

# Introduction to Polymer Filter

December, 2014

Koshin Kogaku Co. Ltd.

# What is Polymer Filter?

Polymer filter was originally developed by NTT(Nippon Telegraph and Telephone Corporation), and was commercialized by Koshin Kogaku Co., Ltd. This filter is so thin and tiny, it can be placed in optical modules which has limited interior spaces.

A thickness of the filter is typically 30  $\mu\text{m}$  (polymer itself  $\sim 5\mu\text{m}$ )\*. With such a thinness, the filter can be inserted into a slit made on the fiber, optical wave guide or ferrule.

\*Note: Minimum thickness of typical glass-based filter is 100  $\mu\text{m}$ .

# Configuration of Optical Wavelength

Optical communication system allows simultaneous transmitting both high-speed data communication signal and multi-channel video signal in a single optical fiber adopting a wavelength allocation based on ITU-T recommendation G.983.3 and IEEE standard for data communication.

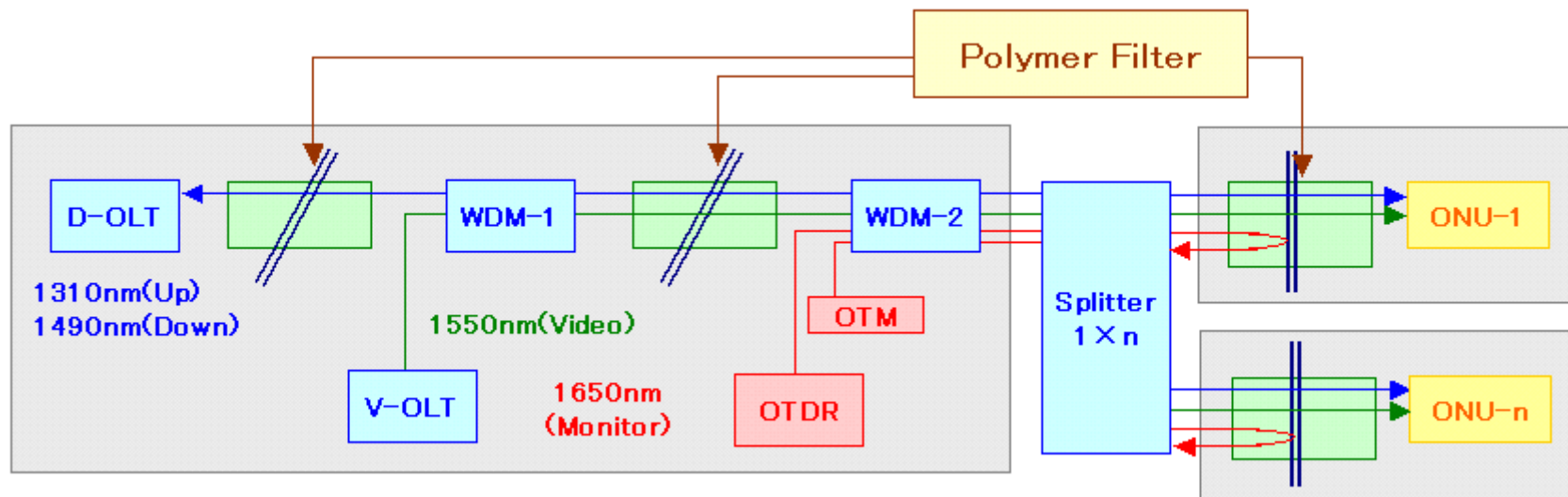
↓ The system uses following wavelength in general case. ↓

- \*  $1.31 \mu\text{m}$  (1310 nm) = Upstream
- \*  $1.49 \mu\text{m}$  (1490 nm) = Downstream
- \*  $1.55 \mu\text{m}$  (1550 nm) = Video Distribution
- \*  $1.65 \mu\text{m}$  (1650 nm) = Monitoring

# Role of Polymer Filter in FTTx system

**Polymer filter works as a key part that select and dispense the optical data.**

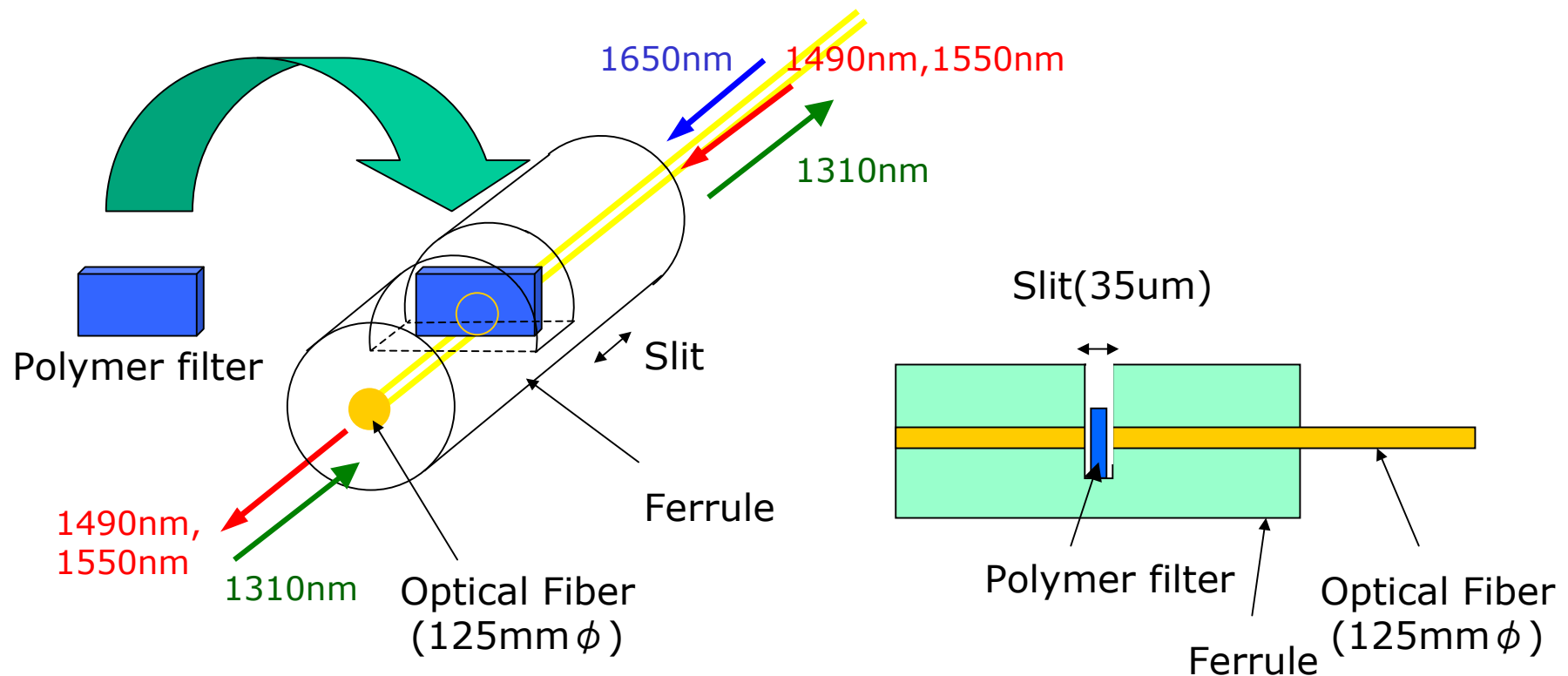
**This very thin filter has as excellent optical characteristics as ordinary glass-based filter; however; it occupies less spaces than glass-based one in limited area.**



# Implementation – Case 1

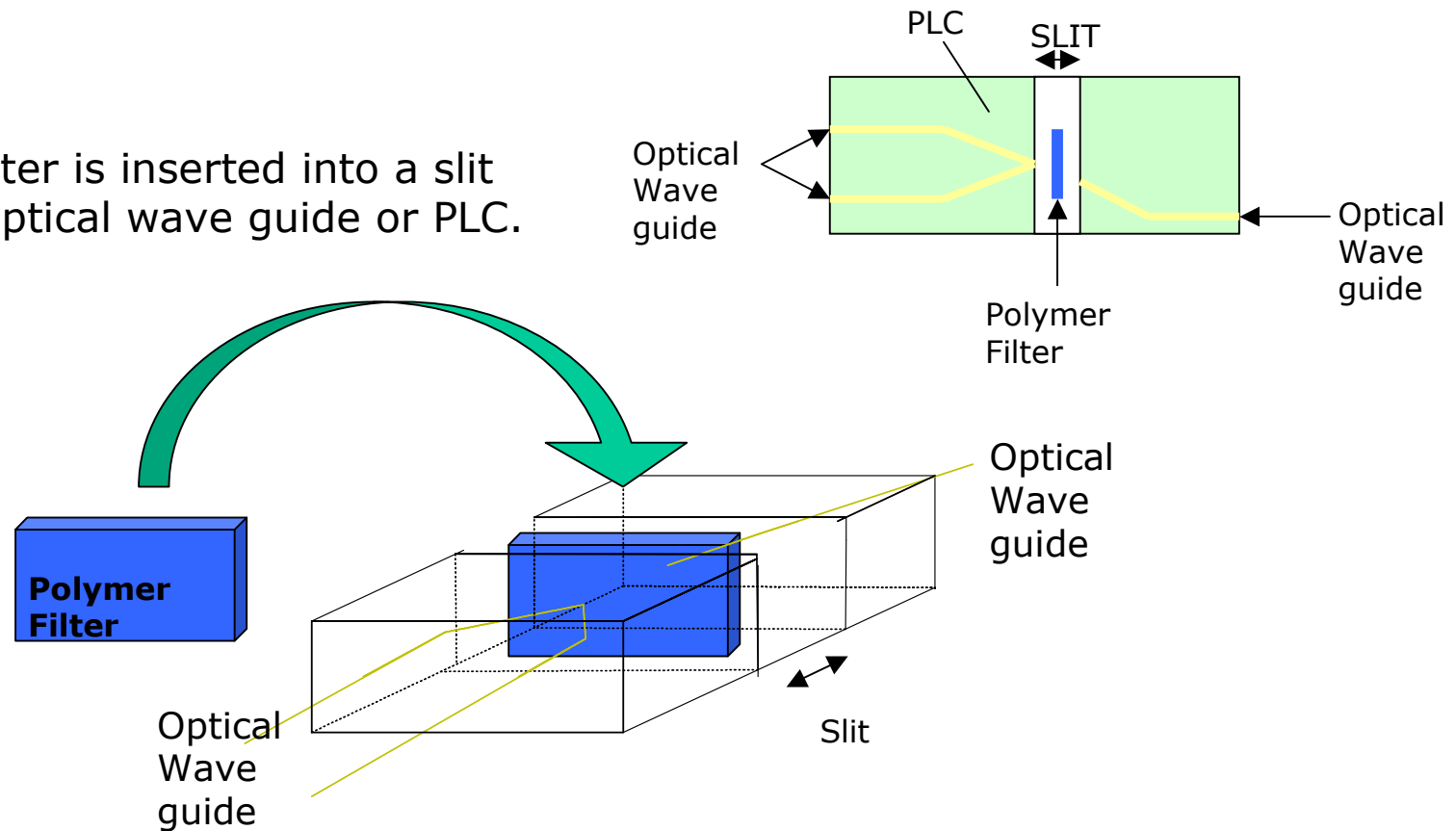
Polymer filter is inserted into a slit made on the fiber.

**Width of slit is approximately 35  $\mu\text{m}$**



# Implementation - Case 2

Polymer filter is inserted into a slit made on optical wave guide or PLC.

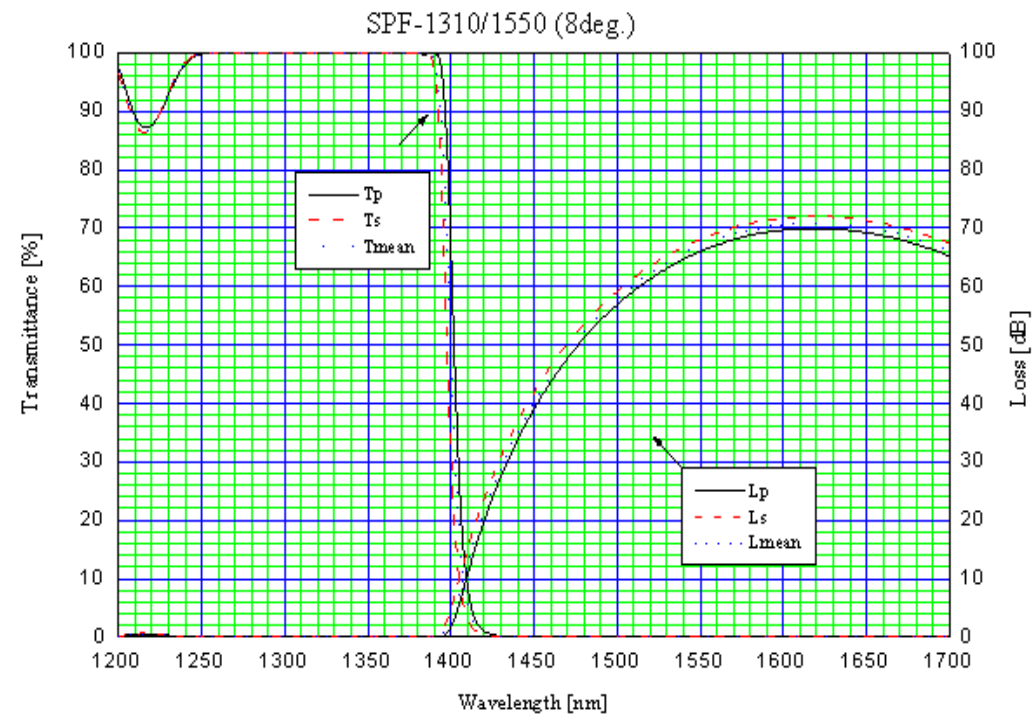


# Types of Polymer Filters - 1

© SPF1310/1550

✧ Transmittance: 1310nm

✧ Reflection: 1550nm

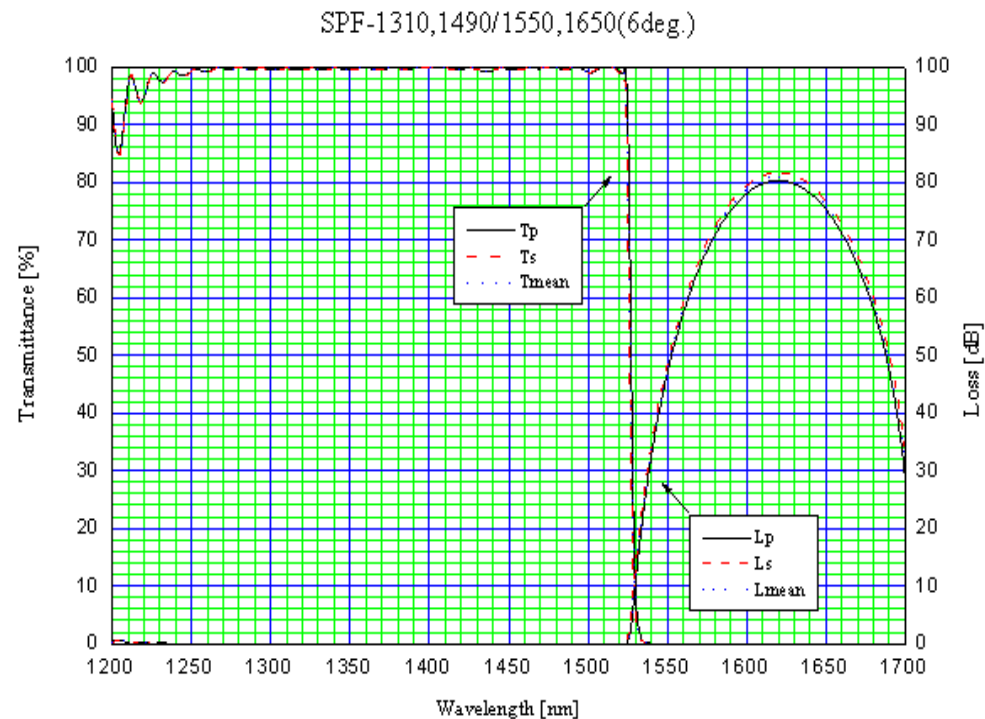


# Types of Polymer Filters - 2

© SPF1310-1490/1550-1650

✧ Transmittance: 1310nm 1490nm

✧ Reflection: 1550nm 1650nm



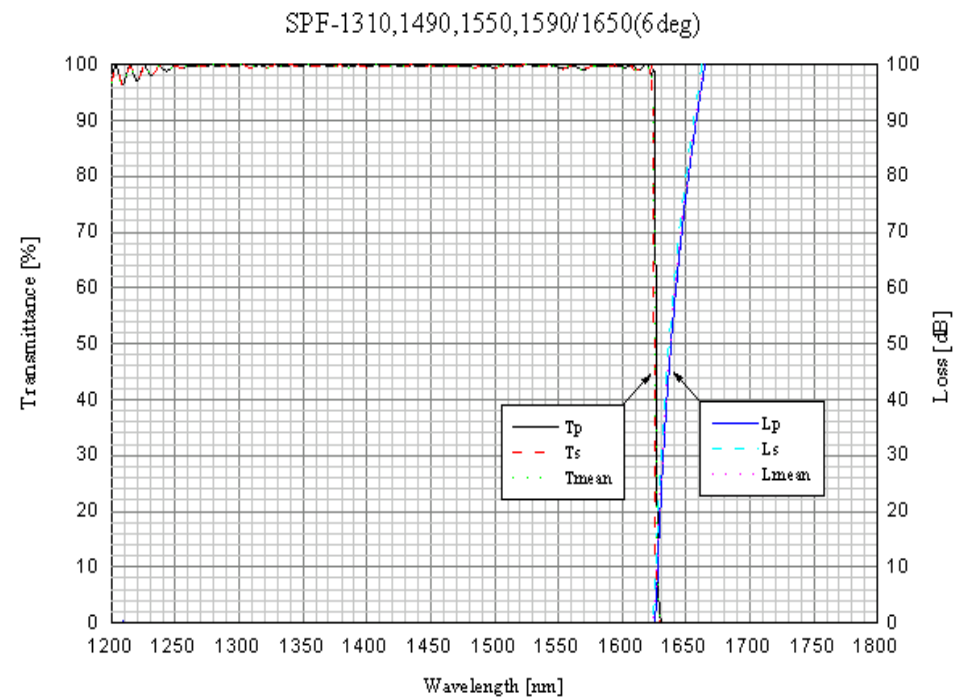


# Types of Polymer Filters - 3

© SPF1310-1490-1550/1650

✧ Transmittance: 1310nm 1490nm 1550nm 1590nm

✧ Reflection: 1650nm



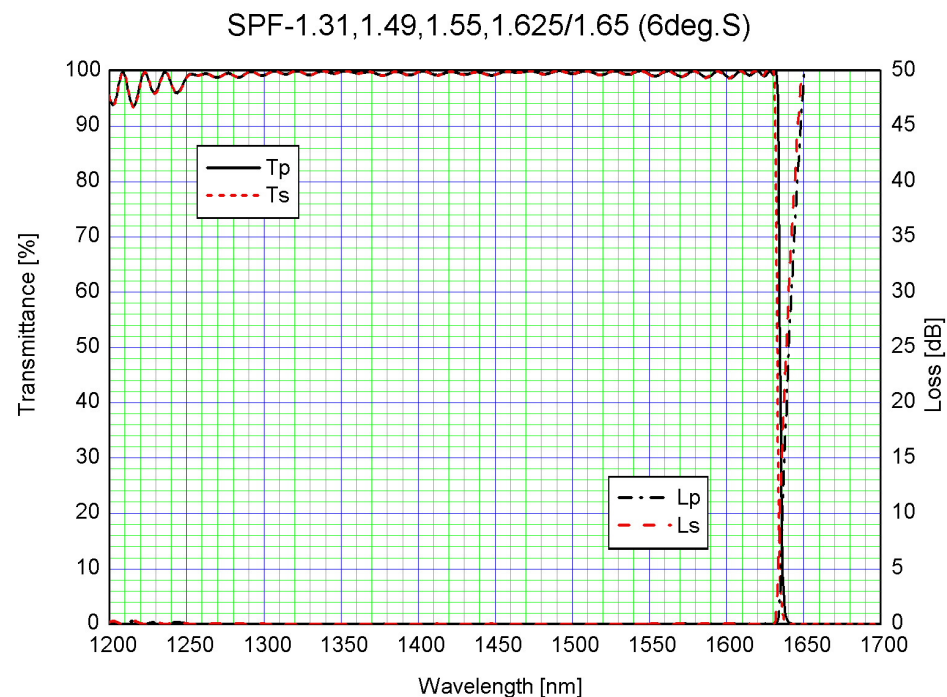
# Types of Polymer Filters - 4

© SPF1310-1490-1550-1625/1650

... Applicable to the wavelength assignment for NG-PON2.

✧ Transmittance: 1310nm 1490nm 1550nm 1590nm 1625nm

✧ Reflection: 1650nm



## Information required to design the polymer filter.

- 1, Dimensions of the filter
- 2, Spectrum specification required
- 3, Quantity required monthly and/or annually
- 4, Intended application

# Achievement

- Optical transceiver maker, Fiber optic cable manufacturer, or PLC manufacturer.
  - Such as: Furukawa Electric, Fujikura, Sumitomo Electric, etc.
- Telecommunication carrier / Infrastructure provider.
  - Such as: NTT, etc.