Attenuation Accuracy in the 7900 Fiber Optic Test System

TECH NOTE

When the FOM-7900B mainframe and FOS-79800 source modules are used in fiber optic test and measurement applications, there are usually several other components attached to the optical source. These components may include multiplexers, splitters, modulators, polarization controllers, and various other fiber optic components. Each component introduces some amount of loss. As a result, the power measured at a device under test may be much different than the set point power of the optical source. In this case, the absolute power accuracy of the source has little meaning. However, when changing the power of a given channel – to equalize the power in adjacent channels, for example – the power attenuation accuracy is of critical importance.

Power attenuation accuracy is defined as $\Delta P_{meas} - \Delta P_{set}$, which is the difference between the actual change in power and the intended change in power. For example, assume that the optical source is initially set at P^i_{set} = 10.00 dBm. The power measured at the device under test is P^i_{meas} = 3.00 dBm. The user then changes the set power of the optical source to P^f_{set} = 7.00 dBm, expecting to decrease the power at the device under test to 0.00 dBm. However, the power measured at the device under test is P^f_{meas} = 0.05 dBm. The intended change in power was 7.00 dBm – 10.00 dB = -3 dB = ΔP_{set}. The actual change in power is 0.05 dBm – 3.00 dBm = –2.95 dB = ΔP_{meas}. The attenuation accuracy in this case is $\Delta P_{meas} - \Delta P_{set}$ = –2.95 dB + 3.00 dB = 0.05 dB.

The specification of Attenuation Accuracy for standard ILX Lightwave DFB sources is ±0.1 dB, and is typically better than specified as shown in Figure 2.

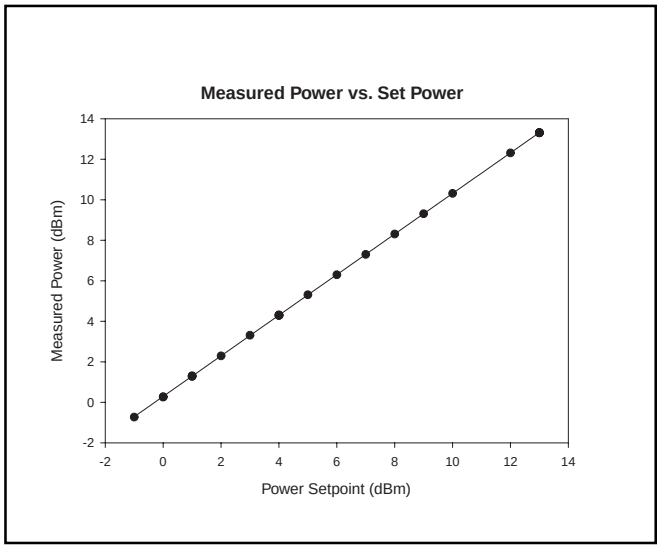

Figure 1. Power measured at the output of an FOS-79800/315C2 module plotted as a function of set point power. The slope of the linear fit is 1.

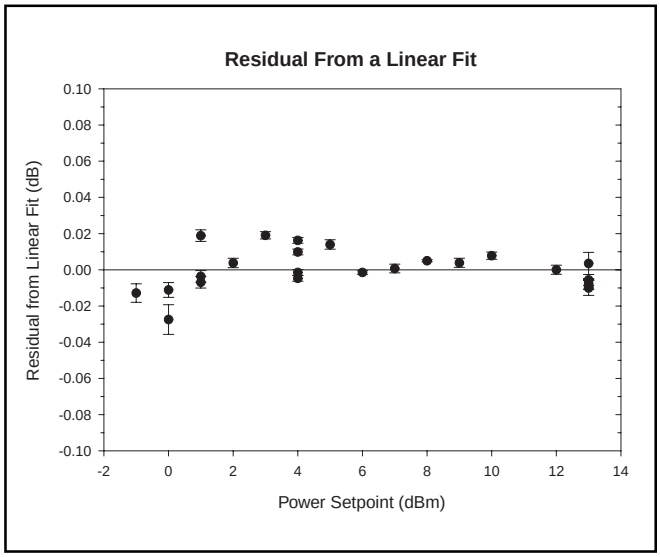

Figure 2. Residuals from a linear fit of the data presented in Figure 1. ILX Lightwave specification for DFB modules is ±0.1 dB.