Narrowband Tunable Optical Filter

TFN

Applications

- Radio Frequency over Fiber / Microwave Photonics
- Quantum Optics
- Atomic Clocks
- Fiber Sensing

Features

- Ultra-Narrow Bandwidth
- Precision Tuning
- High Optical Isolation
- Sharp-Edged
- Flexible
- Easy Integration

The TFN Narrowband Tunable Optical Filter combines indie's fiber Bragg grating (FBG) technology and a thermally tunable platform to create a tunable filter with unprecedented stability and resolution.

The TFN is available in two models: reflection (R) and transmission-reflection (T+R). The narrowband option enables bandwidths from 2 GHz to 100 GHz, and the ultra-narrowband option enables bandwidths from 35 MHz to 500 MHz.

Both models feature wavelength tuning resolution of 2 pm (250 MHz at 1550 nm) over a range of +/- 30 GHz around the center wavelength.

The TFN tunable optical filter has been specifically designed for high-precision applications that require a high-optical isolation coupled with precise and accurate narrowband filtering. It provides excellent sideband filtering and carrier suppression, making this tunable filter ideal for RF over fiber, advanced fiber-optic sensing systems and quantum applications.

Features Details

- **Ultra-Narrow Bandwidth:** Supports bandwidths as narrow as 35 MHz.
- **Precision Tuning:** Tunable over a range of ±30 GHz around the center frequency with a resolution of 2 pm.
- **High Optical Isolation:** Narrowband models can reach optical isolation higher than 25 dB.
- **Sharp-Edged:** Both the narrowband flat-top filter and ultra-narrowband notch filter have sharp-edged spectra for precision wavelength filtering.
- **Flexible:** Can be cascaded to separate, redirect, and combine different wavelength peaks.
- **Easy Integration:** Comes equipped with control software that makes this tunable filter ready-made for advanced fiber-optic systems requiring precise tuning and excellent sideband suppression.

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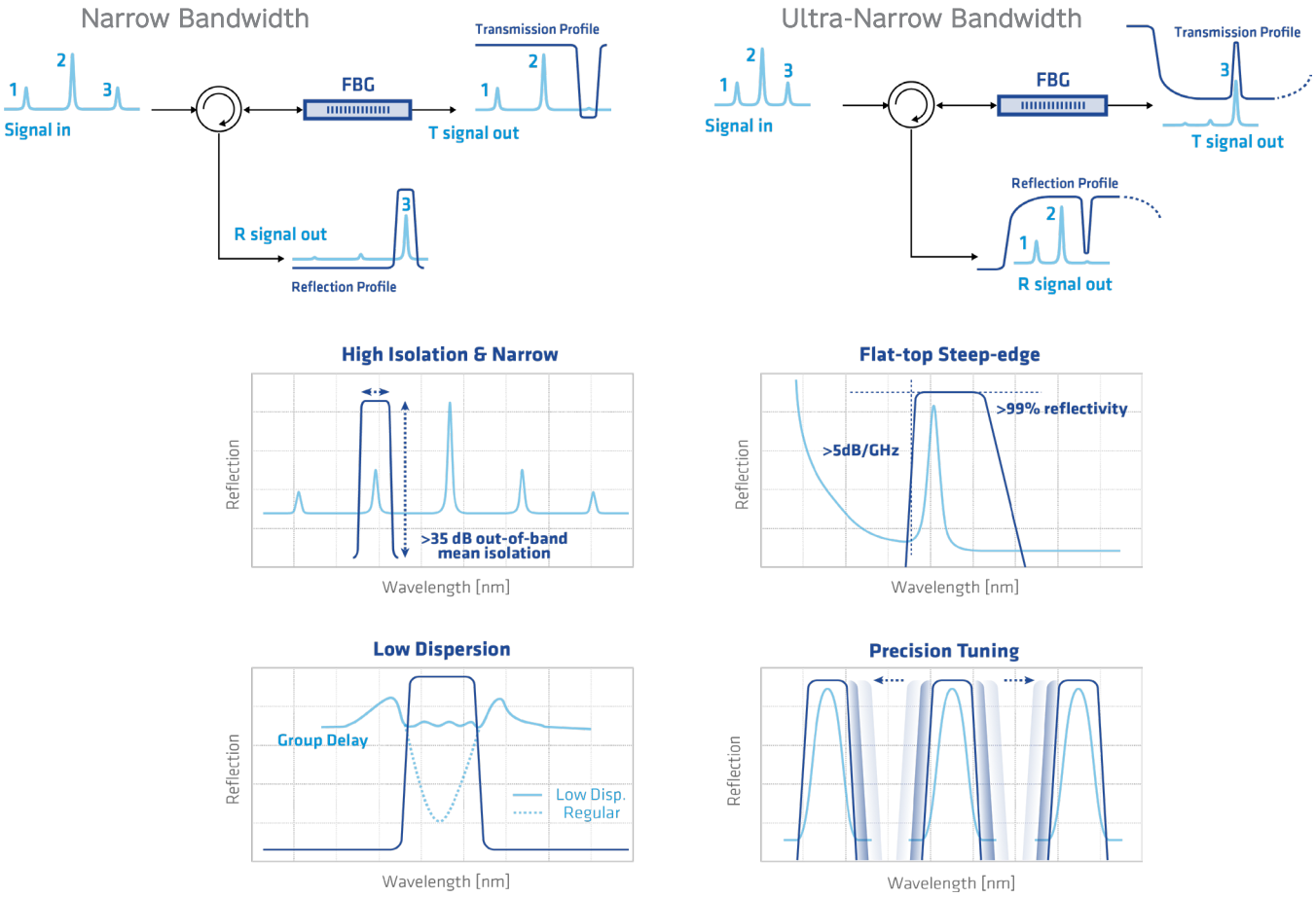
Filter Profile Examples, Usage and Applications



Usage	Key Features	Application Examples
• Optical communication carrier and side- band suppression	• Flat-top steep-edge • High optical isolation BW: 2 – 12 GHz typical	• RF over Fiber • DWDM Access & DCI • Quantum Computing
• Brillouin or Rayleigh signal isolation • Probe or pump wavelength isolation • ASE suppression	• High reflectivity • High optical isolation • Minimal thermal drift BW: 5 – 25 GHz typical	• Distributed Fiber Sensing • Quantum Sensing
• Picosecond lasers spectral filtering • Cyberattacks prevention	• Low dispersion • High isolation BW: 0.1 – 0.8 nm typical	• Quantum Key Distribution • Ultrafast lasers

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Optical Specifications	Narrowband Configuration	Ultra-narrowband Configuration	Units
Single center wavelength λ @25°C (referenced to vacuum) (1)	700 — 2100	1525 — 1570	nm
Bandwidth	2 — 100	0.035 — 0.5	GHz
Reflectivity	50 – 99.9+	N/A(2)	%
Side Mode Suppression Ratio (SMSR)	> 20	N/A	dB
Power handling	500 (3)	10 – 40	mW
Typical insertion loss	< 3.5 (3)	< 2	dB
Fiber type	PM or non-PM	PM	
Tuning range	±30		GHz
Tuning resolution	2		pm
Isolation	20 – 70 (4)		dB
Polarization extinction ratio	> 20		dB

(1) Other center wavelengths available on request
(2) Notch optimized for transmission
(3) Including circulator
(4) Per FBG; BW/2 + 10GHz (~10 GHz from edge)

Other Specifications	Values	Units
Operating temperature	-5 to 65	°C
Storage temperature	-40 to 85	°C
Control interface	I2C	
Voltage	5	V
Typical power consumption	3	W
R module dimensions	130 x 22 x 14	mm
T+R standard module dimensions	150 x 54 x 19.5	mm
T+R compact module dimensions	158 x 25 x 16	mm
RoHS compliance	Yes	

Reflection (R) module

Transmission + Reflection (T+R) standard module

Transmission + Reflection (T+R) compact module

Contact us at info@teraxion.com or visit our website www.indie.inc/photonics.