OptoTest
Your Partner in Fiber Optic Test Solutions

SOLUTION SHEET

Distribution in the UK & Ireland

Lambda

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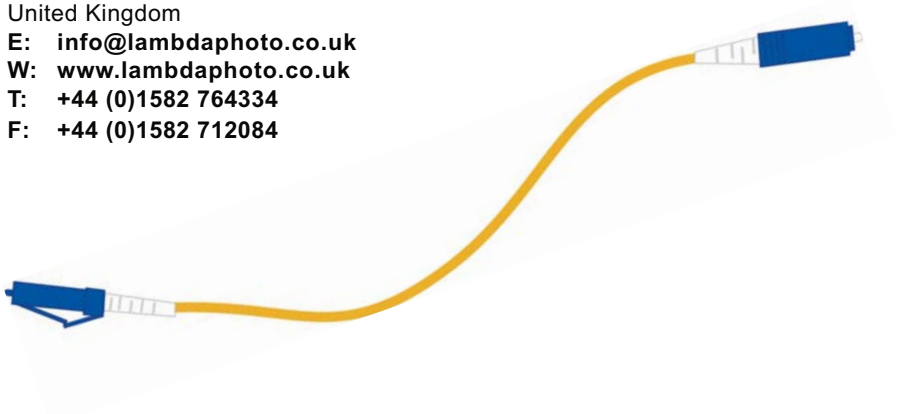
Characterisation, Measurement & Analysis



Hybrid Cable - Simplex

Fiber patch cables, also known as patch cord or jumper cables, are fiber optic cables that are terminated with connectors on both ends. When the connector types on each end are different, the cable is aptly dubbed a **HYBRID CABLE**.

These hybrid cables can serve to link otherwise incompatible infrastructure in existing fiber systems, such as those found in networks or data centers. They can be used to connect newer racks to legacy hardware, in distribution hubs to branch lines from high density panels to the nodes they serve, or to connect between devices from different manufacturers.

How Can You Accurately Test Performance of Hybrid Cables?

While the hybrid nature of these cables makes them ideal for these types of applications, it does present some challenges when evaluating the performance of the cables, whether during production or prior to installation. Like most other passive components that are added to networks or data centers, hybrid cables typically need to have both sides qualified for insertion loss (IL) and return loss (RL), along with interferometry and visual inspection.

The challenge comes from mating the different connectors of the hybrid cable to the reference cables and detectors used to measure IL and RL, which must be done since each side of the cable must be tested. This can be achieved by having twice as many reference cables and detectors, two of each in the case of a simplex cable.

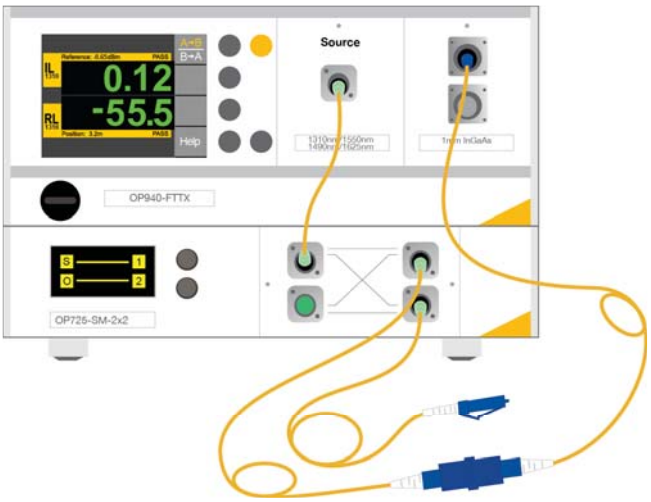
A Note on Hybrid Mating Adapters:

While hybrid mating adapters can allow different connector types to be mated together, these types of adapters can cause issues for IL testing. LC to SC mating adapters in particular often induce extra loss into the measurements. The difference in ferrule size between the two connector types makes their connection within the hybrid mating adapter unreliable for IL testing. **For this reason, the better approach is to use a different reference cable for each type of connector being tested.**

A Tailored Solution for a Challenging Problem

The **OP940 IL and RL meter** serves as the base for our simplex hybrid cable test system, built with two detectors to accommodate the different connectors. Introducing the **OP725 optical switch** allows us to use two reference cables by toggling which cable the light travels through.

This configuration provides both ease of use and flexibility. Having multiple reference cables connected at once allows the user to test both sides of the device under test without having to swap cables in and out. This particular example uses LC and SC cables, but testing different connector types is as simple as substituting different reference cables. A similar substitution can be done for the adapters on the detectors. In fact, if the different connectors have the same size ferrule (i.e. FC and SC), the configuration can be simplified to use one detector with a universal adapter.



For more details on how to perform an insertion loss and return loss test with this configuration, see **Application Notes AN111** and **AN117**.

ISO CERTIFIED
Our Quality Management System is certified and in compliance with ISO 9001:2015.

MADE IN THE USA
We proudly design & manufacture our equipment in California, United States.

RELATED PRODUCTS

- OP725-OP940 Bidirectional IL/RL Test System
- High Performance Reference Cable
- Adapters

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System Specifications

Return Loss

	Single Mode, FTTX	Multimode
Source Wavelength	1310nm, 1550nm 1490nm*, 1625nm*	850nm, 1300nm
Calibrated Measurement Range	-10dB to -80dB	-10dB to -58dB
Measurement Linearity	±1dB (-12dB to -72dB)	±1dB (-10dB to -45dB)
Distance Range	up to 2500 meters	
Mandrel-free minimum distance	1.7 meters (both reflections <-45dB)	

**FTTX only.*

Insertion Loss

	Single Mode	FTTX	Multimode
Source Center Wavelength	±30nm from nominal	±30nm from nominal	±30nm from nominal
Source Bandwidth	<10nm	<10nm	<140nm (850nm) <200nm (1300nm)
Internal Fiber	9/125µm (SMF28)	9/125µm (SMF28)	50/125µm, 62.5/125µm, 105/125µm
Launch Condition	N/A	N/A	Available upon request
Output Power* (typical)	-1.5dBm	-2.5dBm	-18dBm(850nm) -20dBm(1300nm): 62.5/125µm
Insertion Loss Stability**	±0.02dB	±0.02dB	±0.02dB
Measurement Linearity (Relative Accuracy)* **			
Deviation ± 0.05dB	0dBm to -65dBm at 1490nm		
Deviation ± 0.01dB	<10dB power variation		

*For single channel systems. ***Over 1 hour with a max. change of 1°C. ****For 1, 2, and 3mm detectors.*

OP725

	Single Mode - SW	Multimode - SW
Channel Count	2x2 configuration only	
Internal Fiber	SMF28, 9/125	50/125 OR 62.5/125
Insertion Loss	<0.7dB*	
Repeatability	± 0.003dB	
Switching Time	10 msec via Software, 300 msec via OP940	
Crosstalk	>60dB	
Optical Interface	FC, SC (other upon request)	
Power	USB (less than 0.1A)	
Dimensions	8.5" x 1.75" x 12"	

*For 1310nm and 1550nm single mode, 850nm and 1300nm multimode.

HPR Cables

	PC	APC
Insertion Loss	<0.15dB	
Return Loss (1300nm and 1550nm)	>55dB single mode >45dB multimode	>70dB single mode >50dB multimode
Radius of curvature	10mm to 25mm	5mm to 12mm
Apex offset	<30um	
Fiber height	0nm to 50nm	
Fiber core position (eccentricity)	<0.6µm	
Standard length	3m: +0.2 / -0.2m	
Custom length	<10m: +0.3m / -0.3m <20m: +0.5m / -0.5m	