

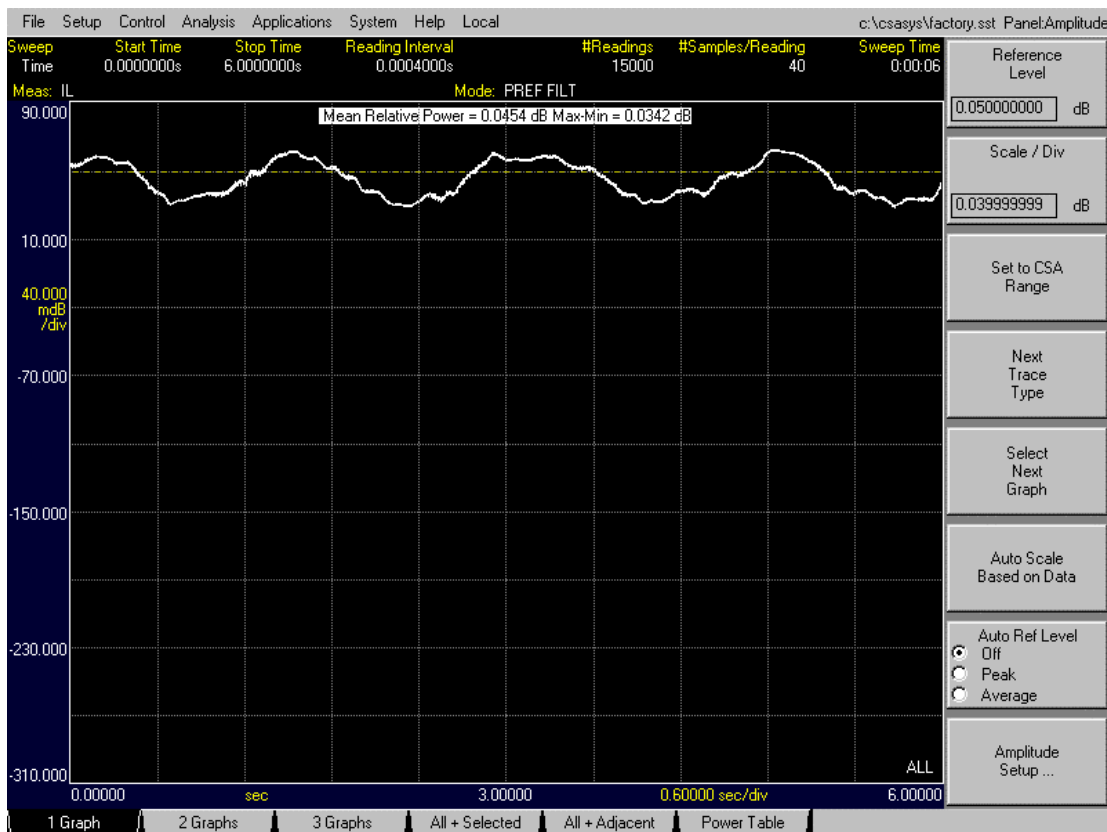


Using PDL Measurement to Identify Stress-Induced Birefringence

When a fiber is stressed, the stress generally induces birefringence. This birefringence is a source of PDL, or Polarization Dependent Loss. With a moderate amount of birefringence, the insertion loss may not be significantly (or even measurably) altered. However, this birefringence will typically induce a more significant amount of PDL, one that is clearly measurable.

There are a number of ways to measure PDL, but one of the most straightforward is to vary the polarization state, and look at the change in the insertion loss. This is often referred to as the All-States method for PDL measurement.

The measurement results below show the Insertion Loss for a typical harness run with straight physical contact connectors, similar to those used on the F-16. The results show a low insertion loss of 0.045 dB. The PDL can be seen as the variation in the insertion loss (the polarization state is being varied during the time of the measurement). For this test, with no stress-induced birefringence, the PDL measurement is only 0.034 dB.

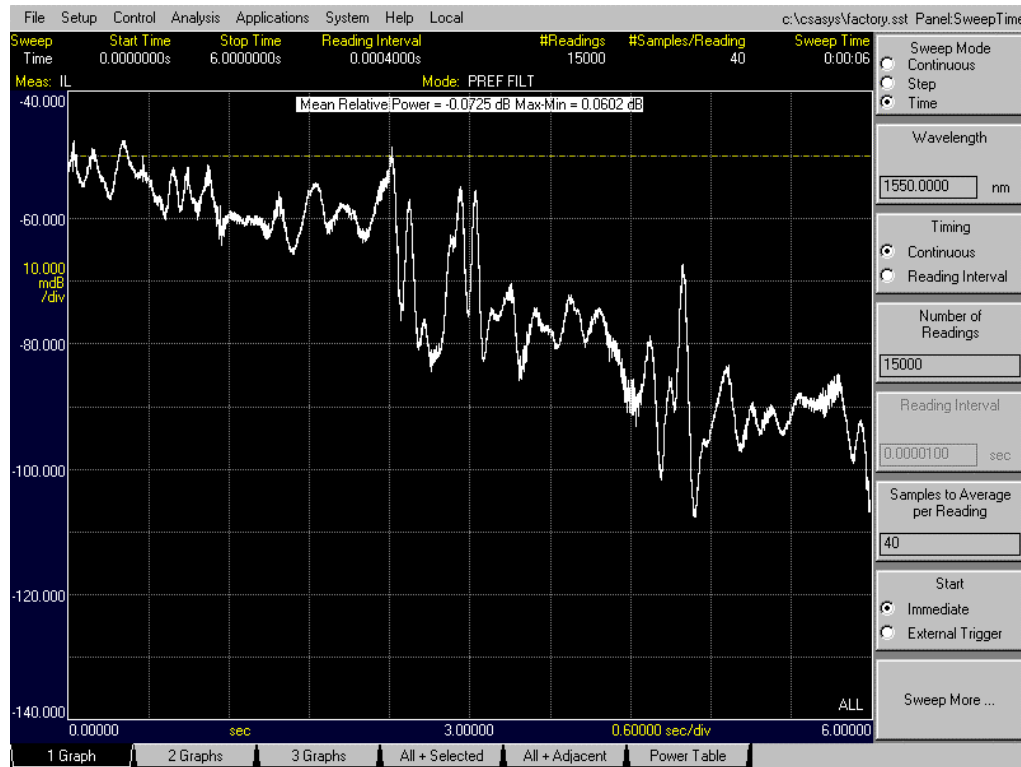


The measurement results below are for the same assembly, except that the fiber run has been stressed (such as might occur if the fiber was pinched in one of the runs, went through a tighter-than-anticipated bend, was twisted, or was diverted under a clamp). The Insertion Loss is still quite low, well within specification. The PDL, however, has grown to be several times the initial value, now 0.148 dB.



(Continued)

The following results show another, different stress-induced occurrence. Here the Insertion loss is still quite low, while the PDL is twice the original typical value.



In optical component manufacturing companies, it is becoming common to run an initial “connection integrity” test that consists of IL and PDL, with the primary interest being in the PDL value. If the PDL is outside of typical values, the operator is instructed to check the integrity of the optical connections (a scratch on the connector can cause results similar to above), and to check the fiber runs for unexpected variance from expected.

With next generation measurement systems, PDL measurement is both inexpensive and easy to implement.



dBm Optics, Inc.
300 South Public Road
Lafayette, CO 80026
303-464-1919
www.dbmoptics.com

©2003 dBm Optics, Inc.