Super-PON Spectral Excursion Definition

200.2.9.21

A ONU transmitter is considered in “steady wavelength channel state” from “laser on” time after the start of a burst to the end of the burst. For ONU transmitters, contributors to maximum spectral excursion include:

- any wavelength tuning error from the nominal wavelength value; and
- any wavelength transient effects after the laser on time.

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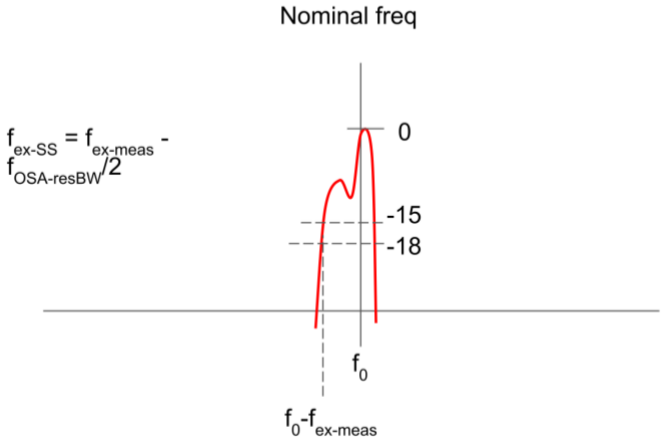
200.2.9.21.1

The spectral excursion measurement for continuous mode downstream OLT transmitters is as follows.

a) Set the transmitter to steady state operation at the desired wavelength
b) Measure the transmitter’s spectrum using a high resolution optical spectrum analyzer using the highest resolution bandwidth available.
c) To compensate for the OSA’s resolution bandwidth, measure the spectrum at 18 dB down, then subtract resBW/2 from the measured value.

The calculations and measurements are illustrated in Figure 200-XYZ



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Annex 200C

The spectral excursion for upstream ONU transmitters is the summation of the continuous mode spectral excursion and the transient effects associated with laser turn-on. Wavelength measuring devices, such as optical spectral analyzers, are not typically designed to measure dynamic effects. A potential method to quantify the transient spectral excursion is described below.

a) Position a 50 GHz tunable Gaussian optical filter with the center wavelength detuned from the ONU's continuous-mode wavelength by 25 GHz between the transmitter and a linear PIN photodiode, as shown in Figure 200C-1. This results in 3 dB less power into the photodiode relative to ideal alignment between the filter's center frequency to the transmitter;
b) Use a burst-mode signal to drive the ONU transmitter with bursts of >100 us;
c) Capture the power envelope of the time domain waveform output from the photodiode. The offset optical filter translates frequency shifts into a power envelop change. An example measurement is shown in Figure 200C-2;
d) Measure the difference in the power envelop between laser on time after the burst start and after the laser has reached steady state; and
e) Convert the change in the measured power envelop into a transient frequency shift by using the Gaussian relationship of the filter.

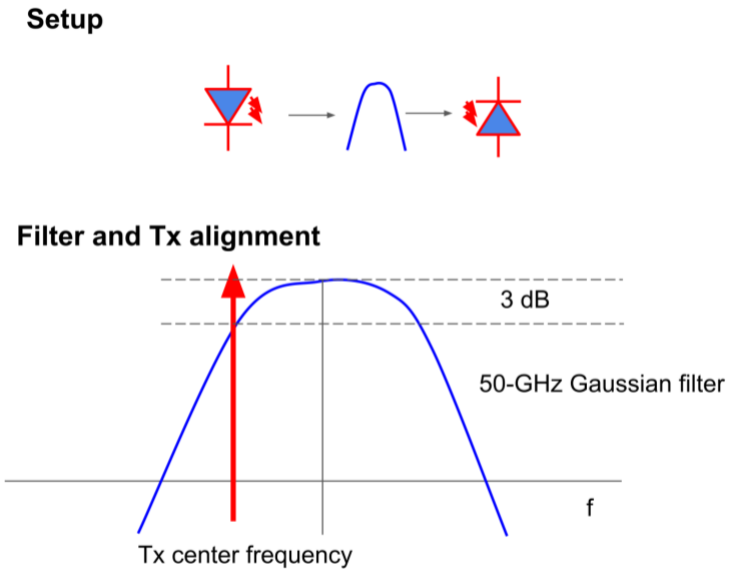

Figure 200C-1 – Experimental setup for testing for transient wavelength drift

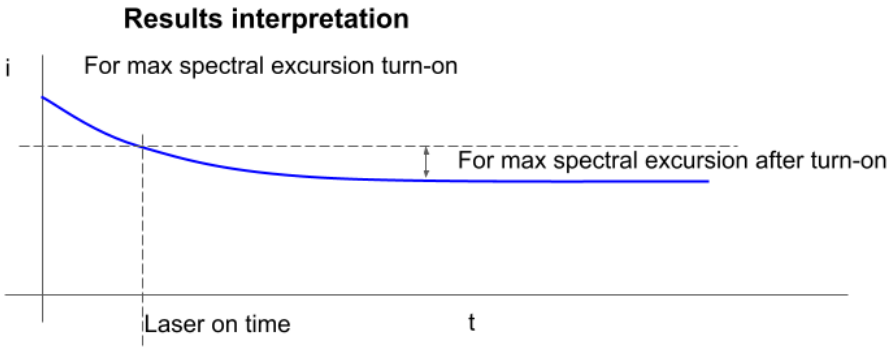

Figure 200C-2 - A possible power envelop output