Bandpass Tunable Filter (Flat-Top)

Short & Long Bandpass Tunable Filter of WLTF-BM- & WLTF-BE- series is built based on free-space optical Fourier transformation combing with diffraction grating to implement passband tuning. Unique optics design produces an access of selecting spatially the part, either long bandpass or short bandpass, of input spectrum and offers flat transmission in passband. Wavelength-tuning is actuated by either a precise micrometer driver or a 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.

Patent-pending optics design offers a great option of bandwidths and tuning ranges with unprecedented low insertion loss and polarization dependent loss (PDL) in the market. Precise tuning mechanism enables filters to provide high wavelength resolution and excellent wavelength-tuning repeatability. Both of manual and electric version filters are available over X-, O-, S-, C-, & L- bands.

Key Features

➢ Long-pass or short-pass type available
➢ Unprecedented low insertion loss and polarization-dependent loss (PDL)
➢ Sharp filter edge roll-off slop
➢ Up to 120nm wavelength tuning range
➢ Wavelength range available over X-, O-, S-, C- and L- bands
➢ High out-band suppression
➢ High optical power handling

Applications

➢ ASE noise suppression
➢ Wideband WDM channel filtering
➢ Pulse shaping and compression
➢ Analysis of optical spectrum
➢ Signal filtering
# Specifications of Bandpass Tunable Filter (WLTF-BM- or BE-Version)

<table>
<thead>
<tr>
<th>Specification</th>
<th>1060nm±15nm</th>
<th>1310nm±15nm</th>
<th>1550nm±20nm</th>
<th>1600nm±20nm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Center Wavelength</td>
<td>1060nm±15nm</td>
<td>1310nm±15nm</td>
<td>1550nm±20nm</td>
<td>1600nm±20nm</td>
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<tr>
<td>Tuning Range</td>
<td>80nm</td>
<td>100nm</td>
<td>100nm</td>
<td>100nm</td>
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<tr>
<td>Insertion Loss</td>
<td>2.0dB typ. and 3.0dB max. (connector exclusive)</td>
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<tr>
<td>Polarization-Dependent Loss</td>
<td>0.15dB typ./0.30dB max. over whole tuning range (SM fiber pigtails only)</td>
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<tr>
<td>Passband Flatness</td>
<td>&lt;0.5dB (measured within any 10% of passband)</td>
<td></td>
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<tr>
<td>Extinction Ratio</td>
<td>20dB (connector exclusive, PM fiber pigtails only)</td>
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<tr>
<td>Filter Edge Rolling-Off Slope ¹</td>
<td>35dB/nm for S-version</td>
<td>25dB/nm for S-version</td>
<td>22dB/nm for S-version</td>
<td>20dB/nm for version</td>
</tr>
<tr>
<td>For P-version</td>
<td>80dB/nm For version</td>
<td>60dB/nm For version</td>
<td>55dB/nm For version</td>
<td>50dB/nm For version</td>
</tr>
<tr>
<td>For U-version</td>
<td>150dB/nm For U-version</td>
<td>120dB/nm For U-version</td>
<td>100dB/nm For U-version</td>
<td>100dB/nm For U-version</td>
</tr>
<tr>
<td>Wavelength Resolution</td>
<td>0.02nm</td>
<td></td>
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<tr>
<td>Wavelength Repeatability</td>
<td>±0.02nm</td>
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<tr>
<td>Return Loss</td>
<td>&gt;45dB</td>
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<tr>
<td>Max. Optical Power</td>
<td>500mW (CW). Up to 5.0W(CW) power handling available on request</td>
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<tr>
<td>Out-Band Suppression</td>
<td>&gt;40dB (for &lt;10nm passband and transmission to the average of background)</td>
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<tr>
<td>Polarization Mode Dispersion</td>
<td>&lt;0.2ps (SM fiber pigtails only)</td>
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<tr>
<td>Group Delay</td>
<td>&lt;0.1ps/nm</td>
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<tr>
<td>Pigtail Fiber Type</td>
<td>HI1060</td>
<td>SMF-28 or SMF-28e</td>
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<tr>
<td>Panda PM980³</td>
<td>Panda PM1300³</td>
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<tr>
<td>Panda PM1550³</td>
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<tr>
<td>Operating Temp.</td>
<td>10°C to 50°C</td>
<td></td>
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<tr>
<td>Storage Temp.</td>
<td>-10°C to 75°C</td>
<td></td>
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<tr>
<td>Electric Interface</td>
<td>USB, FC and SPI. Or other type interfaces available on request</td>
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<tr>
<td>Dimension</td>
<td>See drawings below</td>
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</tr>
<tr>
<td>Weight</td>
<td>&lt;0.75kg</td>
<td></td>
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<tr>
<td>Other</td>
<td>RoHS compliant</td>
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</tbody>
</table>

¹ Measured from -3dB to -43dB level
² High power up to 5.0W (CW) is available on request.
³ PM fibers aligned in PM slow axes (fast-axis blocking) unless specified otherwise.
Dimensions of Manual Tunable Filter (WLTF-BM-S, or -P version)

[Diagrams showing dimensions and notes]

Notes/Specifications:
1. Manual Bandpass Tunable Optical Filter of S- or P- Version over 980-1700nm.
2. Up to 1200nm Tuning Range.
3. 2.0dB typ. and 3.0dB max. Insertion Loss over Tuning Range.
4. >45dB Return Loss.
5. 0.15dB typ. and 0.30dB max. PDL (SM fiber pigtail only).
6. >20dB ER (PM fiber pigtail only).

Dimensions of Electric Tunable Filter (WLTF-BE-S or -P-version)

[Diagrams showing dimensions and notes]

Notes/Specifications:
1. Electrically Bandpass Tunable Optical Filter of S- or P- Version Flat Top over 980-1700nm.
2. Up to 1500nm Tuning Range.
3. 2.6dB typ. and 3.6dB max. Insertion Loss over Tuning Range.
4. >45dB Return Loss.
5. >20dB ER (PM fiber pigtail only).
6. >20dB ER (PM fiber pigtail only).
8. USB, SP, or DC interfaces. Other interfaces Available on Request.
Transmission Spectrum of S-Version Short Bandpass Tunable Filter over 1260-1360nm

Transmission Spectrum of S-Version Long Bandpass Tunable Filter over 1260-1360nm
USB interface of S- or P-version electric tunable filters for Filter Wavelength Tuning (FWT) through a PC is equipped with USB-RS232 virtual serial port interface (USB B-type connector). The power supply is provided from either USB directly or an extra 5V DC (on request). It is easy to use any Serial COM Port Software in PC to control FWT, such as HyperTerminal and Tera Term. The command set is very simple and easy to drive the filter to find the home position, go to desirable center wavelengths of transmission band or any indicated positions within actuation range.

**Ordering Information**

Part Number of Manual Version: WLTF-BM-\text{[A] B C D E F G}

Part Number of Electric Version: WLTF-BE-\text{[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 respectively.

B. Bandpass type: L is for long bandpass type and S is for short bandpass type respectively.

C. Center Wavelength of tuning range in nanometer: 1550 is for 1550nm center wavelength, 1310 is for 1310nm center wavelength and 1050 is for 1050nm center wavelength.

D. Fiber type: SM is for single mode fiber and PM is for polarization maintaining fiber.

E. Pigtail cable diameter in millimeter: 0.25 is for 250µm OD buffer fiber, 0.9 is for 900µm 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 interface: such as FC/APC, FC/UPC SC/APC or LU/UPC and 00 is for no connector.

H. Interface type for electric version: USB is for USB interface, I^2C is for I^2C interface and SPI is for SPI interface.
Example 1: WLTF-BM-S-L-1550-SM-3.0/1.0-FC/APC
Description: S-version fiber optic polarization-insensitive manually long bandpass tunable optical filter centred @ 1550nm with 1M long, 3.0mm OD loose cabled SMF-28e fiber pigtails and FC/APC connectors on both ports. 500mW (CW) max. optical input power.

Example 2: WLTF-BM-P-S-1060-PM-0.9/1.0-FC/APC-3.0
Description: P-version fiber optic polarization-sensitive manually short bandpass tunable optical filter @ 1060nm centered @ 1060nm with 1M long, 900µm OD loose cabled Panda PM980 fiber pigtails aligned in PM slow axes (fast-axis blocking) and FC/APC connectors on pigtail ends. 3.0W (CW) max. optical input power.

Example 3: WLTF-BE-P-S-1060-PM-0.9/1.0-FC/APC-USB-5.0
Description: P-version fiber optic polarization-sensitive electrically short bandpass tunable optical filter @ 1060nm center wavelength with 1M long, 900µm OD loose cabled Panda PM980 fiber pigtails aligned in PM slow axes (fast-axis blocking) and FC/APC connectors on both pigtail ends. 5.0W (CW) optical input power and USB interface.

Example 4: WLTF-BE-S-L-1310-SM-FC/APC-I2C
Description: S-version fiber optic polarization-insensitive electrically long bandpass tunable optical filter centered @ 1310nm with receptacle input and output interface for FC/APC connectors. SMF-28 operating fiber, 500mW (CW) max. optical input power and I2C digital interface.