

## Yokogawa T&amp;M application note

# Characterization of optical filters with an OSA

by Yokogawa Europe Product Marketing

With a broadband light source and the optical filter analysis function, our Optical Spectrum Analysers series AQ637X can perform characterization of both reflection-type and transmission-type optical filters.

## Characterization of reflection-type optical filters.

In order to evaluate the characteristic of a spectrum of a light reflected off a DUT, the OSA compares the measurement result with a reference spectrum of a light reflected off a standard reflector\*1.

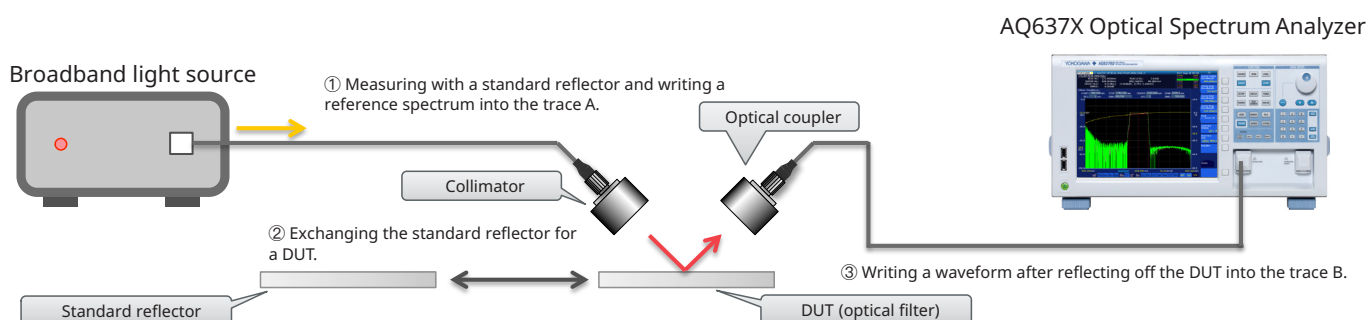
The light source is required to be high-intensity, broadband, and highly stable, and broadband light sources such as LED, white light (halogen), ASE, SLD, SC, etc. are used according to required optical level and wavelength band.

Thanks to the free space optical input, the AQ637X series allows a large-diameter optical fiber having a core diameter of up to 800  $\mu\text{m}$ . Because the larger the core diameter is, the more optical power the AQ637X can acquire, measurement becomes easier. It has an advantage in low power measurement using a LED or a white light source that doesn't require high resolution.

If it is necessary to consider polarized waves due to a single mode and high resolution, a polarization maintaining fiber is used. The smaller a NA is and the shorter an optical path length between a collimator and an optical coupler is, the smaller a loss becomes. That is advantageous to measurement, however adjusting the accuracy and the position of the devices is more difficult. Adjusting optical coupler side is especially difficult, and if sufficient optical level is available, it is easier to adjust a fiber only with a ferrule. The user has to make sure that no stray light or environmental light enters into the optical coupler.

The AQ637X series offers a lineup of broad wavelength range from 350 to 3400 nm, which enables measurement of ND filters and bandpass filters in the VIS, NIR and IR ranges.

*\*1: When the dependence of a collimator and optical coupler on wavelength is sufficiently small and a polarization characteristic and an absolute value level can be ignored, a spectrum acquired by directly measuring a broadband light source without using a standard reflector can be used as a reference.*

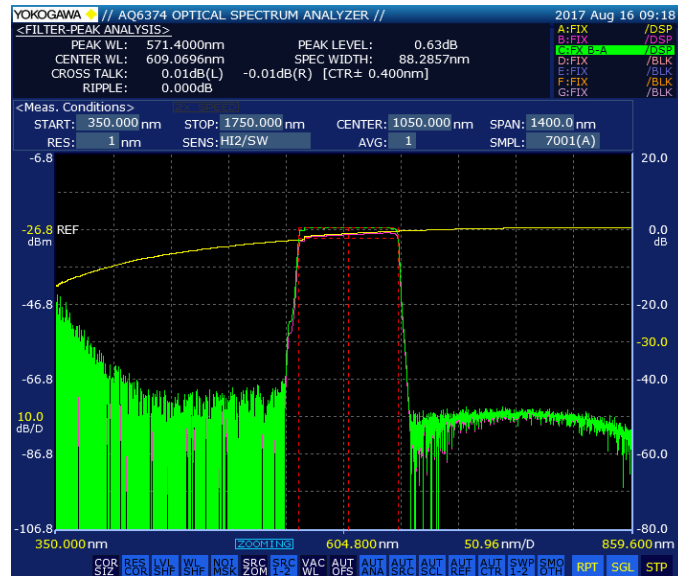


## Characterization of transmission-type optical filters

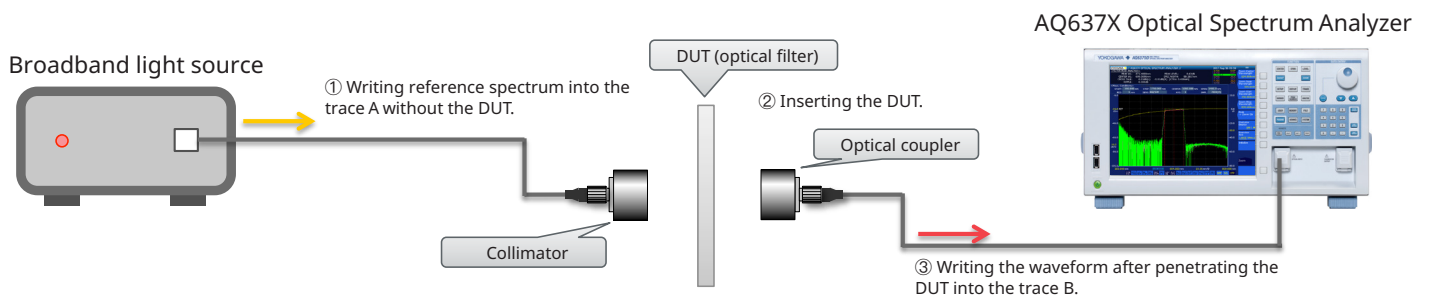
The Optical Spectrum Analyzers series AQ637X can evaluate the characteristic of a spectrum measured after penetrating a DUT with reference to a spectrum measured before the DUT. The light source is required to be high-intensity, broadband, and highly stable, and broadband light sources such as LED, white light (halogen), ASE, SLD, SC, etc. are used according to required optical level and wavelength band.

Thanks to the free space optical input, the AQ637X series allows a large-diameter optical fiber having a core diameter of up to 800  $\mu\text{m}$ . Because the larger the core diameter is, the more optical power the AQ637X can acquire, measurement becomes easier. It has an advantage in low power measurement using a LED or a white light source that doesn't require high resolution.

The smaller a NA is and the narrower an interval between a collimator and an optical coupler is, the smaller a loss becomes. That is advantageous to measurement, however adjusting the accuracy and the position of the devices is more difficult. The user has to make sure that no stray light or environmental light enters into the optical coupler.



Screen AQ637X Optical Spectrum Analyzer



Yokogawa Europe B.V.  
Euroweg 2, 3825 HD,  
Amersfoort,  
The Netherlands  
Tel. +31 88 464 1000  
Fax +31 88 464 1111  
tmi@nl.yokogawa.com