Fiber Fabry-Perot Tunable Filter | FFP-TF

Applications

- Optical Performance Monitoring
- Spectrum Analysis
- Tunable Optical Noise Filter
- Tunable Optical Add/Drop
- Tunable Sources
- Optical Sensing

Features

- High resolution for precise spectrum analysis
- Large dynamic range permits accurate measurements
- Efficient low loss design
- Tunable across S, C & L bands
- Wide ranges of user-specified parameters
- Thermally stable
- Vibration and shock resistant
- Small footprint
- Low power requirements
- Proven reliability, less than 80 FITS
- Qualified for Telcordia GR 2883
- All-fiber platform
- Compact for OEM application

Description

The Micron Optics Fiber Fabry-Perot (FFP) Tunable Filter is a specialized filter based on the all-fiber Fabry-Perot etalon technology. The FFP tunable filter passes wavelengths that are equal to integer fractions of the cavity (etalon) length; all other wavelengths are attenuated according to the Airy function.

The key to the elegant design of the FFP tunable filter is the lensless fiber construction. There are no collimating optics or lenses, thus the FFP tunable filter achieves high finesse and maintains a low loss transmission profile. Micron Optics has eliminated the pitfalls of other Fabry-Perot component technologies, including misalignment, environmental sensitivity, and extraneous modes.
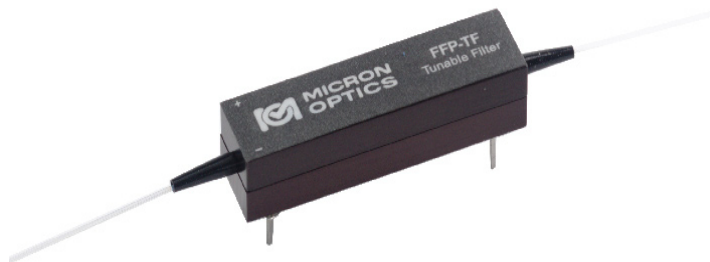
The all-fiber FFP tunable filter follows the Airy function so closely that engineers can design it into the opto-electronic systems with a high degree of confidence that it will provide results very close to the theoretical mathematical model. Low loss, high isolation, and accurate power or wavelength measurements are just a few of the characteristics resulting from an ideal Airy function.

Micron Optics has provided thousands of FFP tunable filters for a large variety of applications. For more than a decade, the Micron Optics Tunable Filter has proven its capabilities in WDM applications, and has satisfied the ever-increasing performance demands of the telecom market including Optical Network Monitoring, Signal Conditioning and Dynamic Networking and Transport. Additionally, the filter continually proves itself as the key enabling technology for Micron Optics line of world-class test instruments.

TUNED Products displaying the "Micron Optics Tuned" logo include Micron Optics tunable technologies insuring high quality and performance.

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Fiber Fabry-Perot Tunable Filter| FFP-TF

Specifications — FFP-TF

Optical Properties

Operating Wavelength Range [1]	(Custom)		800-1200 nm		
Operating Wavelength Ranges [1]	(Standard)	O-Band 1260 - 1360 nm	C-Band 1520 - 1570 nm		
		E-Band 1360 - 1480 nm	L-Band 1570 - 1620 nm	Extended L-Band	1570 - 1640 nm
		S-Band 1480 - 1520 nm	C & L Band 1520 - 1620 nm	Extended C&L Band	1520 - 1640 nm

Free Spectral Range (fixed FSR but selectable within this range)	10 to 25,000 GHz (80 pm to 200 nm at 1550 nm)
Standard Finesse Values (nominal)	10, 40, 100, 200, 500,
(For non-standard finesse values up to 16,000 - Contact Micron Optics)	650, 1000, 2000, 4000
3dB Bandwidth	Equals desired FSR/Finesse
Insertion Loss [2]	<2.5 dB
Polarization Dependent Loss [2]	<0.2 dB
Input Power (Maximum) [3]	< 100mW (for finesse <200)
Glitch Free Dynamic Range (GFDR)	> 15 dB

Electrical Properties

Tuning Voltage/FSR	< 12 V
Capacitance	< 3.0 µF
Cycling Speed Over 1 FSR [4]	2500 Hz (max)
Maximum Tuning Voltage	70 V

Mechanical Properties

Dimensions	12.7 mm x 14.3 mm x 57.2 mm
Weight	28 g
Mounting Holes	(4) #1-72 UNF x 0.16 inch deep
Electrical Terminals	DIP Pins Standard, Side Terminals Optional
Cable Jacket	(loose) 900 µm buffer tubing
Cable Length	>1 m
Connector	See options

Environmental Properties [2,5]

Operating Temperature[1]	-20° to 80°C
Δ Operating Voltage/Operating Temperature	< 12 V
Δ Insertion Loss/Operating Temperature (dependent on FSR)	± 0.5 dB
Δ Insertion Loss/Vibration	< 0.5 dB

Notes:
1. Specifications are dependent on filter configuration. Please contact Micron Optics for final specifications.
2. Typical value; final value is dependent on Free Spectral Range and Finesse.
3. Maximum input power level depends on finesse value. Generally, the higher the finesse, the lower the maximum input power level.
4. Noted cycling speeds are recommended maximums. Experimental rates of <100 KHz have been achieved on the FFP-TF version.
5. These parameters are not available for all possible configurations. Please contact Micron Optics for details.

Ordering Information

FFP-TF-wwww-bbbuffff-i.i   (Example: FFP-TF-1550-010G0200-2.0)

wwww: Wavelength Band	bbb: Bandwidth	u: Bandwidth Unit	ffff: Finesse	i.i: Insertion Loss
1310 *(1260 -1360 nm)* 1550 *(1520-1570 nm)*	Specify bandwidth	G GHz	Specify finesse	Specify Loss
1420 *(1360 -1480 nm)* 1600 *(1570 -1620 nm)*	(i.e: 010 = 10GHz)	M MHz	(i.e: 0200=Finesse of 200)	(i.e: 2.0=2dB)
1500 *(1480-1520 nm)* 1580 *(1520 - 1620 nm)*		K KHz		

Options

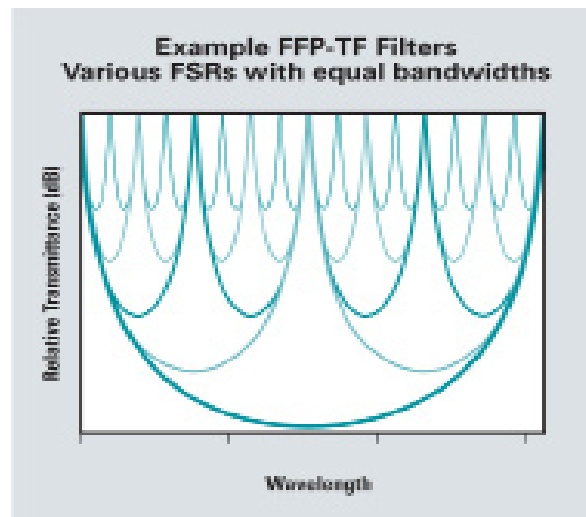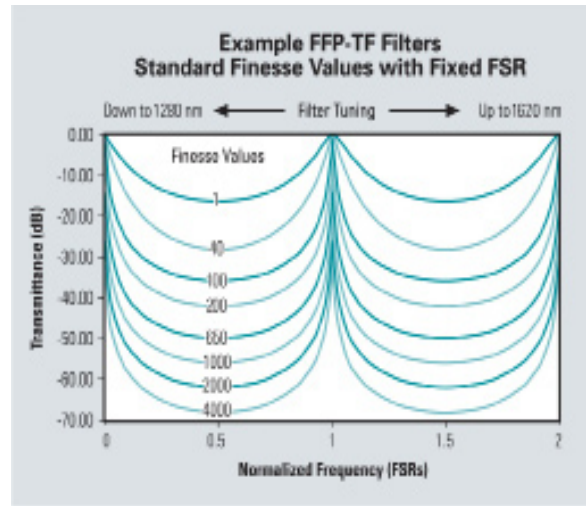|		
060 FC/SPC Connectors (Fusion Spliced)	061 FC/APC Connectors (Fusion Spliced)	062 SC/SPC Connectors (Fusion Spliced) 063 SC/APC Connectors (Fusion Spliced)
065 FC/APC Connectors (Connectorized)	069 Other Connectors	070 Side Terminal Configuration

Applications

Optical Performance Monitor

Micron Optics FFP Technology is the base for the highest performing optical performance monitor available today, monitoring up to 400 channels in the C band alone. The high resolution, deep dynamic range and continuous smooth tuning combine to allow accurate dense channel analysis. For example, Micron Optics Finesse 2,000 filters have a contrast factor of 62 dB.

Tunable Optical Noise Filtering & Channel Locking

Micron Optics FFP Technology is used in telecom systems around the world for optical noise filtering and dynamic channel locking. A key attribute is the extreme low loss nature (to less than 1 dB) of the filter and its reliable locking capability. Data from thousands of filters in the field has shown a projected reliability of less than 80 FITs. The resulting benefit is an extremely low bit error rate and high network receiver sensitivity.

Tunable Channel Drop for Ultra DWDM (< 25 GHz spacing)

The rapid tuning and locking capabilities of the Micron Optics FFP Technology enables reliable channel selection and dropping applications in dynamic optical networks. The high degree to which the FFP filters follow the Airy Function theory allows optical engineers to accurately design system performance parameters, without the overhead of allowing for imprecise measurements.

Example FFP-TF Filters
Standard Finesse Values with Fixed FSR

Example FFP-TF Filters
Various FSRs with equal bandwidths

To assist in filter selection, three of the highest volume applications are listed below. These filters typically have short lead times. In addition to these standard filters, Micron Optics will be pleased to produce custom filters. Call or e-mail our sales engineers to best match our filter specifications to your applications.

### FFP-TF Standard Filters (for common applications)

| Parameter (Nominal Values)	Unit	Channel Drop	Optical Channel Monitor	Optical Channel Analyzer
Wavelength Range		C Band	C or L Band	C or L Band
Bandwidth	pm	280	80	40
	GHz	35	10	3.75
Free Spectral Range (FSR)	nm	60	60	60
	GHz	7,500	7,500	7,500
Finesse		215	750	2,000
Insertion Loss	dB	<2.5	<3.5	<3.5

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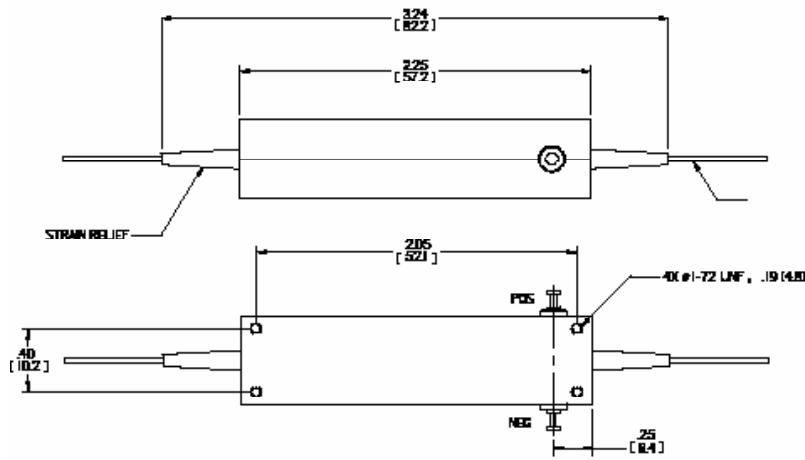
Dimensions

Fiber Fabry-Perot Tunable Filter Side Terminal Configuration
Optional
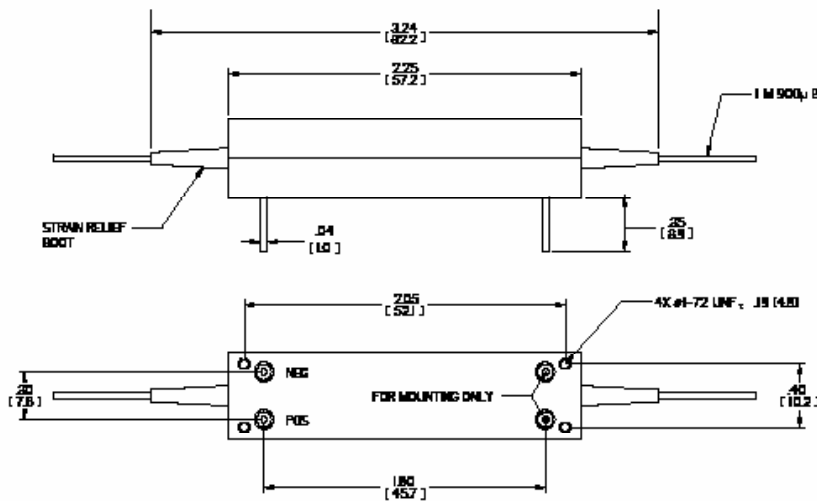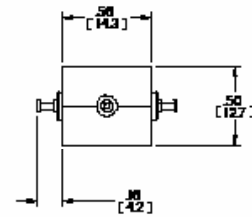
Fiber Fabry-Perot Tunable Filter DIP Pin Configuration
Standard
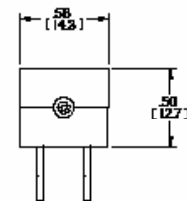
Notes:
All dimensions in inches.
[mm]