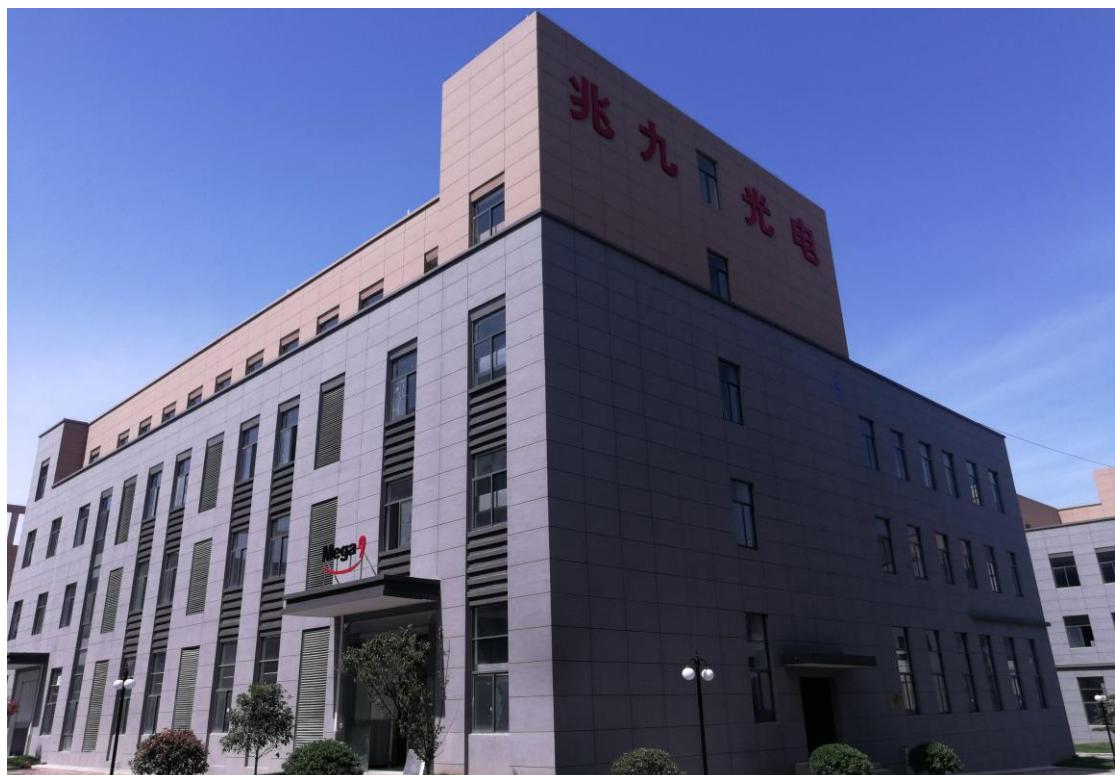




| Part No. | Wavelength Range (nm) | Transmission (%) | Tp-Ts (%) | T/R | Dimension (nm) |
|-------------|-----------------------|------------------|------------|-----|----------------|
| NPBS-011-05 | 400-700 | 8±5 | <8 | 1/9 | 5x5x5 |
| NPBS-011-10 | 400-700 | 8±5 | <8 | 1/9 | 10x10x10 |
| NPBS-011-12 | 400-700 | 8±5 | <8 | 1/9 | 12.7x12.7x12.7 |
| NPBS-011-20 | 400-700 | 8±5 | <8 | 1/9 | 20x20x20 |
| NPBS-011-25 | 400-700 | 8±5 | <8 | 1/9 | 25.4x25.4x25.4 |
| NPBS-012-05 | 400-700 | 18±5 | <8 | 2/8 | 5x5x5 |
| NPBS-012-10 | 400-700 | 18±5 | <8 | 2/8 | 10x10x10 |
| NPBS-012-12 | 400-700 | 18±5 | <8 | 2/8 | 12.7x12.7x12.7 |
| NPBS-012-20 | 400-700 | 18±5 | <8 | 2/8 | 20x20x20 |
| NPBS-012-25 | 400-700 | 18±5 | <8 | 2/8 | 25.4x25.4x25.4 |
| NPBS-013-05 | 400-700 | 27±5 | <8 | 3/7 | 5x5x5 |
| NPBS-013-10 | 400-700 | 27±5 | <8 | 3/7 | 10x10x10 |
| NPBS-013-12 | 400-700 | 27±5 | <8 | 3/7 | 12.7x12.7x12.7 |
| NPBS-013-20 | 400-700 | 27±5 | <8 | 3/7 | 20x20x20 |
| NPBS-013-25 | 400-700 | 27±5 | <8 | 3/7 | 25.4x25.4x25.4 |
| NPBS-014-05 | 400-700 | 36±5 | <8 | 4/6 | 5x5x5 |
| NPBS-014-10 | 400-700 | 36±5 | <8 | 4/6 | 10x10x10 |
| NPBS-014-12 | 400-700 | 36±5 | <8 | 4/6 | 12.7x12.7x12.7 |
| NPBS-014-20 | 400-700 | 36±5 | <8 | 4/6 | 20x20x20 |
| NPBS-014-25 | 400-700 | 36±5 | <8 | 4/6 | 25.4x25.4x25.4 |
| NPBS-015-05 | 400-700 | 47±5 | <8 | 5/5 | 5x5x5 |
| NPBS-015-10 | 400-700 | 47±5 | <8 | 5/5 | 10x10x10 |
| NPBS-015-12 | 400-700 | 47±5 | <8 | 5/5 | 12.7x12.7x12.7 |
| NPBS-015-20 | 400-700 | 47±5 | <8 | 5/5 | 20x20x20 |
| NPBS-015-25 | 400-700 | 47±5 | <8 | 5/5 | 25.4x25.4x25.4 |
| NPBS-016-05 | 400-700 | 56±5 | <8 | 6/4 | 5x5x5 |
| NPBS-016-10 | 400-700 | 56±5 | <8 | 6/4 | 10x10x10 |

| | | | | | |
|-------------|-----------|------|----|-----|----------------|
| NPBS-016-12 | 400–700 | 56±5 | <8 | 6/4 | 12.7x12.7x12.7 |
| NPBS-016-20 | 400–700 | 56±5 | <8 | 6/4 | 20x20x20 |
| NPBS-016-25 | 400–700 | 56±5 | <8 | 6/4 | 25.4x25.4x25.4 |
| NPBS-017-05 | 400–700 | 65±5 | <8 | 7/3 | 5x5x5 |
| NPBS-017-10 | 400–700 | 65±5 | <8 | 7/3 | 10x10x10 |
| NPBS-017-12 | 400–700 | 65±5 | <8 | 7/3 | 12.7x12.7x12.7 |
| NPBS-017-20 | 400–700 | 65±5 | <8 | 7/3 | 20x20x20 |
| NPBS-017-25 | 400–700 | 65±5 | <8 | 7/3 | 25.4x25.4x25.4 |
| NPBS-018-05 | 400–700 | 75±5 | <8 | 8/2 | 5x5x5 |
| NPBS-018-10 | 400–700 | 75±5 | <8 | 8/2 | 10x10x10 |
| NPBS-018-12 | 400–700 | 75±5 | <8 | 8/2 | 12.7x12.7x12.7 |
| NPBS-018-20 | 400–700 | 75±5 | <8 | 8/2 | 20x20x20 |
| NPBS-018-25 | 400–700 | 75±5 | <8 | 8/2 | 25.4x25.4x25.4 |
| NPBS-023-05 | 700–1100 | 27±5 | <8 | 3/7 | 5x5x5 |
| NPBS-023-10 | 700–1100 | 27±5 | <8 | 3/7 | 10x10x10 |
| NPBS-023-12 | 700–1100 | 27±5 | <8 | 3/7 | 12.7x12.7x12.7 |
| NPBS-023-20 | 700–1100 | 27±5 | <8 | 3/7 | 20x20x20 |
| NPBS-023-25 | 700–1100 | 27±5 | <8 | 3/7 | 25.4x25.4x25.4 |
| NPBS-024-05 | 700–1100 | 36±5 | <8 | 4/6 | 5x5x5 |
| NPBS-024-10 | 700–1100 | 36±5 | <8 | 4/6 | 10x10x10 |
| NPBS-024-12 | 700–1100 | 36±5 | <8 | 4/6 | 12.7x12.7x12.7 |
| NPBS-024-20 | 700–1100 | 36±5 | <8 | 4/6 | 20x20x20 |
| NPBS-024-25 | 700–1100 | 36±5 | <8 | 4/6 | 25.4x25.4x25.4 |
| NPBS-025-05 | 700–1100 | 47±5 | <8 | 5/5 | 5x5x5 |
| NPBS-025-10 | 700–1100 | 47±5 | <8 | 5/5 | 10x10x10 |
| NPBS-025-12 | 700–1100 | 47±5 | <8 | 5/5 | 12.7x12.7x12.7 |
| NPBS-025-20 | 700–1100 | 47±5 | <8 | 5/5 | 20x20x20 |
| NPBS-025-25 | 700–1100 | 47±5 | <8 | 5/5 | 25.4x25.4x25.4 |
| NPBS-026-05 | 700–1100 | 56±5 | <8 | 6/4 | 5x5x5 |
| NPBS-026-10 | 700–1100 | 56±5 | <8 | 6/4 | 10x10x10 |
| NPBS-026-12 | 700–1100 | 56±5 | <8 | 6/4 | 12.7x12.7x12.7 |
| NPBS-026-20 | 700–1100 | 56±5 | <8 | 6/4 | 20x20x20 |
| NPBS-026-25 | 700–1100 | 56±5 | <8 | 6/4 | 25.4x25.4x25.4 |
| NPBS-034-05 | 1100–1600 | 36±7 | <8 | 4/6 | 5x5x5 |
| NPBS-034-10 | 1100–1600 | 36±7 | <8 | 4/6 | 10x10x10 |
| NPBS-034-12 | 1100–1600 | 36±7 | <8 | 4/6 | 12.7x12.7x12.7 |
| NPBS-034-20 | 1100–1600 | 36±7 | <8 | 4/6 | 20x20x20 |
| NPBS-034-25 | 1100–1600 | 36±7 | <8 | 4/6 | 25.4x25.4x25.4 |
| NPBS-035-05 | 1100–1600 | 47±7 | <8 | 5/5 | 5x5x5 |
| NPBS-035-10 | 1100–1600 | 47±7 | <8 | 5/5 | 10x10x10 |
| NPBS-035-12 | 1100–1600 | 47±7 | <8 | 5/5 | 12.7x12.7x12.7 |
| NPBS-035-20 | 1100–1600 | 47±7 | <8 | 5/5 | 20x20x20 |

More about Mega-9



Factory Building



Coating Room



Clean Room



Cary 5000 Photospectrometer for measuring transmission, OD6 of blocking depth can be recognized



Collimator for testing cubes beam deviation



Ultrasonic Cleaning Room



High Low Temperature and Humidity Testing



Laser Marking Machine



Certificate of State High-Tech Enterprise



State Sponsored Project for Machine Vision Filters

科技型中小企业技术创新基金

立项证书

承担单位: 上海兆九光电技术有限公司
项目名称: 内置式CCD安防监控滤光片
项目类别: 创业项目
立项代码: 09C26213103465
批准文号: 国科发计字[2009]579号
执行期限: 2009.05.12 至 2011.05.12



2009年11月11日



The Administration Center of Innovation Fund for Technology-Based SMEs

State Sponsored Project for Optical Filters Build-in CCD Camera

copy

Registration No.: 00920Q11460R3S



**CHINA GREAT WALL (TIANJIN)
QUALITY ASSURANCE CENTRE
QUALITY MANAGEMENT SYSTEM CERTIFICATE**

We hereby certify that

Shanghai Mega-9 Optoelectronic Co.,Ltd. (Unified social credit code: 91310117789516484Q)

Registered address is located at: Room 104, 1/f, building 13, No.68,

Zhongchuang Road, Songjiang, Shanghai, China.

Office/Service address is located at: 3/F, building 12, No.85,

Mingnan Road, Songjiang, Shanghai, China. Post Code: 201613

Its quality management system meets the requirements of the

GB/T19001-2016/ISO9001:2015 Standard.

The quality management system applies in the following areas:

Optical component development and sales (within the scope of administrative license if there are administrative license requirements).

Date of Issuance: Oct. 10th, 2020

Date of Expiry: Oct. 9th, 2023



General Manager

Houyizhe



中国认可
国际互认
管理体系
MANAGEMENT SYSTEM
CNAS C009-M

The certificate-related information can be queried through CGW website and CNCA website (www.cnca.gov.cn).
This certificate is only valid when it is used with the original <the notification of the keeping register certificate> which is
award after passing the annual inspection. CGW Add: 3F, HengHua Building, No.501, DaGuNan Road,
HeXiDistrict, Tianjin, P.R.China; Postalcode:300202; The web of centre: www.isocgw.net

ISO Certificate



Mega-9 has 30 patents for optical filters fabrication