# IEEE P802.3cs
## Measuring spectral excursion

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# Steady state contribution text

The steady state contributions of spectral excursion can be measured by setting the transmitter to steady state operation at the desired wavelength. Measure the transmitter's spectrum using a high resolution OSA. Use the lowest resolution bandwidth available. The OSA's resolution bandwidth contributes to the measured spectral width. To compensate, measure the spectral at 18 dB down, then subtract resBW/2 from the result. The figure illustrates how to compensate for the OSA's resolution bandwidth in a measurement.

# Steady state OSA measurement

Nominal freq

$f_{ex\text{-}SS} = f_{ex\text{-}meas} - f_{OSA\text{-}resBW}/2$

0

-15

-18

$f_0$

$f_0\text{-}f_{ex\text{-}meas}$
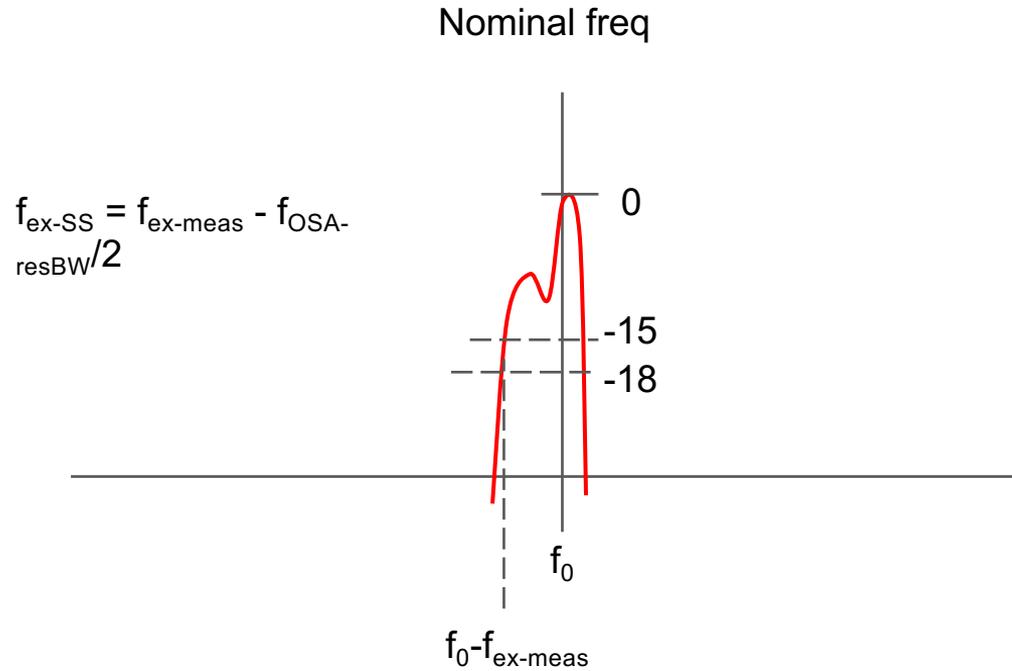
# Transient contribution text

For the burst-mode ONU, we must also account for the transient effects associated with laser turn on. A 50 GHz Gaussian optical fiber with the center wavelength detuned from the ONT's continuous-mode wavelength by ~25 GHz is placed between the transmitter and a linear PIN photodiode. This results in 3 dB less power into the photodiode if the filter and transmitter are aligned in frequency. Any wavelength shifts in the ONT's output is translated to intensity fluctuations by the Gaussian filter in a deterministic manner. The envelope of the captured waveform is used to calculate the received optical power against time within a burst. The instantaneous wavelength shift is them calculated from the optical power using a Gaussian relationship.

# Transient contribution figure

**Setup**



**Filter and Tx alignment**



3 dB

50-GHz Gaussian filter

f

Tx center frequency
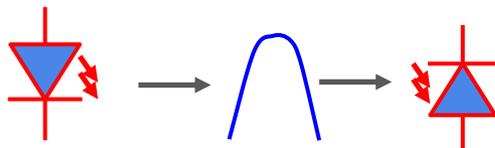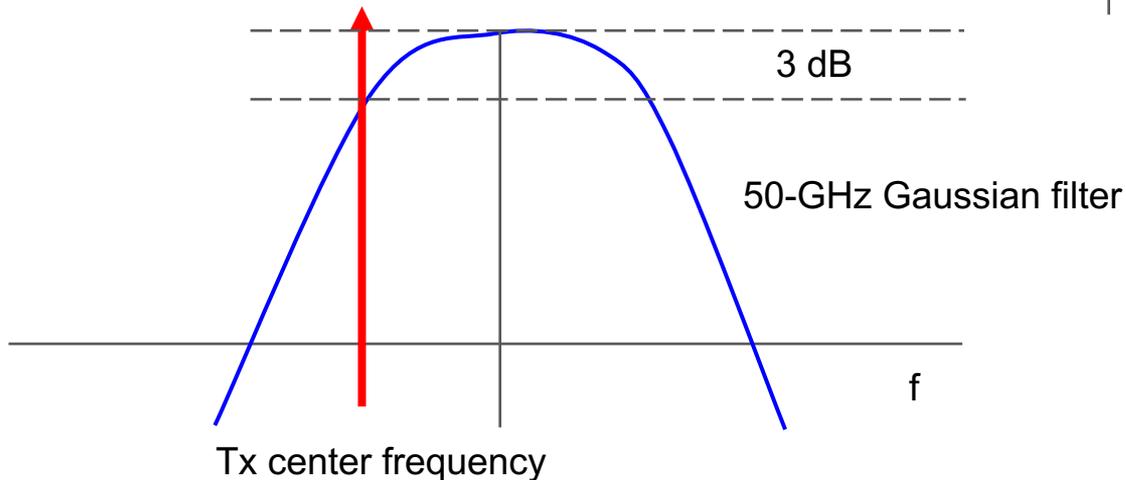
**Results interpretation**



i

For max spectral excursion turn-on

For max spectral excursion after turn-on

256 ns

t
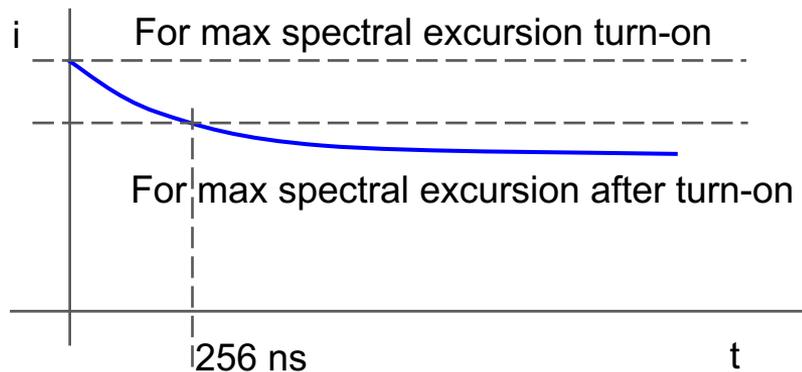
# Total spectral excursion

The total spectral excursion is the sum of the steady-state spectral excursion and the transient spectral excursion and is obtained by summation of the two values.