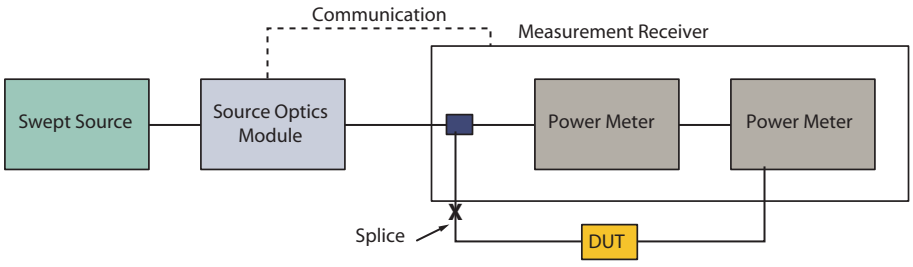
Insertion Loss - Swept Wavelength

Introduction

Swept wavelength measurements are very similar to the basic fixed wavelength insertion loss measurement from a procedural perspective. The fundamental difference is its ability to measure the loss as a function of wavelength, rapidly and accurately, through the use of a sweeping laser source and unique real time measurement technique. This makes it the method of choice for DWDM components where parameters such as bandwidth and center wavelength are required (parameters extracted from the basic IL (l) data). The reader is referenced to the fixed wavelength method as general introduction.



Measurement Method

The swept wavelength measurement technique, as embodied in the SWS, uses a continuous sweep of a tunable laser to generate the optical source. The Source Optics Module provides system co-ordination and real time measurement of the optical wavelength. This wavelength information is communicated through a communication channel that can be embedded optically on the same fiber as the source laser or through electrical means. In the SWS the measurement receiver is similar to the configuration to the two power meters used in the fixed wavelength method, however they are built into a single measurement unit and can be easily expanded. As in the fixed wavelength technique, a two-step process is necessary and the fundamental loss calculation remains the same.

$$IL = (P[dBm] - P_{SourceMonitor}[dBm])_{DUT} - P[dBm] - P_{SourceMonitor}[dBm])_{Reference}$$

However, due to the fact that the laser is changing wavelength in time, it is key that the bandwidth of the power meter be properly matched to the sweep speed to ensure there is no wavelength skew in the measurement. In addition, synchronous triggering of the power meters is critical to ensure the timing to the measurements remains correlated.

DUT

WDMs, DWDMs, isolators, circulators, switches, taps, splitters, GFF

Standards

TIA/EIA 455-180-A: Measurement of Optical Transfer Coefficients of a Passive Branching Device (Coupler)

IEC 61300-3-5: Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 3-5: Examinations and measurements - Wavelength dependence of attenuation

IEC 61300-3-29: Basic test and measurement procedures - Part 3-29: Examinations and measurements - Measurement technique for characterizing the amplitude of the spectral transfer function of DWDM components

Product References

The SWS is the ideal system to execute this test method.

SWS Tunable Laser

SWS Source Optics Module

SWS Receiver

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