AN-102

Polarity Verification
through Loss Testing on Duplex Cables

Overview

Insertion loss (IL) and polarity testing are just a couple of the steps required in the testing of multi-stranded fiber optic cables. IL testing quantifies the amount of light lost through the cables and polarity testing ensures that the correct input is routed to its proper output. Usually these two steps can't be done simultaneously and require almost twice the time. In the case of duplex cables, the OP815D—coupled with OPL-Pro and a proper configuration setup—can perform both tests at the same time and effectively shortening the testing process. The example discussed below shows how to combine the two steps into one.

Background

Figure 1: OPL-Pro parameter file without polarity verification

The typical duplex insertion loss setup is displayed above. Inputting "IL" into both columns within the parameter file leaves both sources on simultaneously, continuously sending out a signal to the power meters. This may work fine for IL but does not help much for polarity testing. Incorrect values can be measured and can seem correct because they pass even though the two fibers may be incorrectly routed, so polarity must be verified to ensure correct inputs to outputs.
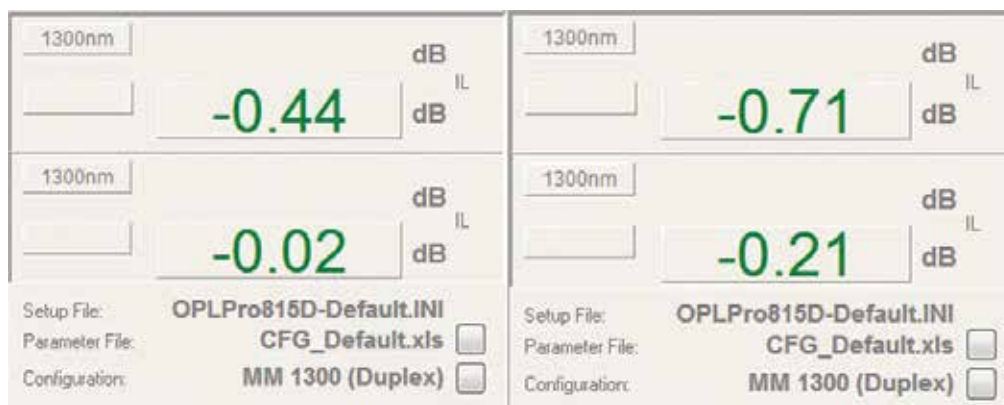

Figure 2: OPL-Pro live display for duplex cables

The images above comply with the configuration setup previously shown. To the left the DUT is properly connected with straight polarity, while on the right the same DUT is connected in a cross polarity fashion. They both indicate passing, making it almost impossible to determine if the selected DUT is the right configuration or not.

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Test Setup for Testing Duplex

Configuration

Setting up this configuration is very similar to the configuration for polarity testing except for one major change: "IL2" must be moved to the J column and "IL1" to the K column. This tells the software that when IL is being measured, turn on source A and have OPM2 expect a reading. The same is true for source B, but for OPM1.

Figure 3: OPL-Pro parameter file setup for straight polarity configuration

Be sure to save this configuration and then select it on OPL-Pro. If a previous setup is selected, the software will ask the user if they want to re-reference, which they can choose Yes or No.

Referencing

Using a Duplex cable as a reference cable, connect the source connector ① and the end faces that correspond to source should connect to ▮1 and source ② to ▮2 .
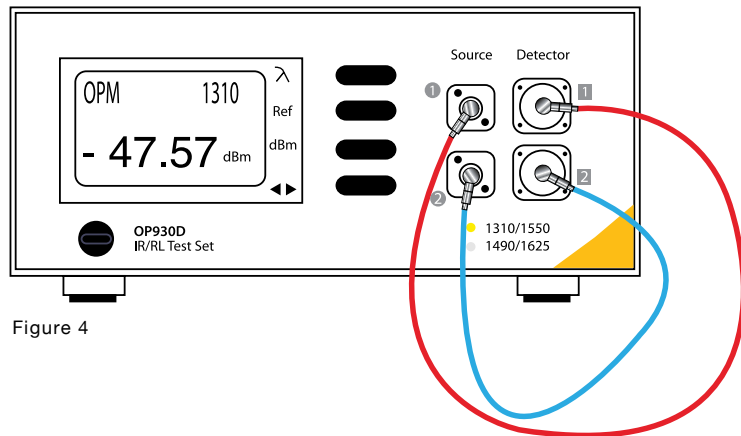

Figure 4

Testing

This cable configuration shows the straight polarity case. Note that red corresponds to source ① and blue source ②. Its corresponding output is in the same color and defines how it should be to obtain proper measurements.

Connect the LC-LC straight polarity DUT attached between the reference cable and the OPMs. Verify that it is the right polarity when connecting.
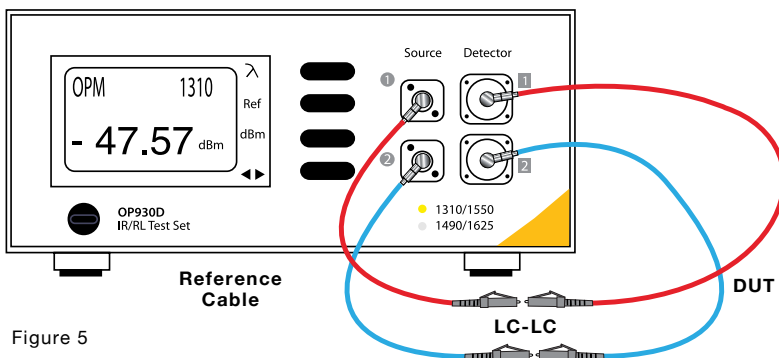

Figure 5

Figure 6: Above shows two values: one passing and one failing. The passing values verify that the DUT passes for both IL and polarity. The dark values (right) show that the cable is failing whether it's by broken cables or incorrect polarity.

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Test Setup for Testing Duplex Cables with Crossed Polarity

Configuration

Setting up this configuration is very similar to the configuration for polarity testing except for one major change: "IL2" must be moved to the J column and "IL1" to the K column. This tells the software that when IL is being measured, turn on source A and have OPM2 expect a reading. The same is true for source B, but for OPM1.

	A	B	C	D	E	F	G	H	I	J	K
1	OPL-PRO Component Test Solution								Version	1.01	
2					Wavelength A		Wavelength B				
3	ID	Configuration Setup	Partnumber	Channels	WL [nm]	IL max [dB]	WL [nm]	IL max [dB]	Retests [#]	Direction A-B	Direction B-A	SNR
19	16	MM 1300 (Duplex)	OC002	1	1300	1	0	1	5	IL2	IL1	PC

Figure 7: enter text here OPL-Pro parameter file setup for crossed polarity configuration

Referencing

To test with crossed cables, the reference should be crossed then returned to normal polarity so that the OPMs have the correct reference during DUT tests. Connect source ❶ to OPM and source ❷ to OPM 1 and reference. When the user is ready to attach the DUT, be sure to flip the reference cables so that when source ❶ sends a signal to the DUT, its crossed configuration sends it to OPM2 and not OPM1.
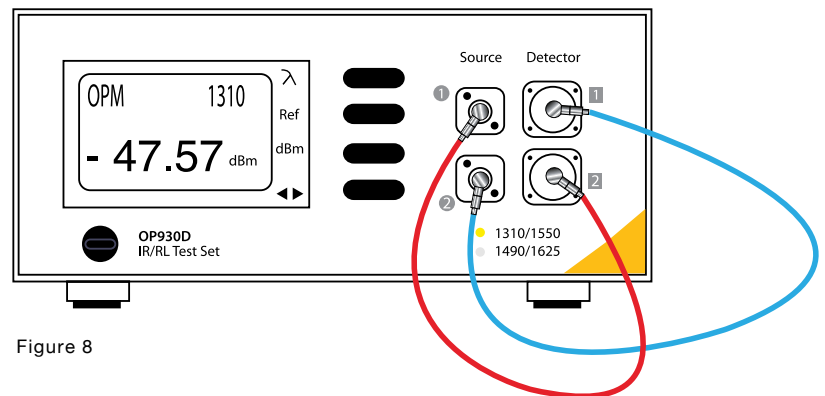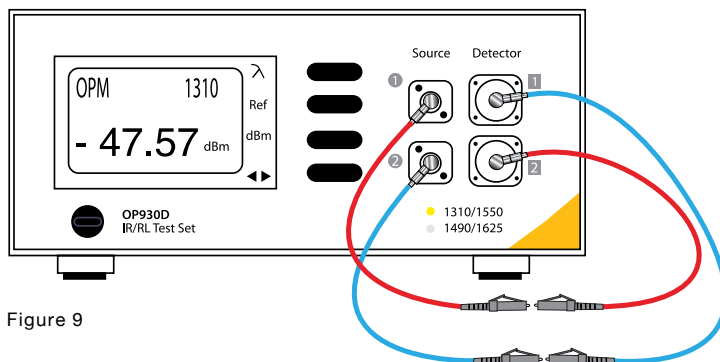

Figure 8

Testing

Figure 9

The cable configuration shown is the cross polarity case. The setup is similar to that of the straight polarity DUT except one needs to verify that the DUT is crossed and that the reference cables are straight. Therefore when the software takes measurements, the signal from source ❶ will be routed to OPM 2 and vice versa.

Just as before with straight polarity, it should be very evident which output gives passing measurements and which fail.