

# **MEMS TUNABLE OPTICAL FILTER**

*With Control Board*

## **OVERVIEW**

**sercalo**'s Tunable Optical Filter is based on MEMS technology and is designed for ITU C and L band with 50 GHz or 100 GHz channel spacing. It can be independently controlled by an UART interface or an I<sup>2</sup>C/SMBus serial bus and features a user-programmable channel grid.

The highly reliable tuning mechanism uses an integrated micro-mirror with switching time below 50 ms and insertion loss below 3 dB.

The component is designed to conform to Telcordia 1221 reliability standards.

## **FEATURES**

- *45 x 23 x 10 mm<sup>3</sup> size*
- *User-programmable channel grid*
- *UART and I<sup>2</sup>C/SMBus interface*

## **APPLICATIONS**

- *Reconfigurable Optical Add/Drop Multiplexers*
- *Optical power monitors*
- *Optical sensor interrogators*
- *Low cost spectrometer*
- *Low cost tunable laser*

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## DESCRIPTION

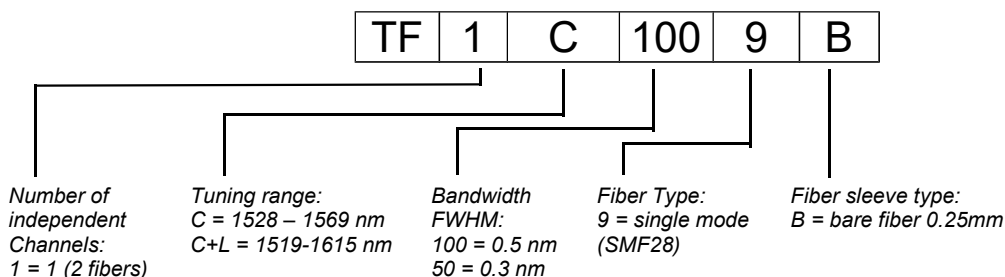
The tunable Filter is composed of an optical system and an electrical driver interface with a size of only 45 x 23 x 10 mm<sup>3</sup>. Light from the input fiber is collimated onto a fused silica grating. The grating diffracts the incoming light into its spectrum with a distinct angle for each wavelength. A MEMS mirror reflects the light onto the output collimator, which only couples a small fraction of the spectrum into the output fiber. By modifying the mirror tilt angle user can chose the wavelength of the filter.

## TECHNICAL SPECIFICATIONS

		Unit	Min	Typ	Max
<b>Optical Filter</b>					
Tuning range (span)		nm	1529		1615
Central wavelength				1570	
Insertion loss <sup>1</sup>		dB		1.5	3.0
model TF1C50	Bandwidth @ 0.5 dB	nm		0.12	
	Bandwidth @ 3 dB	nm		0.3	
	Bandwidth @ 10 dB	nm		0.6	
	Bandwidth @ 20 dB	nm		0.8	
model TF1C100	Bandwidth @ 0.5 dB	nm		0.2	
	Bandwidth @ 3 dB	nm		0.5	
	Bandwidth @ 10 dB	nm		1.0	
	Bandwidth @ 20 dB	nm		1.2	
Return loss		dB	30		
Wavelength repeatability		nm		0.01	
Wavelength temperature dependence		pm/K		1	5
Switching time		ms		10	50
PDL		dB		0.3	
Durability		cycles	No wear		
Side Mode Suppression Ratio (SMSR)		dB	25		
<b>Integrated Driver</b>					
Supply voltage (Vdd)		V	4.75	5	5.25
Power consumption (idle)		W		0.2	
Power consumption (operating)		W		1	
UART speed		baud	9600		115200
SMBus/I <sup>2</sup> C bus speed		kHz			400
Logic level low		V		0	0.6
Logic level high		V	2.8	5	
Reset inactive voltage <sup>2</sup>		V	2.4	5	
Reset active voltage		V		0	0.9
Reset pulse duration		ms	15		
<b>Package</b>					
Operation temperature		°C	0		70
Storage temperature		°C	-40		70
Size (including control board)		mm	45 x 23 x 10		
Size (only optical engine)		mm	16 x 11.2 x 9.2		
Weight		g	75		

<sup>1</sup>Value @ 25 °C, without connectors. <sup>2</sup>Through onboard pull-up resistor.

## ORDERING INFORMATION

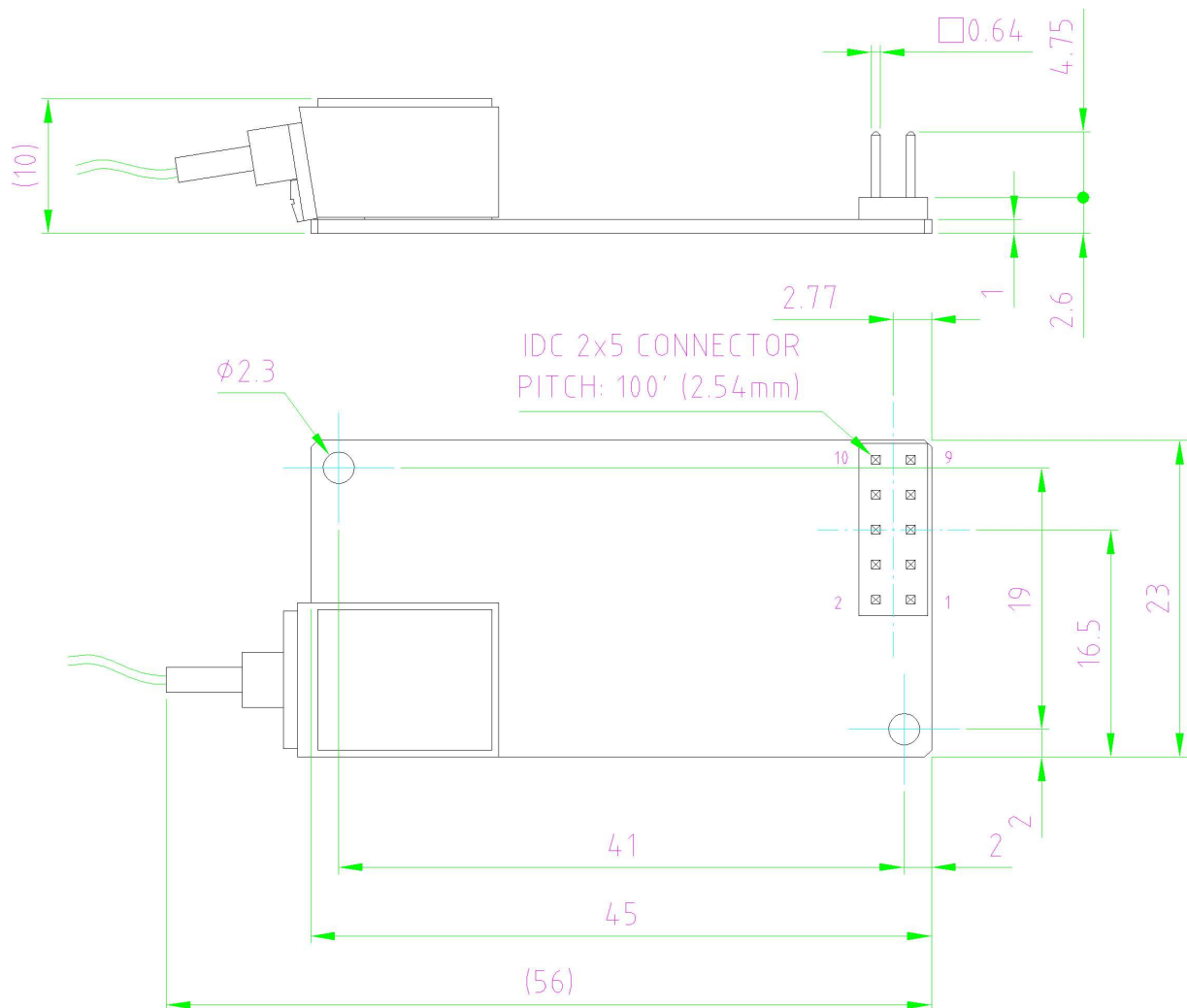


## CONNECTOR PINOUT

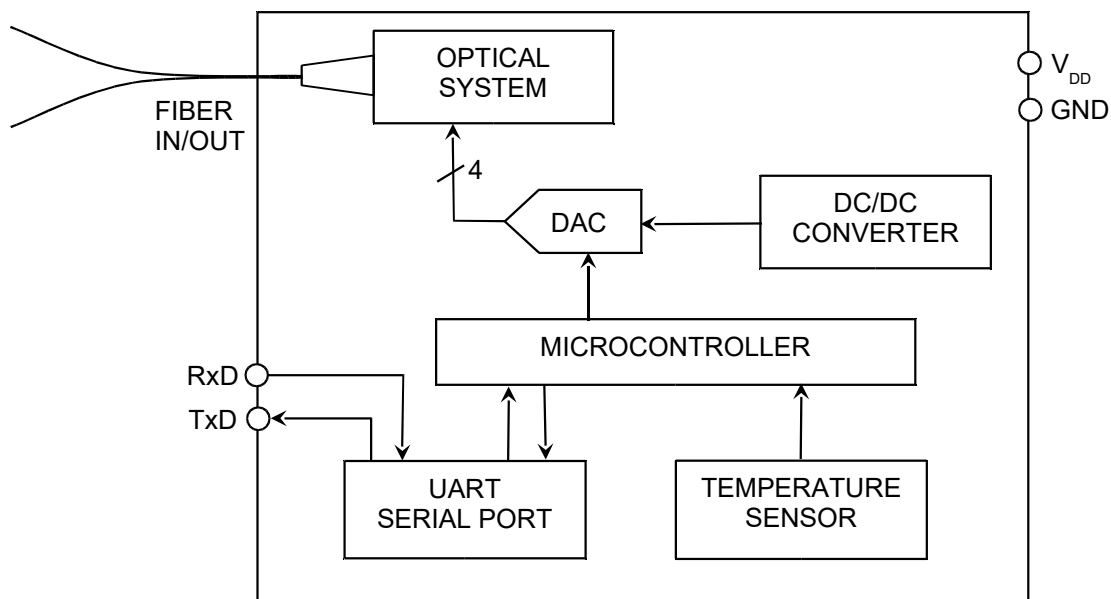
Pin number	Description
1	Ground (GND)
2	Supply voltage (V <sub>DD</sub> )
3	Reserved <sup>1</sup>
4	UART TX data
5	Reserved <sup>1</sup>
6	UART RX data
7	System reset (/RST)
8	SMBus/I <sup>2</sup> C SDA
9	SMBus/I <sup>2</sup> C SCL
10	Ground (GND)

<sup>1</sup>Let reserved pins unconnected.

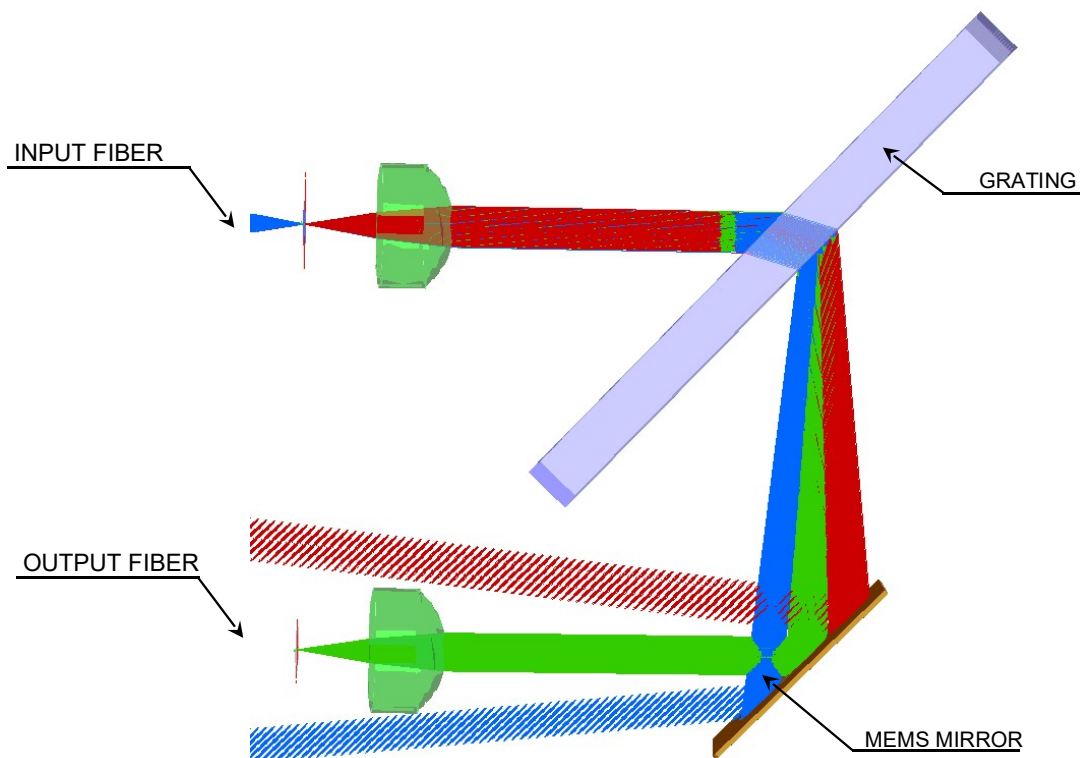
## DEVICE LAYOUT (DIMENSIONS IN MILLIMETERS)



## FUNCTIONAL BLOCK DIAGRAM



## TUNABLE FILTER OPERATING PRINCIPLE



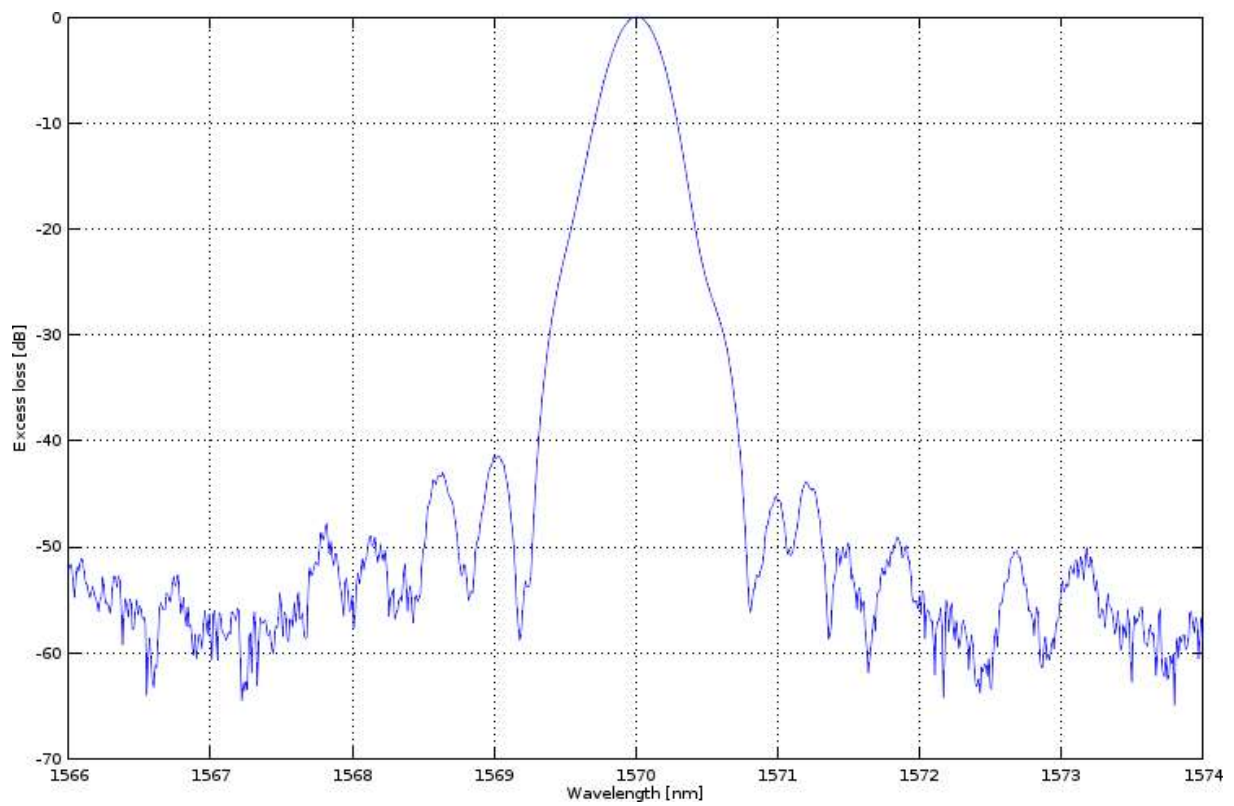
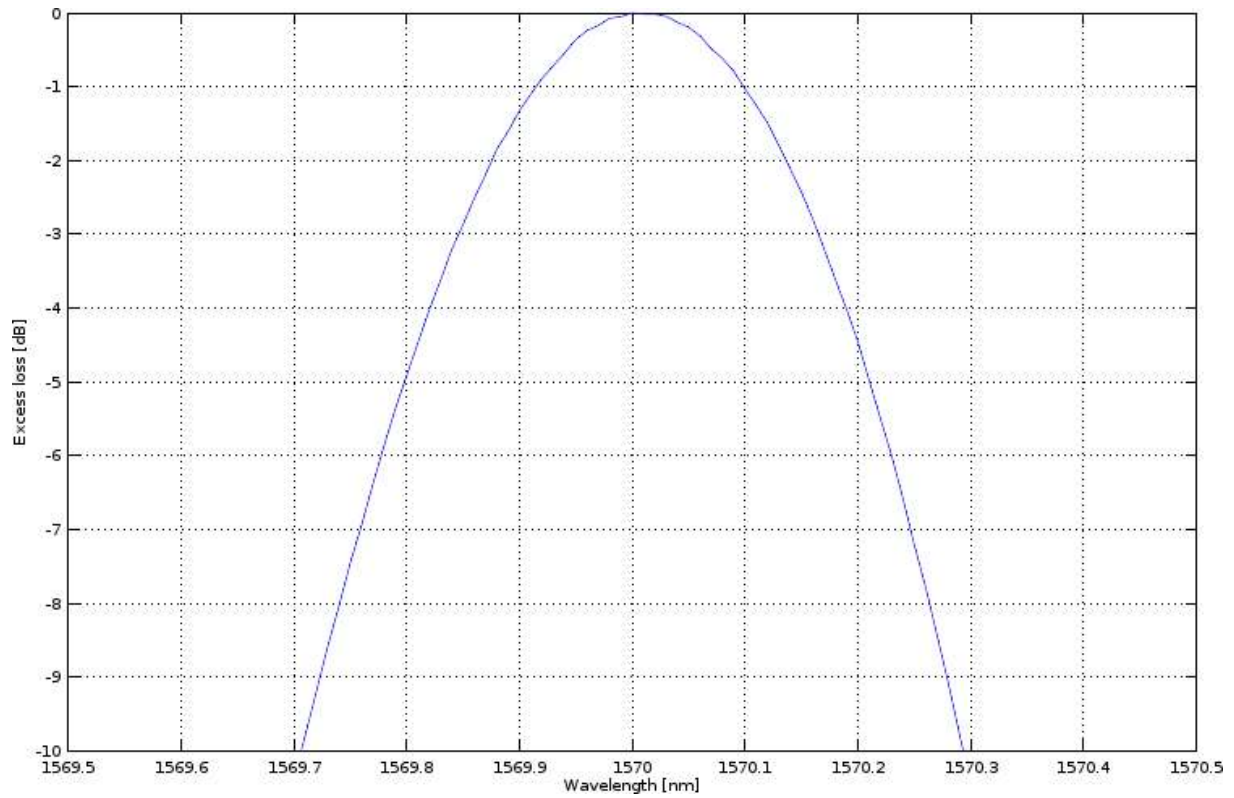
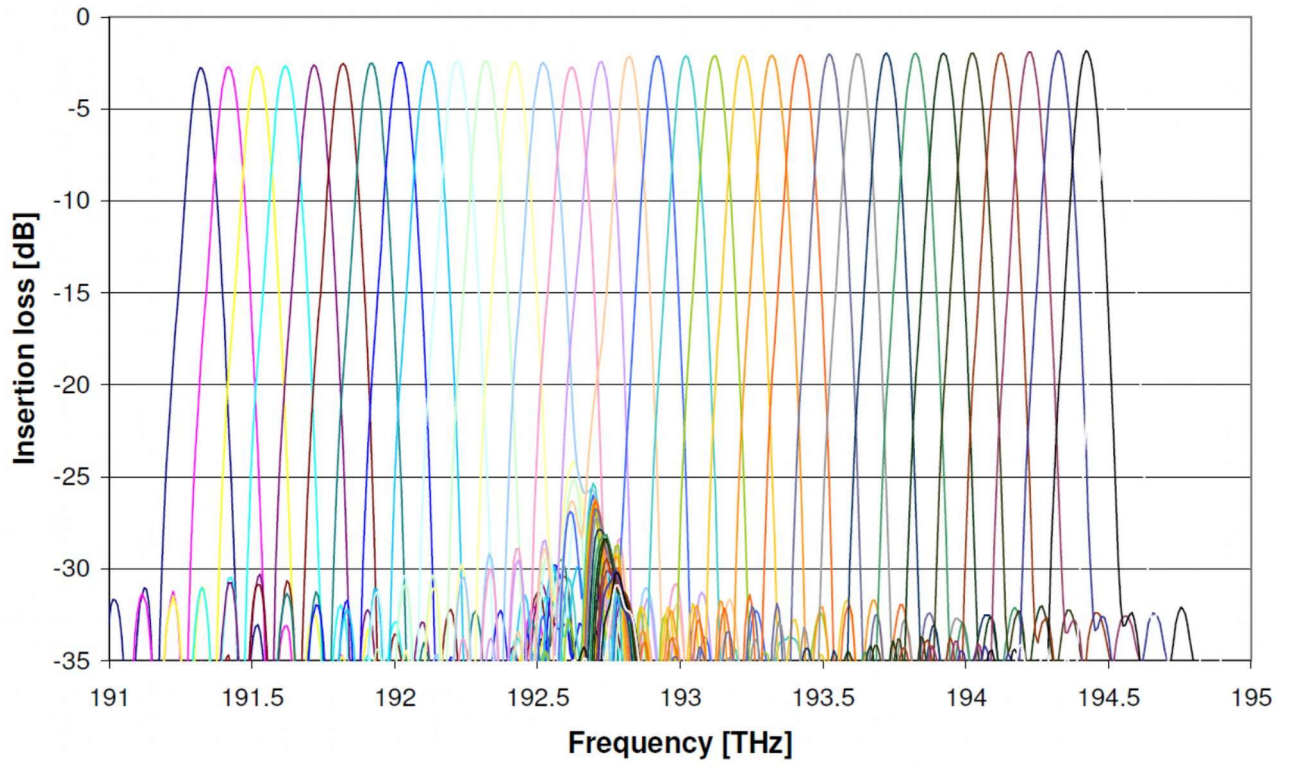


Figure 1 – Typical filter shape (model TF1C509B)



**Figure 2 – Example of custom grid: 100GHz spacing, 32 channels**