MEMS TUNABLE OPTICAL FILTER

OVERVIEW

sercalo's Tunable Optical Filter is based on MEMS technology and is designed for ITU O, C and L band with 50 GHz or 100 GHz channel spacing. The highly reliable tuning mechanism uses an integrated micro-mirror with switching time below 50 ms and insertion loss below 3 dB.

The bare Tunable Filter component (BCTF variant) measures only 43x11x9.5 mm and is ideal for applications requiring reduced size and weight. The miniature package withstands rugged environments and is well suited for direct mounting on printed circuit boards.

An interface board with UART and I²C/SMBus is also available.

The component is compliant to Telcordia 1221 reliability standards and RoHS requirements 2015/863/EU.
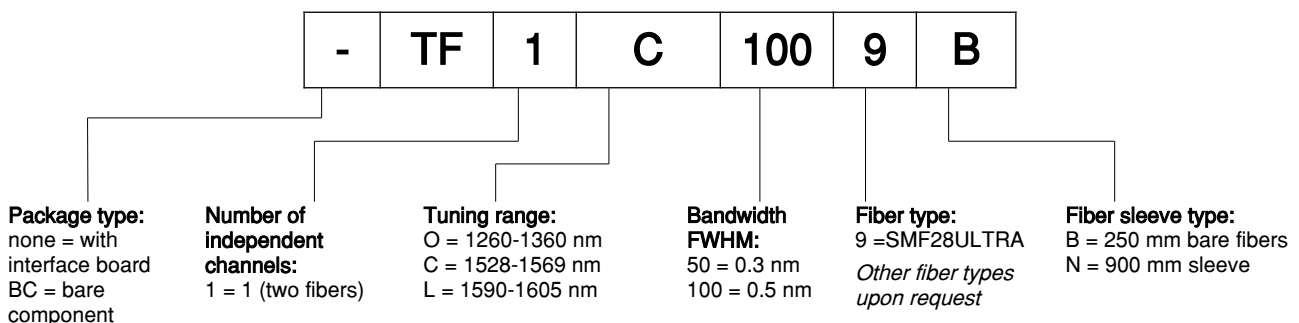
FEATURES

- Small 43x11x9.5 mm³ body size
- Low insertion loss
- Also available with UART and I²C/SMBus interface board

APPLICATIONS

- Reconfigurable optical add/drop multiplexers
- Optical sensor interrogators
- Optical power monitors
- Low cost spectrometers

Contact:
Sercalo Microtechnology Ltd.
Landstrasse 151
9494 Schaan - Principality of Liechtenstein
Tel. +423 237 57 97   Fax. +423 237 57 48
http://www.sercalo.com e-mail: info@sercalo.com

ORDERING INFORMATION

-	TF	1	C	100	9	B

Package type:
none = with interface board
BC = bare component

Number of independent channels:
1 = 1 (two fibers)

Tuning range:
O = 1260-1360 nm
C = 1528-1569 nm
L = 1590-1605 nm

Bandwidth FWHM:
50 = 0.3 nm
100 = 0.5 nm

Fiber type:
9 = SMF28ULTRA
Other fiber types upon request

Fiber sleeve type:
B = 250 mm bare fibers
N = 900 mm sleeve

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sercalo's Tunable Filter is composed by an optical system where light coming from the input fiber is collimated on a fused silica grating. The grating diffracts the light with a distinct angle for each wavelength. Light is then reflected by a MEMS mirror onto the output collimator which only couples a small fraction of it into the output fiber. By modifying the MEMS mirror tilt angle user can chose the central wavelength of the filter.

TECHNICAL SPECIFICATIONS

		Unit	Min	Typ	Max
Optical specifications					
Tuning range (O band variant)		nm	1260		1360
Tuning range (C band variant)		nm	1528		1569
Tuning range (L band variant)		nm	1570		1615
Insertion loss[1]		dB		2.5	4.0
Variant TFxx50	Full bandwidth @ 0.5 dB	nm		0.12	
	Full bandwidth @ 3 dB	nm		0.3	
	Full bandwidth @ 10 dB	nm		0.6	
	Full bandwidth @ 20 dB	nm		0.8	
Variant TFxx100	Full bandwidth @ 0.5 dB	nm		0.2	
	Full bandwidth @ 3 dB	nm		0.5	
	Full bandwidth @ 10 dB	nm		1.0	
	Full bandwidth @ 20 dB	nm		1.2	
Return loss		dB	30		
Wavelength repeatability		nm		0.01	
Wavelength temperature dependence		pm/˚C		1	5
Switching time		ms		10	50
Polarization dependent loss		dB		0.3	0.5
Durability		cycles		No wear out	
Side Mode Suppression Ratio (SMSR)		dB		25	
Electrical specifications (optical component)					
Driving voltage voltage		V	0		60
Driving voltage damage threshold		V			65
Electrostatic discharge tolerance[2]		V			70
Electrical specifications (control board)					
Supply voltage		V	4.75	5	5.25
Power consumption (idle)		W		0.2	
Power consumption (operating)		W		1	
UART speed		baud	9600		115200
SMBus/I²C bus speed		kHz			400
Input logic level low		V		0	0.6
Input logic level high		V	2.4	5	
Output logic level low		V		0	0.6
Output logic level high		V	2.6	3.3	
Reset inactive voltage[3]		V	2.4	5	
Reset active voltage		V		0	0.9
Reset pulse duration		μs	15		
Package					
Operating temperature		˚C	0		70
Storage temperature		˚C	-40		70
Operation humidity (non condensing)		% r.h.	0		95
Pigtail length		cm	50		100
Size (optical component)		mm		43.3 x 11.2 x 9.5	
Size (with control board)		mm		45 x 23 x 10	
Weight		g		75	
ROHS Compliance				2015/863/EU (no exceptions)	

[1]*Value @ 25 ˚C, without connectors.* [2]*The bare optical component is not protected against ESD and need special care during handling.* [3]*Through onboard pull-up resistor.*
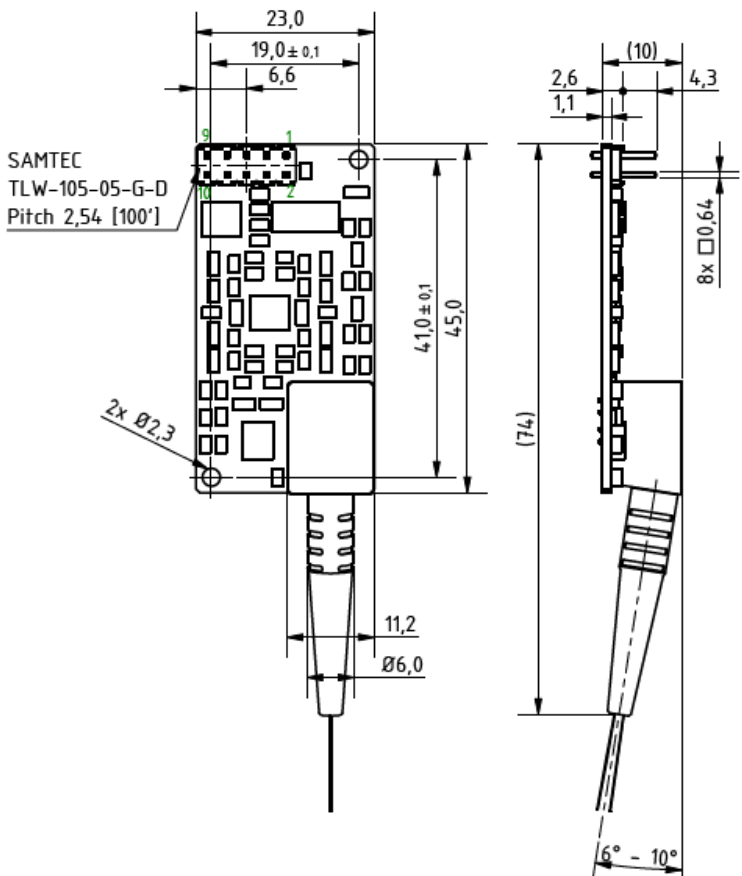
BCTF – BARE OPTICAL COMPONENT (DIMENSIONS IN MILLIMETERS)
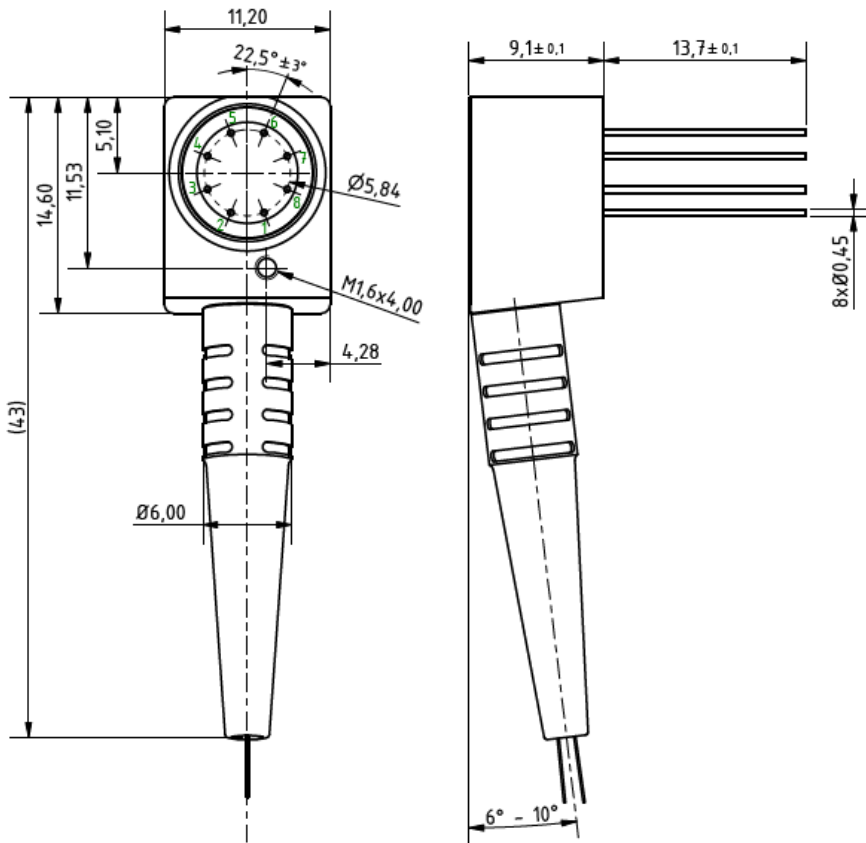
Pin number	Description
1	Not connected
2	Not connected
3	Y+
4	Not connected
5	X-
6	Y-
7	Common reference
8	X+

TF – WITH CONTROL BOARD (DIMENSIONS IN MILLIMETERS)

SAMTEC
TLW-105-05-G-D
Pitch 2,54 [100']

Pin number	Description
1	Ground (GND)
2	Supply voltage (V_{DD})
3	Reserved
4	UART Tx
5	Reserved
6	UART Rx
7	Reset (/RST)
8	SMBus/I²C SDA
9	SMBus/I²C SCL
10	Ground (GND)

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TUNABLE FILTER OPERATING PRINCIPLE
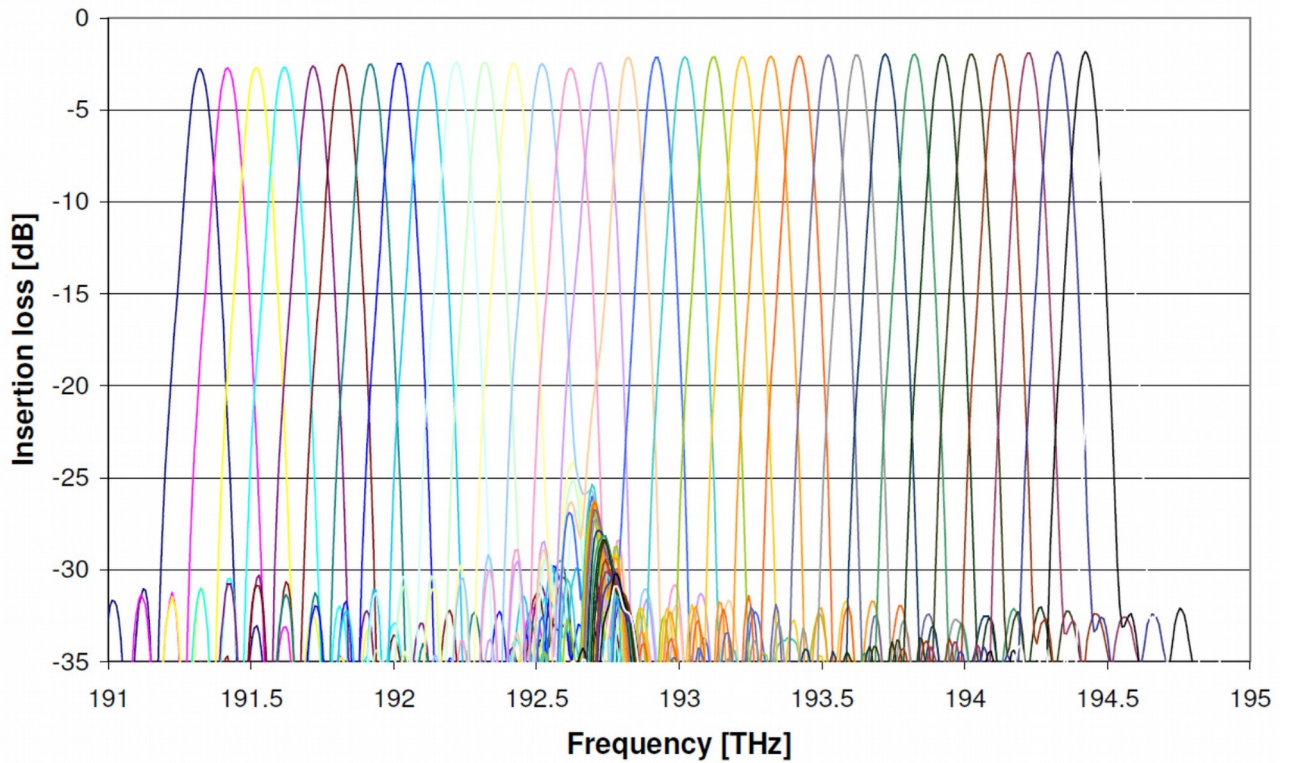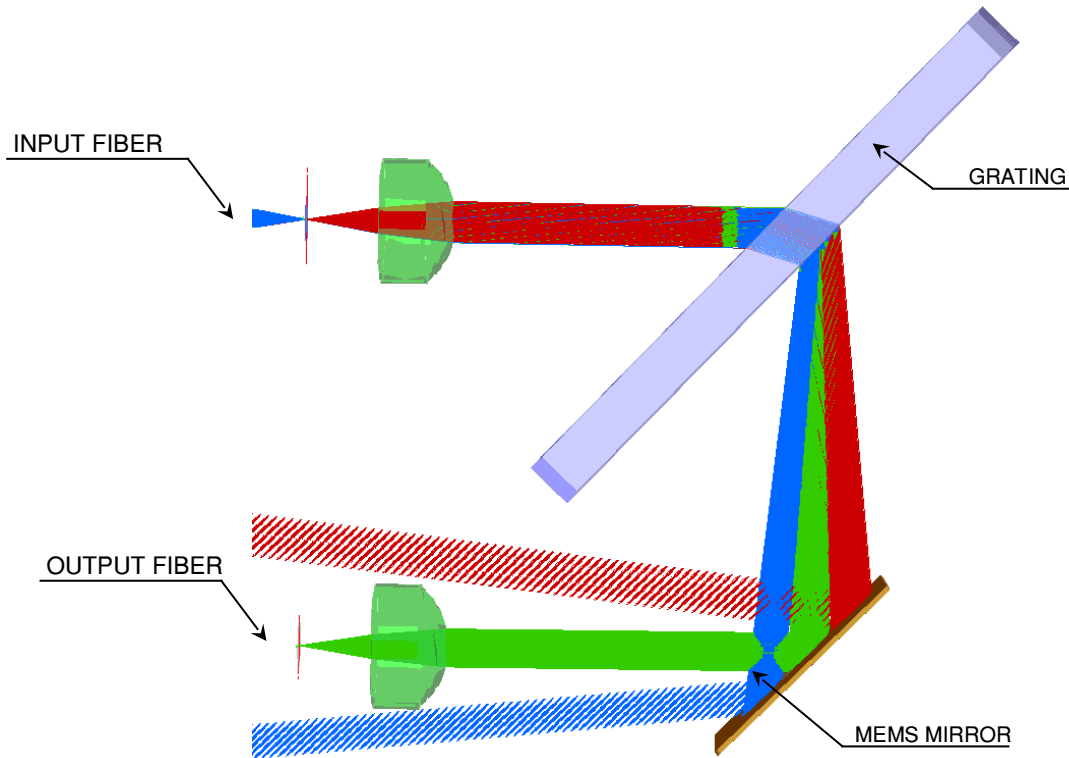
Figure 1 – Example of custom grid: 100GHz spacing, 32 channels
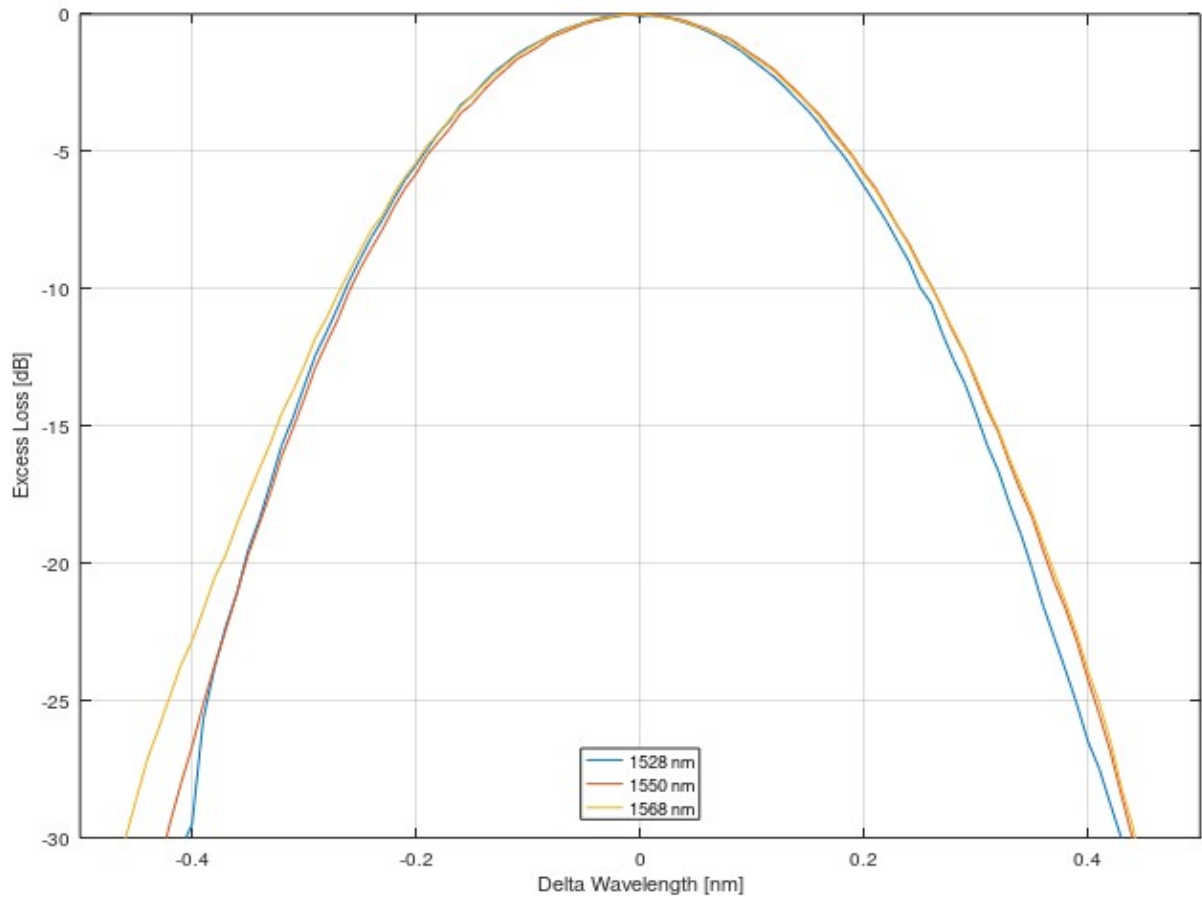
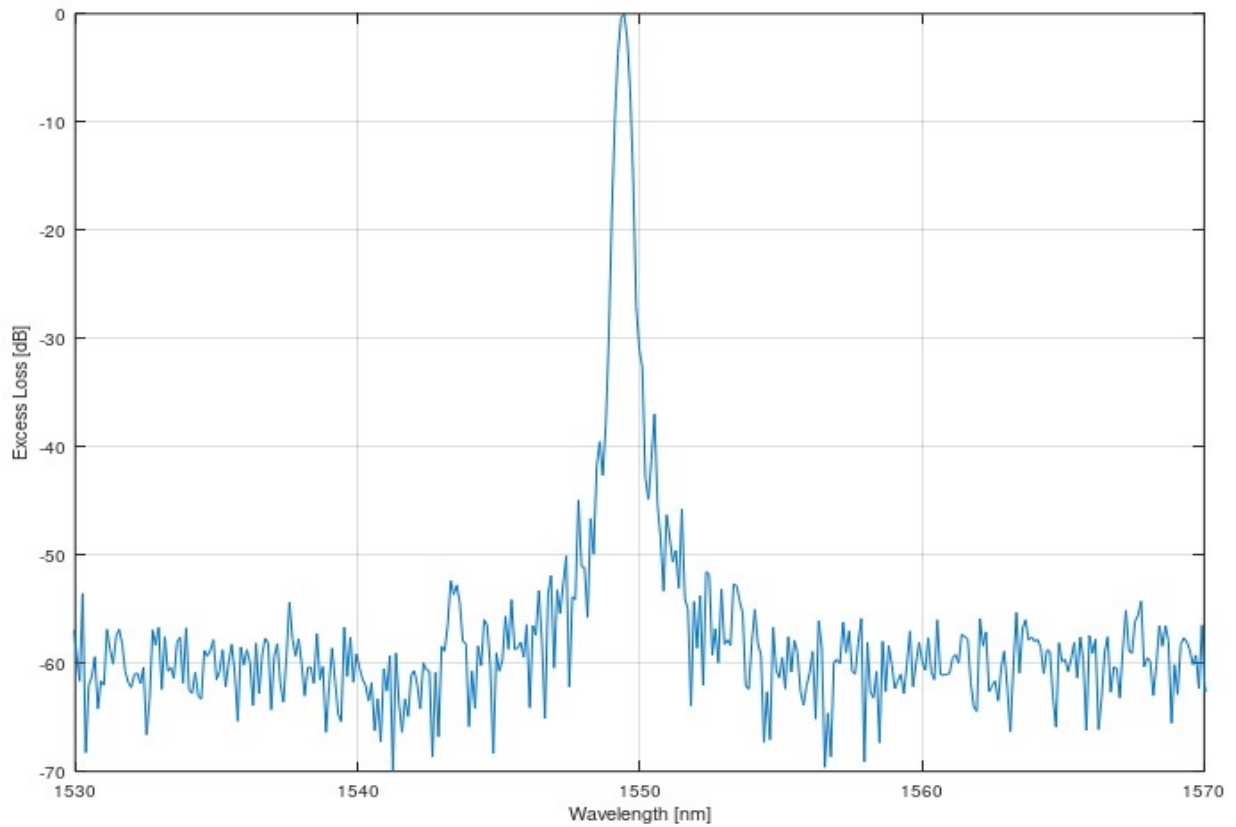**Figure 2 – Typical filter shape (50 GHz, C band variant)**

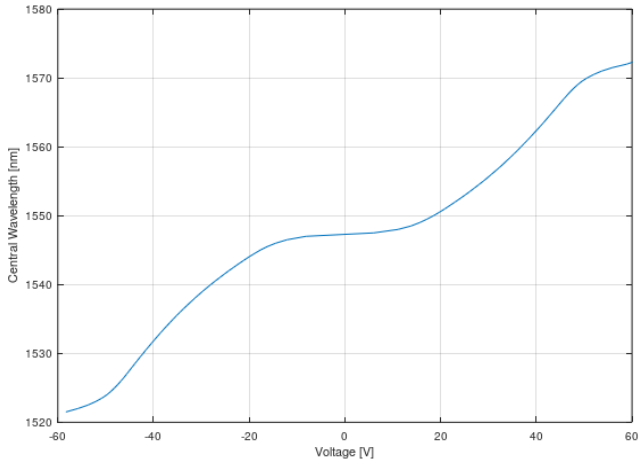**Figure 3 – Typical filter shape over the whole tuning range (C band variant)**

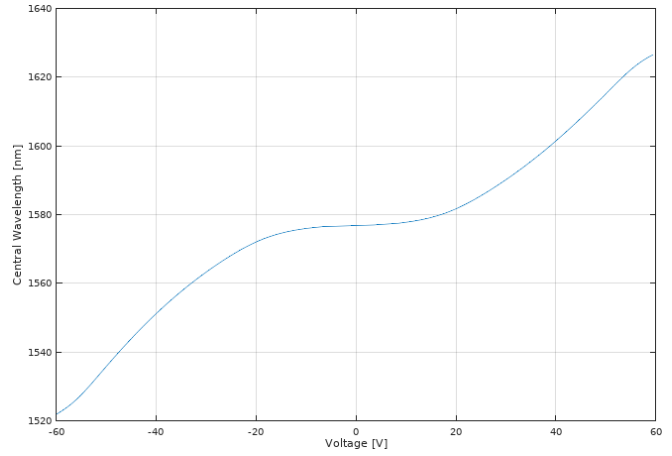Figure 4 – Typical Central Wavelength vs. Voltage (C band variant)

Figure 5 – Typical Central Wavelength vs. Voltage (C+L band variant)

Ordering Information:

XSoptix

800 Village Walk #316
Guilford, CT 06437
Ph: 203-401-8093
Email orders to: sales@xsoptix.com
Fax orders to: 800-878-7282

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