

## Tunable IR Filter – Fabry-Perot Interferometer

### 1. General Description

A Fabry-Perot-Interferometer (FPI) with quarter wavelength stacks supported by thick silicon carriers used as mirrors is the optical active part of this tunable infrared filter. A special arranged parallel spring suspension of the movable mirror fabricated by bulk micro machining leads to very flat and parallel mirrors and to potentially high wavelength resolution as well as high transmission rates. The filter is electro statically actuated. The cavity of the FPI defining the central transmission wavelength is capacitively detected by electronics on base of Digital Signal Processing which allows setting up a closed loop system for high precision filters.

Important benefits are high accuracy, very good parallelism of reflectors already without closed-loop operation, mechanical robustness and typical microsystem properties: small size and light weight.

The tunable infrared filter was developed and built up in cooperation with InfraTec GmbH Dresden.

### 2. Features

- First order IR filter
- Thick reflector carriers (300  $\mu\text{m}$ ) with two (HL) quarter wavelength stacks (poly-Si,  $\text{SiO}_2$ )
- Movable reflector suspended by parallel spring hinges

### 3. Suggested Applications

- Infrared measurement
- Gas concentration measurement
- Spectral imaging

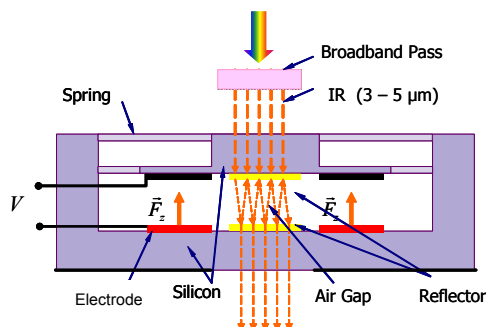


Fig. 1: Schematic cross view and working principle

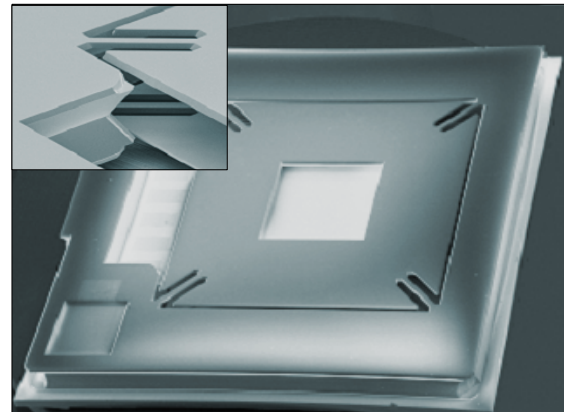


Fig. 2: SEM view of the filter chip and the spring hinges

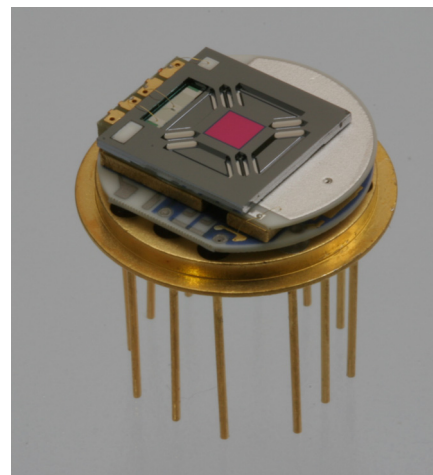


Fig. 3: IR detector with filter module mounted in TO8 package

### 4. Characteristics

Parameter	Value	Unit
Measurement range:	3.0 - 4.2	$\mu\text{m}$
	3.9 - 5.0	$\mu\text{m}$
Transmission:	> 50	%
Bandwidth (FWHM):	50	nm
Tuning voltage:	max. 15	V
Aperture:	2.2 x 2.2	$\text{mm}^2$
Chip size:	(8.5x8.5x0.6)	$\text{mm}^3$

### 5. Contact

Dr. Steffen Kurth  
Phone: +49 371 45001-255  
Fax: +49 371 45001-355  
E-Mail: [steffen.kurth@enas.fraunhofer.de](mailto:steffen.kurth@enas.fraunhofer.de)