



Using ORL Measurement to Identify Physical Contact Connector Problems

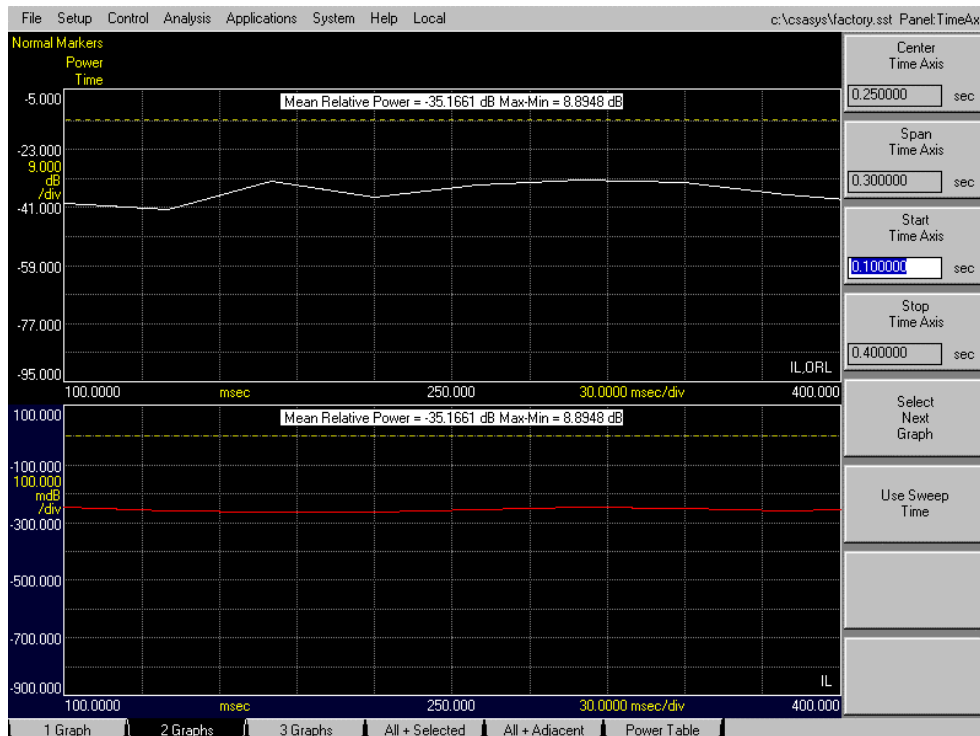
Physical Contact (PC) optical connectors have the advantageous quality that even a poorly connected connector pair still has low PDL. Unfortunately, it can exhibit very high Optical Return Loss (ORL). This is one of the downsides of standard PC connections (relative to its angled counterpart, APC), but this downside can also be used as a quality tool to identify poorly connected fibers.

Poorly mated PC connectors can come from a number of causes, including insufficient force on the ferrules, poor tolerances on the connectors, a film on the connection surfaces, deposits (sand, dust, etc) on the connector faces, or simply connectors that have not been fully engaged.

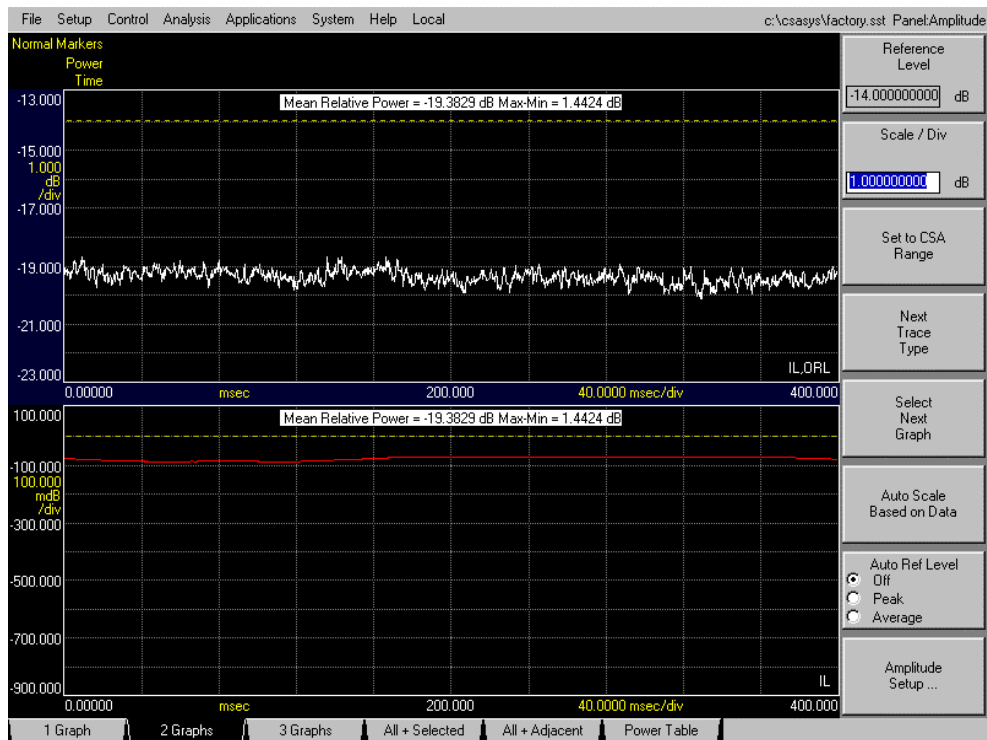
If there is a poorly mated connector, the impact on the Insertion Loss may not be immediately apparent. The added insertion loss of a poorly connected fiber can be as low as only a 4% increase in Insertion Loss (~0.16dB). However, if the connection is not made well, the variability of the Insertion Loss will rise substantially, and the long term increase in Insertion Loss can be very substantial.

In testing, we can use this problem to our benefit. After connecting our device to be tested, we can run a preliminary connection verification using the ORL measurement as a diagnostic tool. Although the Insertion Loss may be in spec, the ORL measurement may be much more significant. With this information, we can direct the operator to first confirm that the optical connectors are clean and fully engaged, before making the assumption that the device being tested is out of spec.

The data below shows a typical Insertion Loss and ORL measurement for a well-mated PC connection. As can be seen, the Insertion Loss is approximately 0.25 dB, while the ORL is approximately -41 dB.

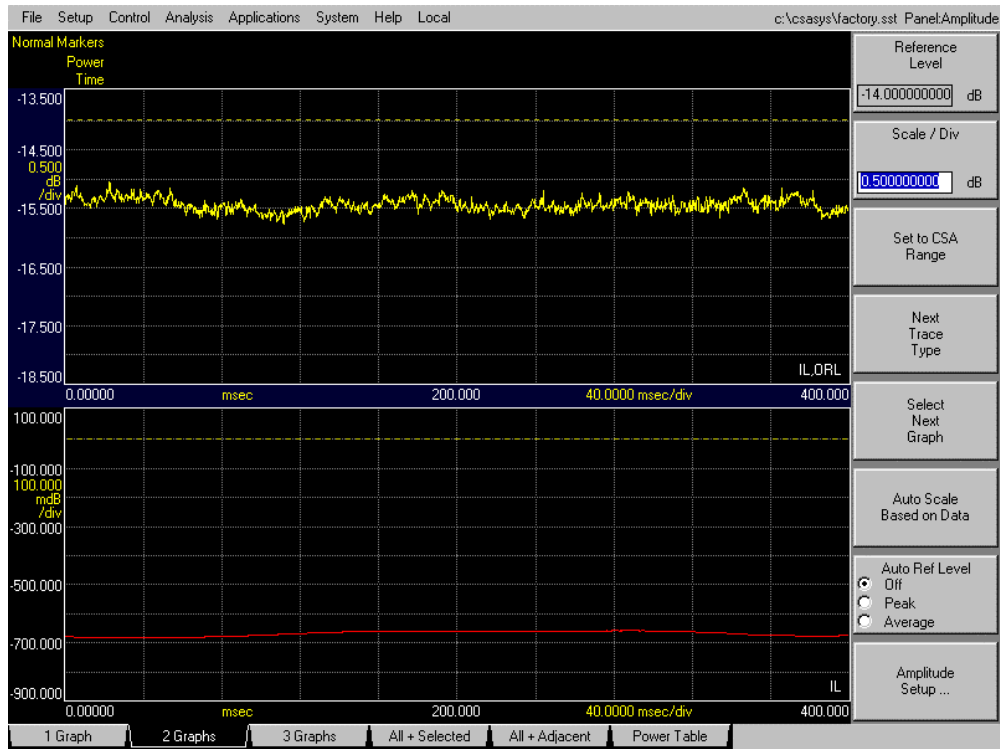


The chart below shows a somewhat poorly connected fiber. The IL is still very low, but the ORL has risen to approx. -19 dB. Over time this connection will show both high variability and also will likely degrade substantially.



The results below show a very poorly connected fiber pair. The ORL of approximately -14.7dB indicates that there is a full air gap in our connection. This will be highly variable, and will certainly degrade over time. The Insertion Loss has only risen to 0.7 dB, a reasonable level that may not have triggered a failure.

(Continued)



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

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