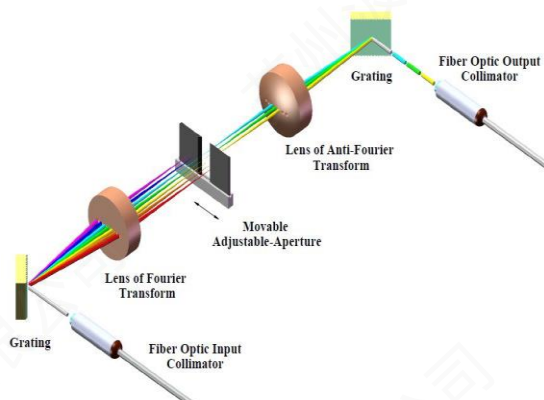




## Bandwidth-Adjustable Tunable Filter (Flat-Top)

Bandwidth-Adjustable Filters of WLTF-BA-series are built based on free-space optical Fourier transformation combining with diffraction grating. It is a 2-port fiber-optic device. When a wide-band spectrum is injected to the input port, the tunable filter will select a target band for output and reject the rest band of spectrum. Both bandwidth and center wavelength of the selected target band are tunable independently. Wavelength-tuning is actuated by either a precise micrometer driver or a built-in micro step-motor connected to a PC through a USB interface in which actuation is monitored by a built-in encoder and controlled dynamically in a closed-loop.

Unique optics design provides offers flat-top transmission and unprecedented low insertion loss & polarization dependent loss (PDL). Precise tuning mechanism enables filters to provide high wavelength resolution and excellent wavelength repeatability. Both manual and electric version filters are available over X-, O-, S-, C-, & L- bands.



Operating Principle and Tuning Mechanism

### Key Features

- Both center wavelength and bandwidth tunable independently
- Unprecedented low insertion loss and polarization-dependent loss (PDL)
- Sharp filter edge rolling-off slope
- Flat-top profile of transmission band
- Up to 120nm wavelength tuning range
- High out-band suppression
- High optical power handling up 5.0 W (CW)

### Applications

- ASE noise suppression
- Wideband WDM channel filtering
- Wideband continuous light source
- Pulse Shaping
- Signal filtering



Manual Version of WLTF-BA-S- or P-



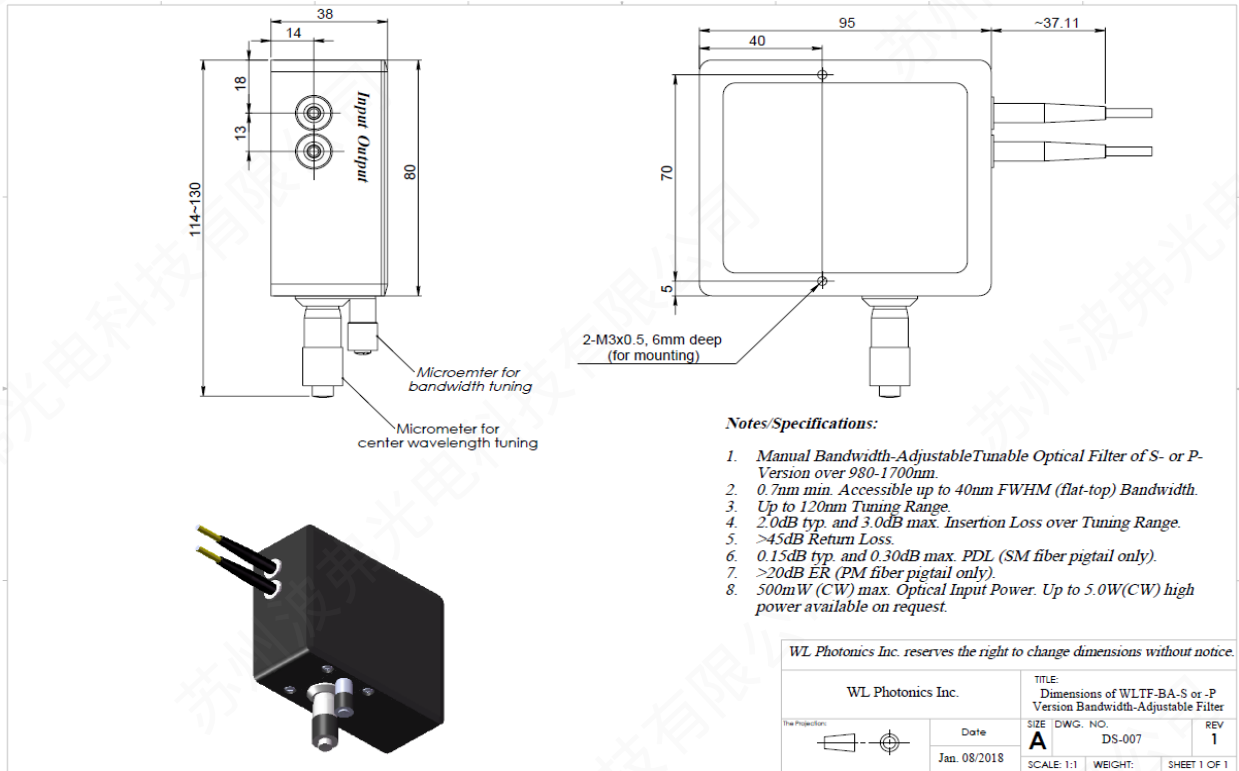
## Specifications of Manual Tunable Filter (WLTF-BA-S, -P, or -U)

lat-top FWHM B<sup>3</sup>

|  |   |   |   |   |
|--|---|---|---|---|
| Center Wavelength  | 1060nm±15nm   | 1310nm±15nm                             | 1550nm±20nm                             | 1600nm±20nm                             |
| Tuning Range (TR)  | 80nm-BW   | 100nm-BW                                | 100nm-BW                                | 100nm-BW                                |
| Insertion Loss   | 1.5dB typ. and 3.0dB max. (Connector exclusive)   |   |   |   |
| FWHM Bandwidth (BW) <sup>2</sup>   | BW <sup>1</sup> <sub>min</sub> to 40nm  | BW <sub>min</sub> to 40nm               | BW <sub>min</sub> to 40nm               | BW <sub>min</sub> to 40nm               |
|  | BW <sub>min</sub> =1.40nm for S-version   | BW <sub>min</sub> =2.00nm for S-version | BW <sub>min</sub> =2.50nm for S-version | BW <sub>min</sub> =2.50nm for S-version |
|  | BW <sub>min</sub> =0.60nm for P-version   | BW <sub>min</sub> =0.80nm for P-version | BW <sub>min</sub> =1.00nm for P-version | BW <sub>min</sub> =1.20nm for P-version |
|  | BW <sub>min</sub> =0.20nm for U-version   | BW <sub>min</sub> =0.25nm for U-version | BW <sub>min</sub> =0.35nm for U-version | BW <sub>min</sub> =0.40nm for U-version |
| Wavelength Resolution  | 0.02nm  |   |   |   |
| Wavelength Repeatability   | ±0.02nm   |   |   |   |
| Polarization-Dependent Loss  | 0.15dB typ./0.30dB max. over tuning range (SM fiber pigtail only)   |   |   |   |
| Extinction Ratio   | 20dB (PM fiber pigtail only without connector)  |   |   |   |
| Spectral Shape   | Flat-top  |   |   |   |
| Passband Flatness  | <0.15dB (Measured with BW <sub>min</sub> )  |   |   |   |
| Filter Edge Rolling-Off Slope <sup>3</sup>   | 30dB/nm for S-version   | 25dB/nm for S-version                   | 22dB/nm for S-version                   | 20dB/nm for S-version                   |
|  | 80dB/nm For P-version   | 60dB/nm For P-version                   | 55dB/nm For P-version                   | 50dB/nm For P-version                   |
|  | 150dB/nm For U-version  | 120dB/nm For U-version                  | 100dB/nm For U-version                  | 100dB/nm For U-version                  |
| Max. Optical Power   | 500mW (CW) standard and up to 5.0W (CW) high power available on request   |   |   |   |
| Return Loss  | >45dB   |   |   |   |
| Out-Band Suppression   | >50dB for BW < 2xBW <sub>min</sub>  |   |   |   |
| Polarization Mode Dispersion   | <0.2ps (SM fiber pigtail only)  |   |   |   |
| Group Delay  | <0.1ps/nm   |   |   |   |
| Pigtail Fiber Type   | HI1060  | SMF-28 or SMF-28e                       |   |   |
|  | Panda PM980   | Panda PM1300                            | Panda PM1550                            |   |
|  | PM fibers aligned in PM slow axes (fast-axis blocking) unless specified as others, LMA or PLMA fiber pigtails are available on request. |   |   |   |
| Operating Temp.  | 10°C to 50°C  |   |   |   |
| Storage Temp.  | -10°C to 75°C   |   |   |   |
| Dimension  | See dimensions drawings below   |   |   |   |
| Weight   | <0.75kg   |   |   |   |
| Other  | RoHS compliant  |   |   |   |
| Note: <sup>1</sup> Minimum achievable flat-top FWHM bandwidth. <sup>2</sup> More than 40nm up to 100nm is available on request. <sup>3</sup> Measured from -3dB down to -43dB level. |   |   |   |   |

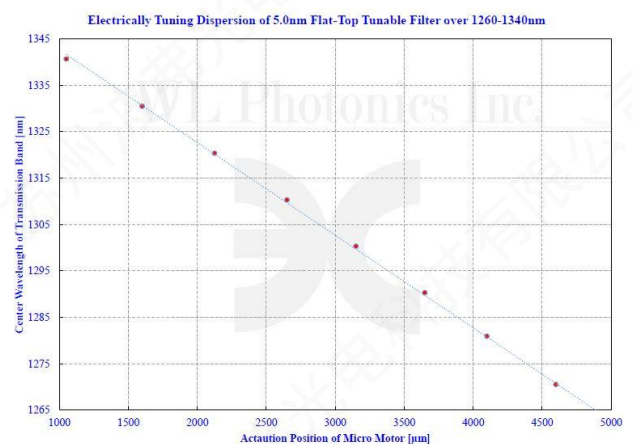
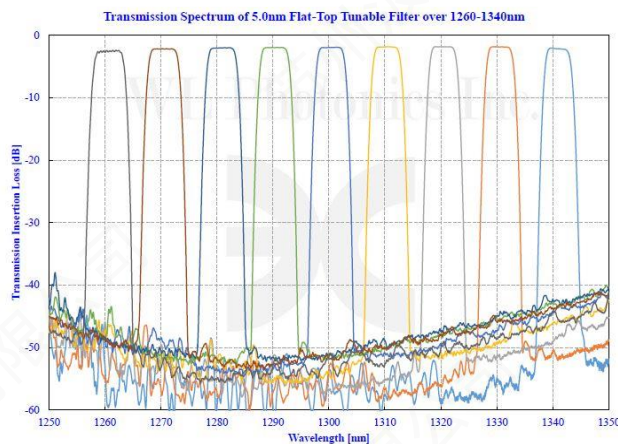


## Dimensions of Manual Tunable Filter (WLTF-BA-S or P-version)



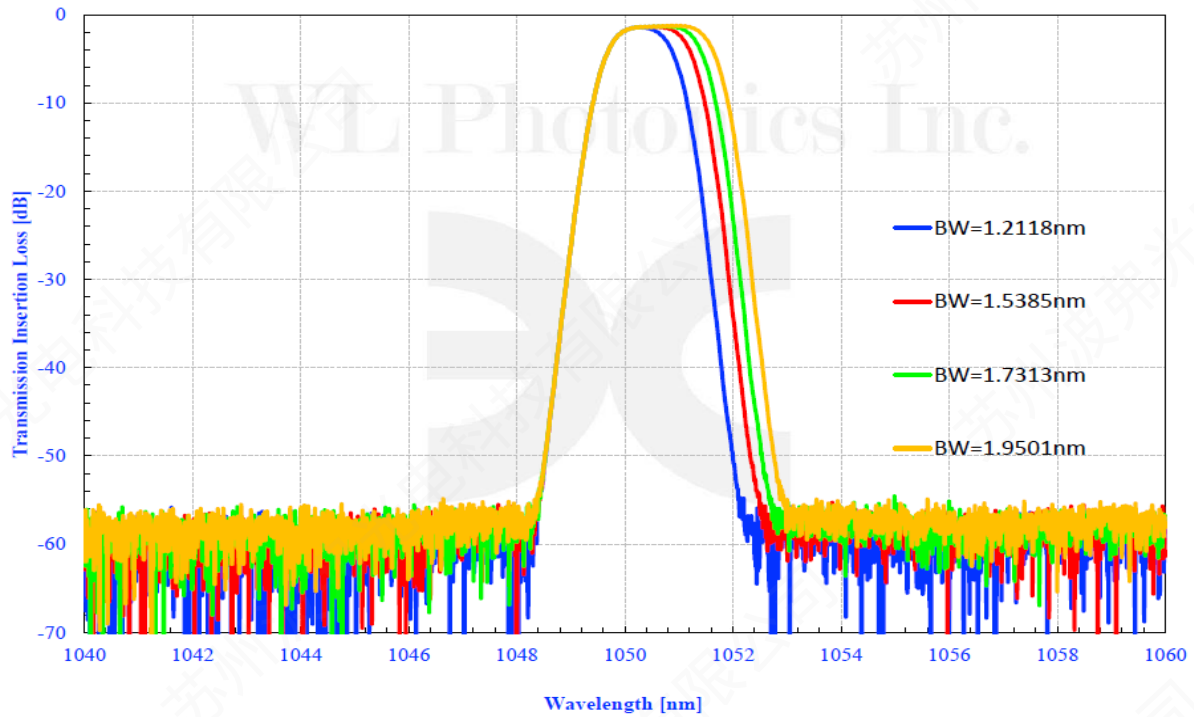
## Example: Typical Transmission Spectrum and Tuning Dispersion of 5.0nm Filter over O-Band

### Tuning Center Wavelength of Transmission Band over O-Band.

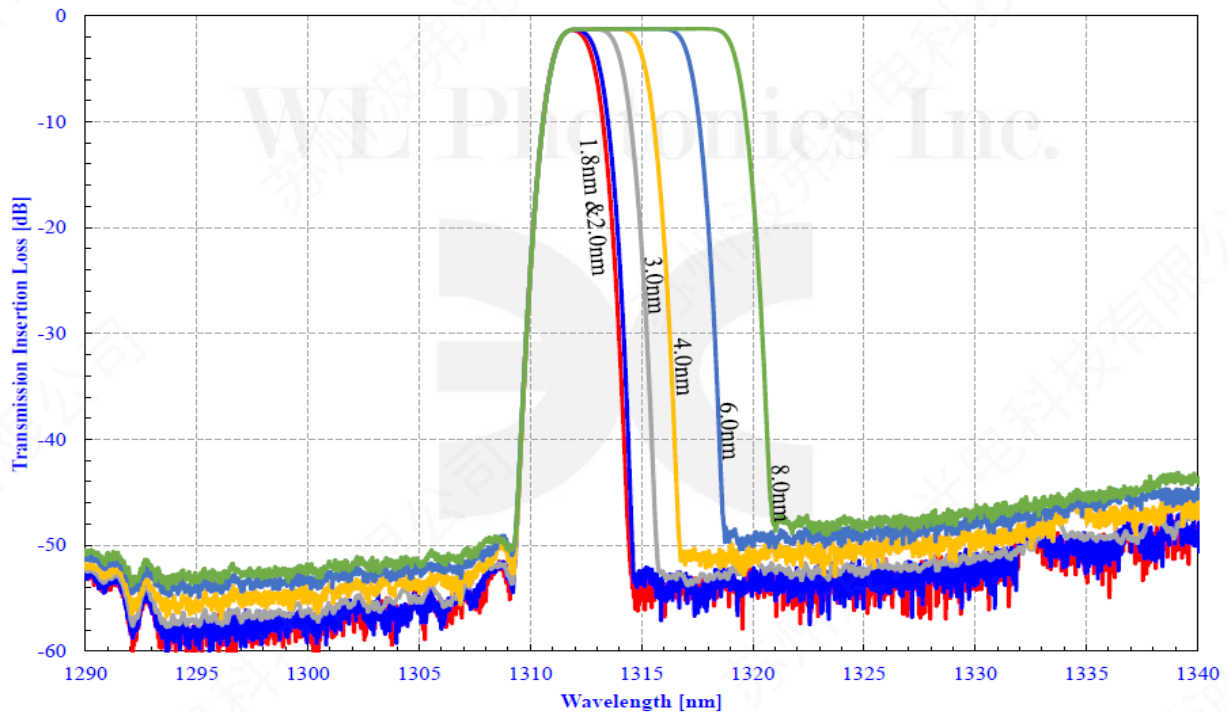




### Bandwidth-Adjustment of S-Version Tunable Filter over 1010-1090nm

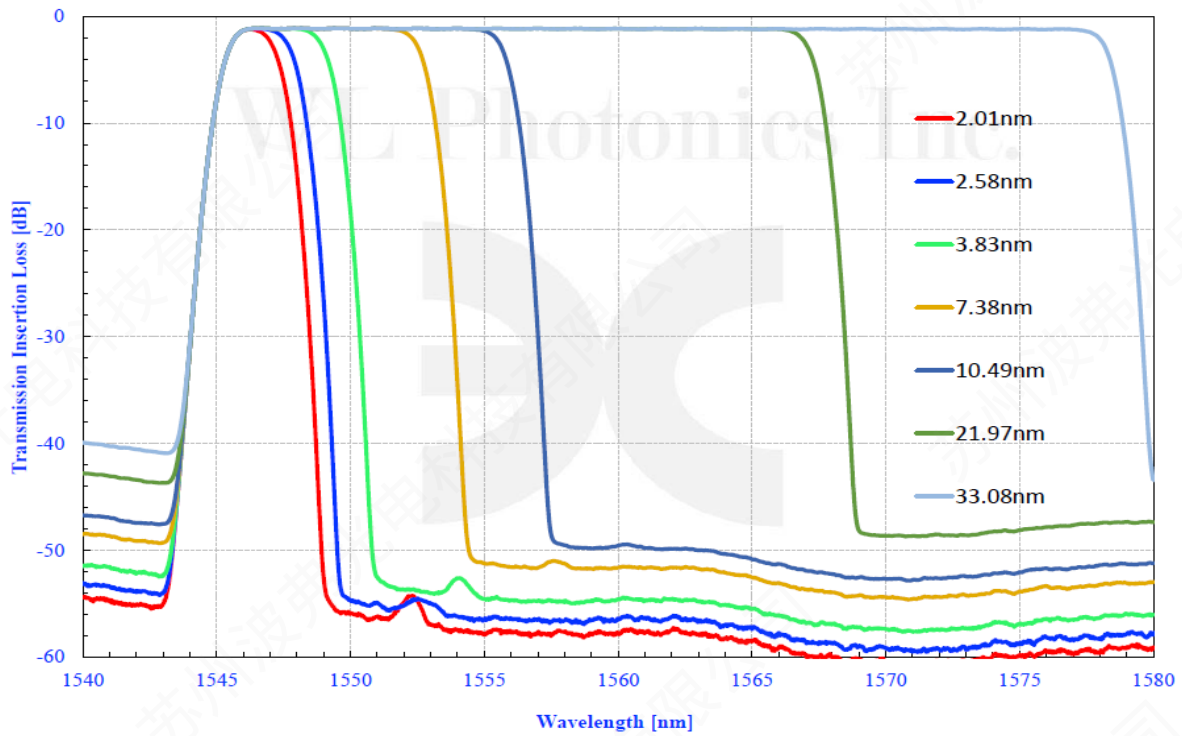


### Bandwidth Adjustment of S-version Tunable Optical Filter over 1260-1350nm

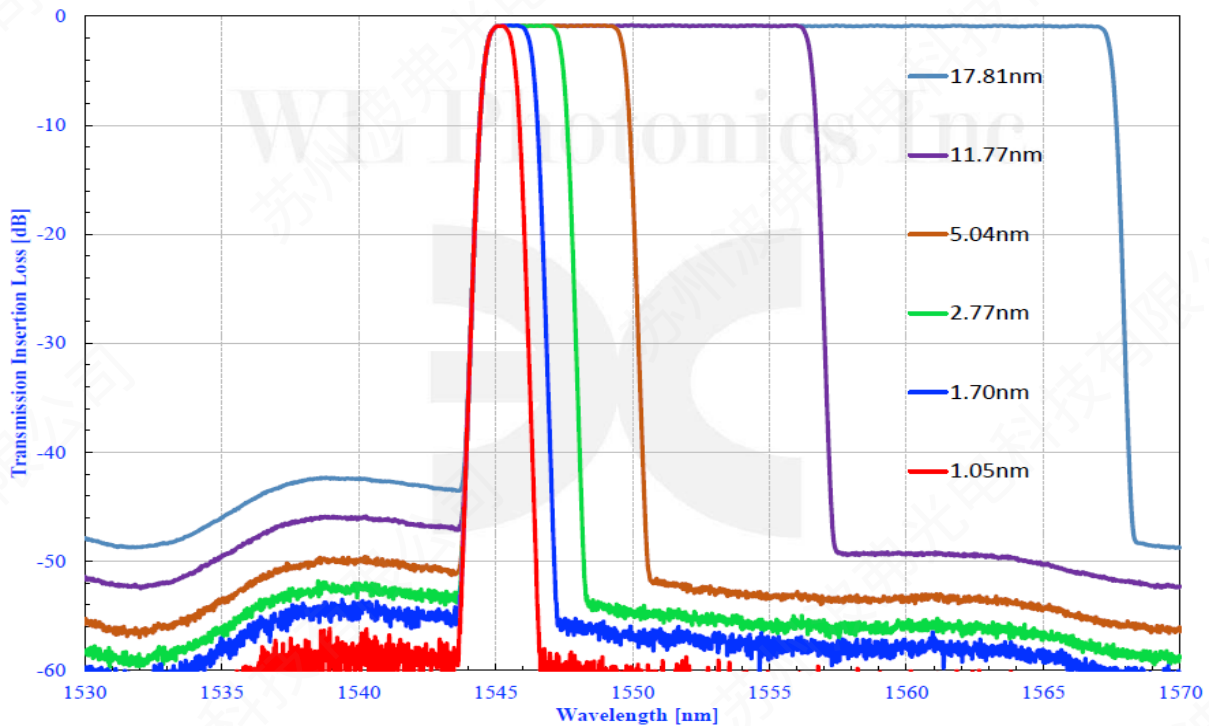




### Bandwidth Adjustment of S-Version Tunable Filter over 1500-1600nm



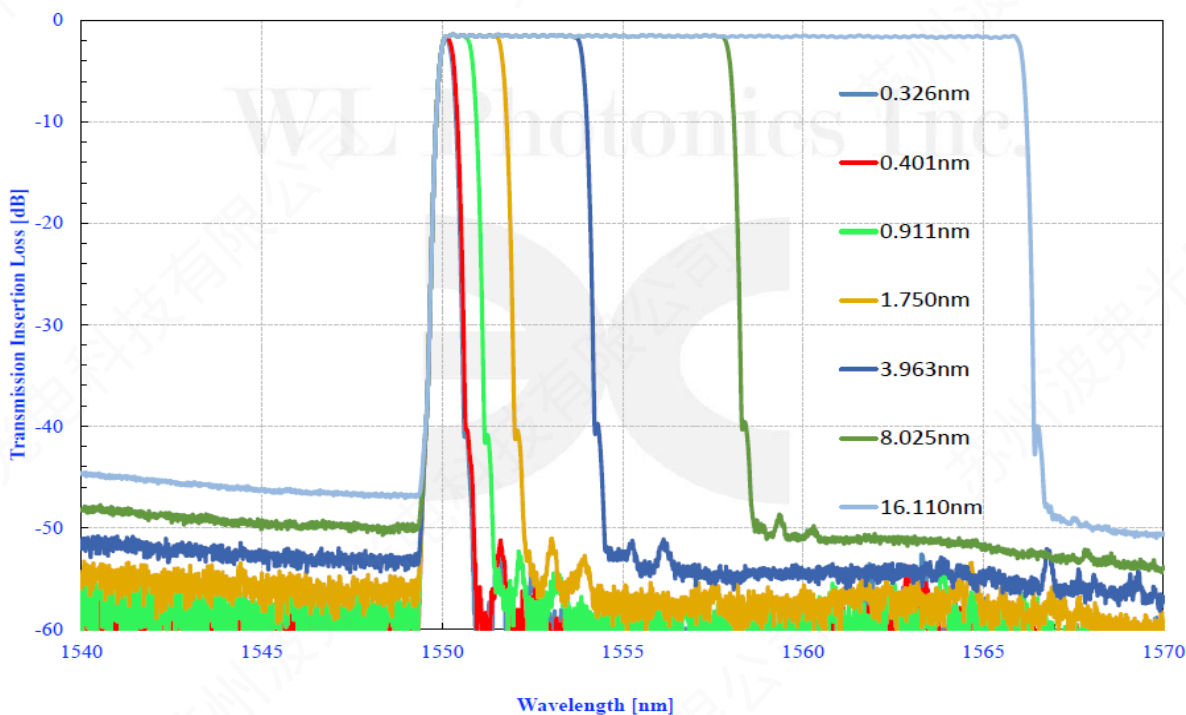
### Bandwidth-Adjustment of P-Version Tunable Optical Filter over 1500-1600nm







Bandwidth-Adjustment of U-version Tunable Optical Filter over 1500-1600nm



## Ordering Information

Part Number of Manual Version: WLTF-BA-**A**-**B**-**C**-**D**-**E/F**-**G**

- A. Version type: **S** is for S-version, **P** is for P-version and **U** is for U-version
- B. Center wavelength in nanometer: **1550** is for 1550nm center wavelength and **1310** is for 1310nm center wavelength.
- C. Tuning wavelength range in nanometer: **80** is for 80nm tuning range and **100** is for 100nm tuning wavelength range.
- D. Fiber type: **SM** is for single mode fiber and **PM** is for Panda polarization maintaining fiber.
- E. Pigtail cable diameter in millimeter: **0.25** is for 250 $\mu$ m OD buffer fiber, **0.9** is for 900 $\mu$ m OD loose tube and **3.0** is for 3.0mm OD cable (only existing for pigtail version).
- F. Pigtail length in meter: **0.5** is for 0.5m long and **1.0** is for 1M long (only existing for pigtail version).
- G. Connector type of either pigtail termination or receptacle adapter, such as **FC/APC**, **FC/UPC**, **SC/APC** or **LU/UPC** and **00** is for no connector.

### Example 1: WLTF-BA-S-1550-100-SM-3.0/1.0-FC/APC

Description: S-version fiber optic polarization-insensitive manually bandwidth-adjustable tunable optical filter over 100nm tuning range centred @1550nm with 1M long, 3.0mm OD loose cabled SMF-28 fiber pigtails terminated with FC/APC connectors on pigtail ends. Bandwidth adjustable from 2.5nm minimum up to 40nm flat-top FWHM bandwidth, 22dB/nm filter edge rolling-off slope and 500mW (CW) optical input power.



**Example 2: WLTF-BA-P-1310-100-PM-3.0/1.0-SC/APC**

Description: P-version fiber optic polarization-sensitive manually bandwidth-adjustable tunable optical filter over 100nm tuning range centred with 1M long, 3.0mm OD loose cabled Panda PM1300 fiber pigtails aligned in PM slow axes (fast-axis blocking) and SC/APC connectors on pigtail ports. Bandwidth adjustable from 0.8nm minimum up to 40nm flat-top FWHM bandwidth, 60dB/nm filter edge rolling-off slope and 500mW (CW) optical input power.

**Example 3: WLTF-BA-P-1060-80-SM-0.9/1.0-FC/UPC-5.0**

Description: P-version fiber optic polarization-insensitive manually bandwidth-adjustable tunable optical filter over 80nm tuning range @1060nm center wavelength with 1M long, 900µm OD loose cabled HI1060 fiber pigtails and FC/UPC connectors on pigtail ends. Bandwidth adjustable from 0.6nm minimum up to 40nm flat-top FWHM bandwidth, 80dB/nm filter edge rolling-off slope and 5.0W (CW) optical input power.

**Example 4: WLTF-BA-U-1550-100-SM-3.0/1.0-FC/APC**

Description: U-version fiber optic polarization-insensitive manually bandwidth-adjustable tunable optical filter over 100nm tuning range centred @1550nm with 1M long, 3.0mm OD loose cabled SMF-28 fiber pigtails terminated with FC/APC connectors on pigtail ends. Bandwidth adjustable from 0.35nm minimum up to 40nm flat-top FWHM bandwidth, 100dB/nm filter edge rolling-off slope and 500mW (CW) optical input power.