

Simplified Field Testing of 12f, 24f, 16f, 32f Connectivity

By Matt Brown, Director, Fiber Optic Products at Tempo® Communications

Multifiber push on connectors (MPO) have been used in large volume for decades, but the need for multifiber handheld test solutions has been driven by the popularity of QSFP type transceivers that use multiple fiber lanes to achieve their high data rates. The increasing popularity of 40G/100G/200G -SR4 and -DR4 transceivers have made 12-fiber and 24-fiber MPO connectivity common. Datacenters are now deploying 400G/800G/1.6T -SR8 and -DR8 transceivers that will require 16-fiber and 32-fiber connectivity.

The earliest versions of these QSFP type transceivers were 40GBASE-SR4. The -SR4 (multimode) and -DR4 (single mode) use four lanes (eight fibers) to achieve their total data rate. These formats have become increasingly popular and common, supporting 100G, 200G, 400G, etc. With this trend we are seeing a shift from MPO to smaller form factor connectors such as MMC and SN-MT.

This has driven demand for 12-fiber MPO capable power meters, light sources, loss testers and OTDRs, creating an increasing need for multifiber handheld test and measurement solutions that provide key connectivity information from ergonomic, low-cost test equipment designed for optimal use in the field.



Multifiber OPM, T9600XL-GE5
from Tempo Communications

Multifiber OPM, T2600XL-GE5
from Tempo Communications

Higher data rates now require eight lanes (16 fibers) to economically provide connectivity. We are seeing 400G, 800G and 1.6TBASE-SR8 and -DR8 formats in QSFP-DD and OSFP transceivers, as well as in Co-packaged optics systems. These 16-fiber applications cannot be supported by traditional 12-fiber MPO connectors (MPO-12). Instead, we are seeing 16-fiber MPO (MPO-16) and very-small-form-factor 16-fiber connectors such as the MDC and SN-MT. We now have significant demand for handheld testers that can handle an array of 16 fibers.



Multifiber OPM, T9600XL-GE7
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The existing Base-12 test products on the market are highly automated, with switches integrated into both the light source and power meter. As such, they can automatically test all fibers quickly and verify polarity. However, the switching components make them very expensive and have several internal elements that introduce loss and loss variability. In multimode products, this loss variability often exceeds typical loss values for one or two MPO connections. In single-mode products, the addition of polarization dependent loss can make the tester loss variability significantly greater.

To summarize, the error or uncertainty of these switched products can be greater than the loss of several connections in the channel under test. This matters, as loss budgets in these applications are very tight, and customers benefit from multiple connections that make the channel manageable.

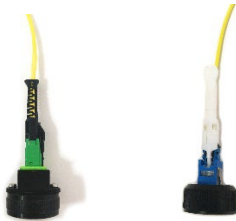
These 12 fiber switched products are also limited to Base-12 connectivity. They do not easily scale up or down in fiber count. Testing 24 fiber connectors or duplex connectors is possible but requires breakout cables on both ends.

Whether the user is a hyperscale data center operator, or a small contractor required to produce a compliant test report to get paid for work on a modest scale system, the central objective is the same: achieve a balance of test accuracy, confidence, and throughput, so that high speed channel performs to expectation.

To meet this demand, the Kingfisher group within Tempo® Communications has developed our T2600XL and T9600XL handheld optical power meters, both available with 5mm and 7mm detectors. The 5mm products can measure output power from any fiber on a Base-12 connector (8f, 12f, 24f, etc.). The 7mm products can measure output power from any fiber on a Base-12 or Base-16 connector (8f, 12f, 24f, 16f, 32f, etc.). They can of course also measure simplex and duplex connectivity.

Tempo's XL series optical power meters enable testing of LC, MDC, SN & MPO connectivity with unparalleled flexibility and test accuracy. Our test equipment can be used on all network configurations, from the most basic to emerging systems where standards are still being proposed.

| Instrument | KI9600XL-Ge5 | KI9600XL-Ge7 |
|------------------|----------------|----------------|
| | KI2600XL-Ge5 | KI2600XL-Ge7 |
| Connector | Adapter | Adapter |
| Duplex LC | OPT224 | OPT224 |
| Duplex CS | OPT200 | OPT200 |
| Duplex MDC or SN | OPT233 | OPT233 |
| MPO-12 | OPT227 | OPT227 |
| MPO-24 | OPT227 | OPT227 |
| MPO-16 | x | OPT228 |
| MPO-32 | x | OPT228 |
| MMC or SN-MT | x | OPT233 |



OPT233

OPT200



OPT224



OPT227



OPT228

Our XL testers are ideal for lower volume testing, system turn-up and troubleshooting. Tempo specializes in ergonomic, practical, low-cost, highest accuracy handheld testers capable of supporting the most useful field testing for Base-12 and Base-16 connectivity:

- Signal is present
- Total power from all channels
- Individual channel power, with controlled input from the far end
- Loss by fiber, with controlled input from the far end
- Lane identification using our multiple fiber ID tones

Having a single simplified tester that provides accurate and repeatable testing of the most common connectivity systems, is NIST traceable calibrated is the smart, practical, and cost-efficient solution to manage, test and troubleshoot multifiber links and channels.