Wideband Tunable Filter
WLTF-WM- & WLTF-WE-

Wideband Tunable Filters of WLTF-WM- & WLTF-WE- series are built based on free-space optical Fourier transformation combing with diffraction grating. Unique optics design produces an access of selecting spatially desired spectral ingredients of input light and offers flat-top transmission spectral shape with flexible bandwidth and unprecedented low insertion loss and polarization dependent loss (PDL). Precise tuning mechanism enables filters to provide high wavelength resolution and excellent wavelength repeatability.

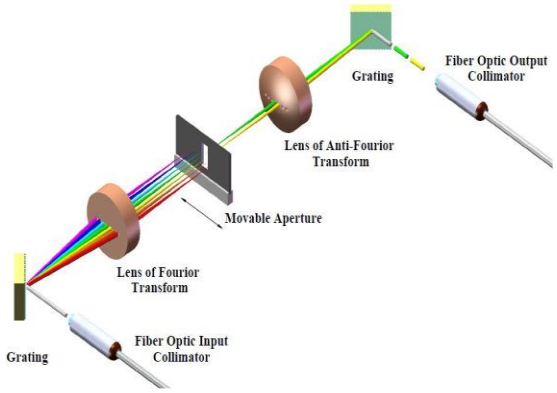
Both of manual and electric version filters are available over X-, O-, S-, C-, & L-bands. Wavelength-tuning is actuated by either a precise micrometer driver or a built-in micro motor connected to a PC through a USB (I²C or SPI) interface in which actuation is monitored by a built-in encoder and controlled dynamically in a closed-loop. Motor control software is provided.

Key Features

- Unprecedented low insertion loss and polarization-dependent loss (PDL)
- Flat-top transmission spectral shape
- Sharp filter edge roll-off slop
- High power handling
- Up to 120nm wavelength tuning range
- Up to tuning range bandwidth
- Spectral range available over X-, O-, S-, C- and L- bands
- High out-band suppression

Applications

- ASE noise suppression
- CWDM channel filtering
- Pulse shaping
- Signal filtering



Operating Principle and Tuning Mechanism

Manual Version of WLTF-WM-

Electric Version of WLTF-WE-

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Specifications of Manual Tunable Filter (WLTF-WM-)

Center Wavelength	1060nm±15nm	1310nm±15nm	1550nm±20nm	1600nm±20nm
Tuning Range (TR)	80nm-BW	100nm-BW	120nm-BW	120nm-BW
Insertion Loss	1.5dB typ. and 3.0dB max. (Connector exclusive)			
FWHM Bandwidth (BW)[2]	BW[1]$_{min}$ to 80nm	BW $_{min}$ to 100nm	BW $_{min}$ to 120nm	BW $_{min}$ to 120nm
	BW $_{min}$=1.40nm for S-grade	BW $_{min}$=2.00nm for S-grade	BW $_{min}$=2.70nm for S-grade	BW $_{min}$=3.00nm for S-grade
	BW $_{min}$=0.70nm for P-grade	BW $_{min}$=1.00nm for P-grade	BW $_{min}$=1.30nm for P-grade	BW $_{min}$=1.50nm for P-grade
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	<0.05dB (measured with BW $_{min}$)			
Filter Edge Roll-Off Slop[3]	35dB/nm for S-grade	25dB/nm for S-grade	22dB/nm for S-grade	20dB/nm for S-grade
	100dB/nm For P-grade	75dB/nm For P-grade	65dB/nm For P-grade	60dB/nm For P-grade
Max. Optical Power[4]	500mW (CW)			
Return Loss	>45dB			
Out-Band Suppression	>40dB for BW<10nm (Transmission peak to the average of background)			
Polarization Mode Dispersion	<0.2ps (SM fiber pigtail only)			
Group Delay	<0.1ps/nm			
Pigtail Fiber Type[5]	HI1060	SMF-28 or SMF-28e		
	Panda PM980	Panda PM1300	Panda PM1550	
Operating Temp.	10°C to 50°C			
Storage Temp.	-10°C to 75°C			
Dimension	38mm (H)x95mm (W)x110mm (L)			
Weight	<0.75kg			
Other	RoHS compliant			
Note	[1] BW $_{min}$ is minimum available flat-top bandwidth			
	[2] Any bandwidth between BW $_{min}$ and TR can be specified as a standard			
	[3] Measured from -3dB to -33dB level			
	[4] High power up to 5.0W (CW) is available on request.			
	[5] PM fibers aligned in PM slow axes (fast-axis blocking) unless specified as others.			

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Specifications of Electric Tunable Filter (WLTF-WM-)

Center Wavelength	1060nm±15nm	1310nm±15nm	1550nm±20nm	1600nm±20nm
Tuning Range (TR)	80nm-BW	100nm-BW	120nm-BW	120nm-BW
Insertion Loss	1.5dB typ. and 3.0dB max. (Connector exclusive)			
FWHM Bandwidth (BW)[2]	BW[1]$_{min}$ to 80nm	BW $_{min}$ to 100nm	BW $_{min}$ to 120nm	BW $_{min}$ to 120nm
	BW $_{min}$=1.40nm for S-grade	BW $_{min}$=2.00nm for S-grade	BW $_{min}$=2.70nm for S-grade	BW $_{min}$=3.00nm for S-grade
	BW $_{min}$=0.70nm for P-grade	BW $_{min}$=1.00nm for P-grade	BW $_{min}$=1.30nm for P-grade	BW $_{min}$=1.50nm for P-grade
Wavelength Resolution	0.01nm			
Wavelength Repeatability	±0.01nm			
Max. Tuning Speed	80nm/Sec.			
PDL	0.15dB typ./0.30dB max. over tuning range (SM fiber pigtail only)			
Extinction Ratio	20d (PM fiber pigtail only without connector)			
Spectral Shape	Flat-top			
Passband Flatness	<0.05dB (Measured within BW $_{min}$)			
Roll-Off Edge of Passband [3]	35dB/nm for S-grade, 100dB/nm For P-grade.	25dB/nm for S-grade, 75dB/nm For P-grade.	22dB/nm for S-grade, 65dB/nm For P-grade.	20dB/nm for S-grade, 60dB/nm For P-grade.
Optical Power [4]	500mW (CW)			
Return Loss	>45dB			
Out-Band Suppression	>40dB for BW<10nm (Transmission peak to the average of background)			
Polarization Mode Dispersion	<0.2ps (SM fiber pigtail only)			
Group Delay	<0.1ps/nm			
Pigtail Fiber Type [5]	HI1060	SMF-28 or SMF-28e		
	Panda PM980	Panda PM1300	Panda PM1550	
Electric Interface	USB, I^{2}C or SPI			
Electric Power Consumption	<0.5W			
Operating Temp.	10°C to 50°C			
Storage Temp.	-10°C to 75°C			
Dimension	35mm (H)x95mm (W)80mm (L)			
Weight	<0.75kg			
Other	RoHS compliant			
Note	[1] BW $_{min}$ is minimum available flat-top bandwidth			
	[2] Any bandwidth between BW $_{min}$ and TR can be specified as standard			
	[3] Measured from -3dB to -33dB level			
	[4] High power version up to 5.0W (CW) is available on request.			
	[5] PM fibers aligned in PM slow axes (fast-axis blocking) unless specified as others			

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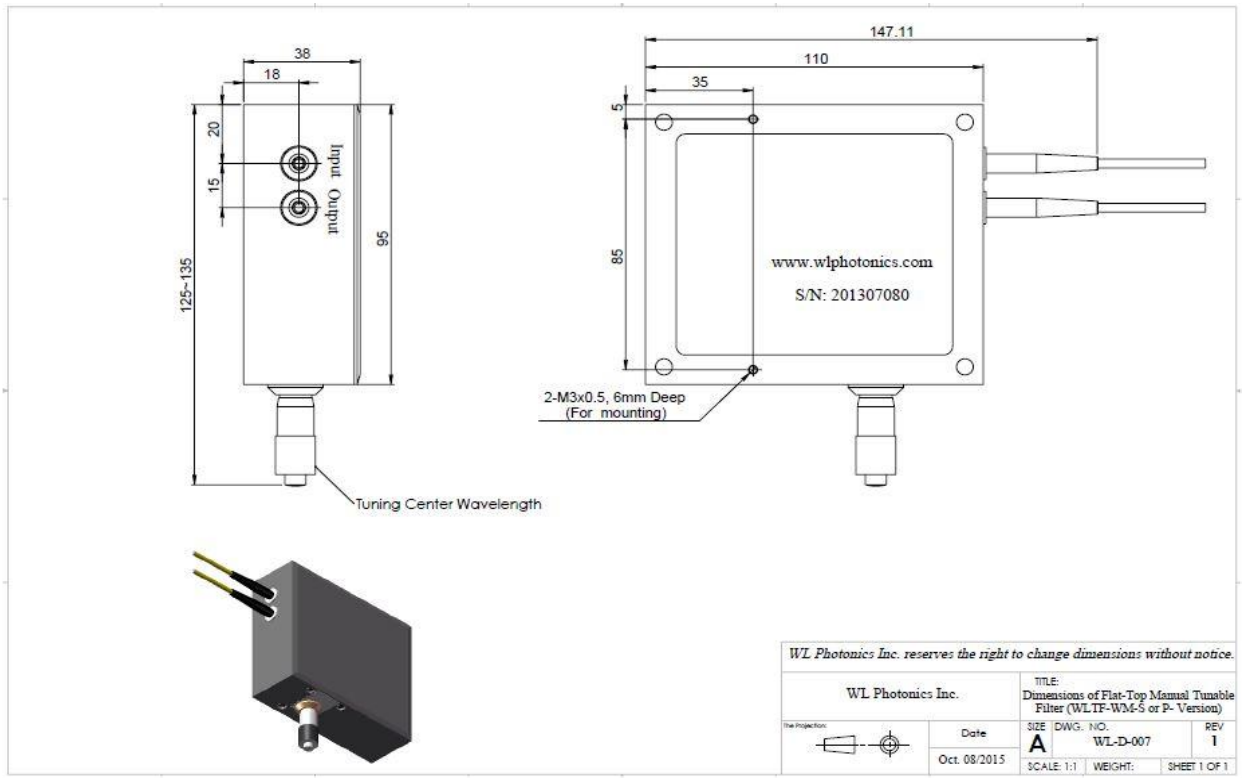
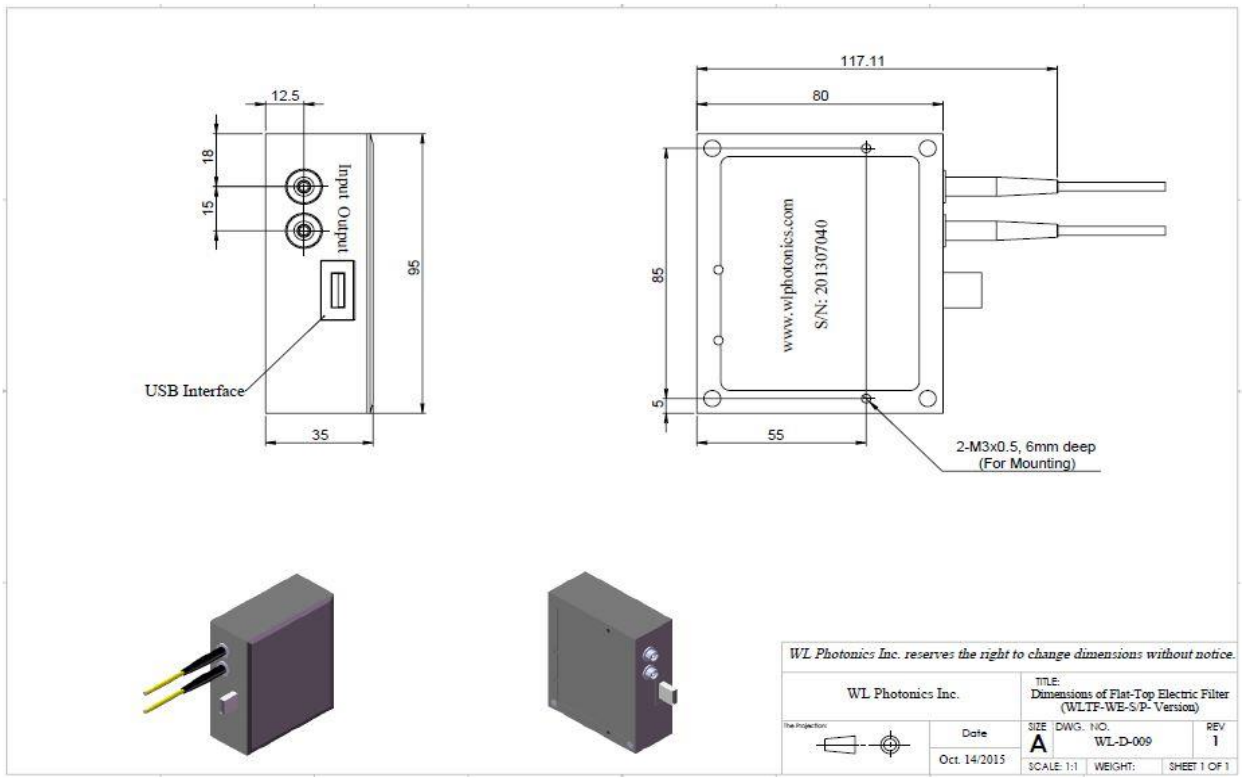
Dimensions of Manual Tunable Filter (WLTF-WM-version)



Dimensions of Electric Tunable Filter (WLTF-WE-version)



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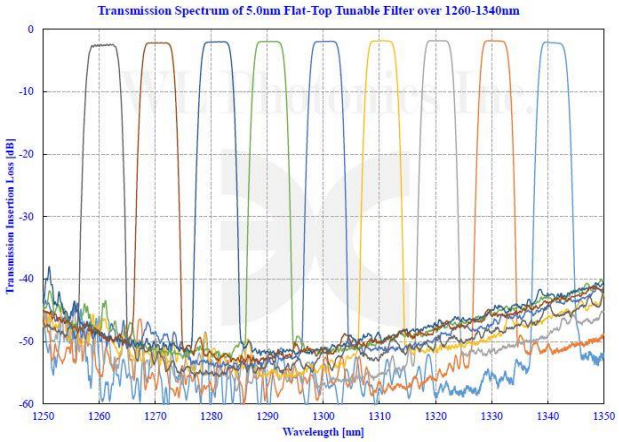
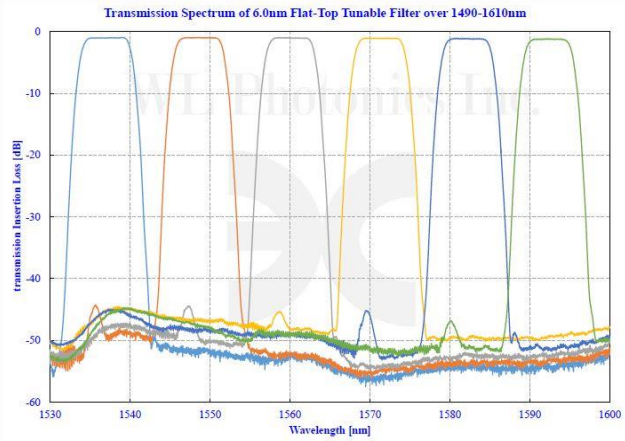
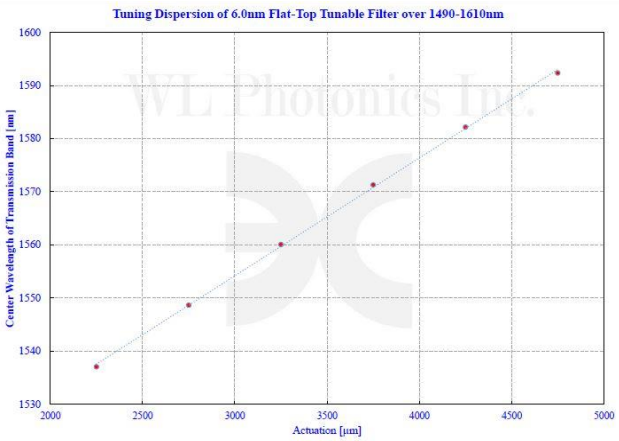
Example: Typical Transmission Spectrum and Tuning Dispersion of 5.0nm Filter over O-Band



Example: Typical Transmission Spectrum and Tuning Dispersion of 6.0nm Filter over S, C, L-Band





Ordering Information

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

Part Number of Electric Version: WLTF-WE-A-B-C/D-E-F/G-H-I

A. Version grade: S is for S-grade and P is for P-grade
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. FWHM bandwidth in nanometer: 3.5 is for 3.5nm FWHM bandwidth.
E. Fiber type: SM is for single mode fiber and PM is for Panda polarization maintaining fiber.
F. 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).

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G. Pigtail length in meter: 0.5 is for 0.5m long and 1.0 is for 1M long (only existing for pigtail version).
H. 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.
I. USB is for USB interface, I^2C is for I^2C interface and SPI is for SPI interface (electric version only).

Example 1: **WLTF-WM-S-1550-120/4.5-SM-3.0/1.0-FC/APC**
Description: S-grade fiber optic polarization-insensitive manually tunable optical filter of 4.5nm FWHM flat-top bandwidth over 1490-1610nm tuning range with 1M long, 3.0mm OD loose cabled SMF-28 single mode fiber pigtails terminated with FC/APC connectors on both ends. 500mW (CW) optical input power.

Example 2: **WLTF-WM-P-1310-100/3.5-PM-3.0/1.0-FC/APC-5.0**
Description: P-grade fiber optic polarization-sensitive manually tunable optical filter of 3.5nm FWHM flat-top bandwidth over 1260-1360nm tuning range with 1M long, 3.0mm OD loose cabled Panda PM1300 fiber pigtails aligned in PM slow axes (fast-axis blocking) terminated with FC/APC connectors on both ends. 5.0W (CW) optical input power.

Example 3: **WLTF-WM-S-1040-80/10-SM-FC/APC**
Description: S-grade fiber optic polarization-insensitive manually tunable optical filter of 10nm FWHM flat-top bandwidth over 1000-1080nm tuning range with receptacle input and output interface for FC/APC connectors. Operating fiber is HI1060 and 500mW (CW) optical input power.

Example 4: **WLTF-WE-S-1550-120/3.0-SM-3.0/1.0-FC/APC**
Description: S-grade fiber optic polarization-insensitive electrically tunable optical filter of 3.0nm FWHM flat-top bandwidth over 1490-1610nm tuning range with 1M long, 3.0mm OD loose cabled SMF-28 single mode fiber pigtails terminated with FC/APC connectors on both ports. 500mW optical input power and USB interface.

Example 5: **WLTF-WE-P-1550-80/0.65-PM-FC/APC-SPI-3.0**
Description: P-grade fiber optic polarization-sensitive electrically tunable optical filter of 0.65nm FWHM flat-top bandwidth over 1020-1100nm tuning range with receptacle input & output interface for FC/APC connectors. Operating fiber is Panda PM980 aligned in PM slow axes (fast-axis blocking), 3.0W (CW) input optical power and SPI digital output interface

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