Test More. Test Faster. Test for Less.

WideOptix-SR4

Efficient & Accurate High Speed Link Performance Testing for 100GBASE-SR4 Cabling

Objective Validation of Multimode Fiber Optic Cable Bandwidth

Validates the Performance of MPO Cables to Meet the Requirements of 100GBASE-SR4 Standard Using Eye-Diagram Analysis

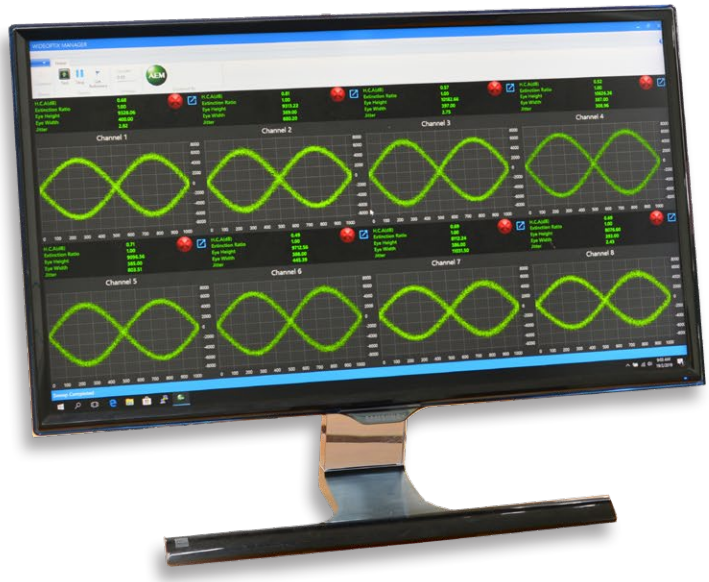
Key Applications:
Manufacturing Test & Incoming Inspection of MPO Multimode Cables for high speed applications such as 5G

2020 Cabling Installation & Maintenance Gold Innovators Awards

What is WideOptix-SR4

AEM's WideOptix transmission performance test platform provides an efficient and accurate solution for high speed link performance testing for 100GBASE-SR4 cabling with a convenient one-box form factor.

WideOptix system performs eye-mask testing and provides objective information about the transmission quality of the fiber cables. Controlled by a PC using USB cable, and running standard linux based software, WideOptix is easy to configure and operate.



Multimode Fiber Bandwidth Challenge

A Note On Tests

Tier 1 certification tests on multimode fiber only test loss and length. This type of certification testing does not guarantee multimode fiber will work for intended high speed application.

Loss measurement by standard certification testers is performed using low speed signal. Bandwidth limitation of the fiber remains undetected in this test. WideOptix is a reliable test system to get dependable confirmation that the fiber is suitable for intended high speed data application.

Multimode fiber optic cables offer a compelling cost advantage for short-reach high data rate transmission. However, as data rates increase to 25Gbps and higher, inherent bandwidth limitation of multimode fiber can no longer be ignored. Performing loss measurement on the fiber cable does not uncover the bandwidth limitations of the cable, causing costly operational failures.

Often, bandwidth verification for multimode fiber cable is done using BER testing. While BER testing is appropriate for characterizing the active devices such as transceivers, it may be time consuming for passive optical component characterization. Multimode Fiber optics is immune to ambient electromagnetic noise, and the performance is primarily limited by the inherent bandwidth limitation. It is known that the bandwidth of multimode fiber is limited by the phenomenon of DMD (Differential Modal Delay), caused by the light propagating at different speed on different modes. This phenomenon causes signal distortions for high-speed signals. As this DMD induced bandwidth limitation is a stationary effect, it can be measured effectively using shorter eye-diagram based metrics, saving test time and complexity.

The WideOptix measurement system offers a purpose-built eye-diagram based bandwidth verification system for multimode fiber optics cables and components. The standards organizations such as TIA and ISO require certification testing of fiber optic cables after installation. While the certification testing is necessary, its effect is limited to identifying light-blocking events along the fiber run. It does not confirm whether the fiber is good enough for the intended speed.

As even OM2 grade multimode fiber typically supports bandwidth in the range of a few gigahertz, a separate test for confirming bandwidth capacity was not considered necessary. But as the data rates have rapidly increase, the bandwidth limitation of multimode fiber can cause catastrophic bottleneck in the data networks. Higher grade multimode fiber cabling such as OM4 is designed to be capable of supporting 25 Gbps rate on single fiber over at least 100m distance. However, if the fiber that claims to be OM4 compliant happens to have poor performance, the risk is high data errors or outright non-functional data links.

WideOptix test system is designed to detect bandwidth limitations before deploying the actual data services. With its fast testing and detailed and clear reporting with pass/fail indication, WideOptix is an easy-to-operate test system.

Principle of Operation

WideOptix-SR4 measurement system can be viewed as a sophisticated and purpose-built combination of (a) signal generator and (b) oscilloscope for extremely high-speed signals ranging in 25GHz frequencies.

The main purpose of this system is to characterize the bandwidth performance of an optical fiber cable under test. This characterization is done by observing the change in waveform shape after the signal propagates through the device-under-test (fiber). A quantitative measure of the change of waveform shape is derived by analysing eye-diagram (a term to describe distorted square wave while traversing through the DUT and attaining a shape resembling an eye).

At such high frequencies, it will be impractical to sample (i.e. observe) a signal waveform with high resolution. To circumvent this problem, test equipment ensure that the incident waveform (e.g. from a signal generator) is already 'known' to the receiver. A sampling oscilloscope, a typical equipment used for this purpose, works by 'locking' itself to the edge of the waveform from signal generator, and then performing sampling at incremental phase changes across many waveforms.

A special and separate 'lock' signal is connected from the signal generator to the sampling oscilloscope. AEM's WideOptix-SR4 employs a more elegant scheme to make transmit signal 'known' to the receiver. It is done by clocking the transmitter and the receiver by the same clock source.

WideOptix Manager

AEM's WideOptix-SR4 system replaces two separate equipment (Signal generator and sampling oscilloscope), and combines this functionality in one equipment. The main advantage of this approach is that the receiving circuit is 'intimately familiar' with transmit signal (excitation signal), enabling famto-second resolution on the eye-diagram display.

WideOptix-SR4 consists of the main test unit that can be controlled by a regular Windows PC. This uses WideOptix Manager, a PC based software.

BASE-T Wired Ethernet Connection Details

- Controlling the test unit
- Capturing eye-diagram test data from all 8 channels of the MPO cable
- Presenting eye-diagram metrics including automated measure of eye quality in dB
- Allowing pre-configured as well as user configurable pass/fail limits
- Allowing configuration of MPO polarity (type A, B or C)
- Conducting actual testing
- Providing per-channel pass/fail result, and producing test reports

Application Example:

WideOptix-SR4 for 100GBASE-SR4 Cabling

IEEE 100GBASE-SR4 standard provides a high speed and cost-effective approach to communications needs for 100G transmission for data centers and 5G wireless infrastructure. Using OM3 and OM4 multimode fiber cable for up to 100m operation, this is an ideal system for short-reach 100Gbps Ethernet links.

While 100GBASE-SR4 provides the cost advantage of using multimode fiber (instead of expensive single-mode fiber), the challenge lies in confirming the transmission performance of the MPO fiber cables. From basic loss measurements it is not possible to determine if the fiber will meet the transmission performance requirements for intended use. Parameters like DMD or Differential Mode Delay play an important role in limiting high-speed transmission performance in multimode fiber.

AEM's WideOptix transmission performance test platform provides a solution for high speed link performance testing for 100GBASE-SR4 cabling with a convenient one-box form factor.

WideOptix system performs eye-diagram testing and provides objective information about the transmission quality of the 8-channel MPO fiber cables in just a couple of minutes.

Controlled by a PC using USB cable, and running standard linux based software, WideOptix will be easy to configure and operate.

KEY CAPABILITIES

- Two Test Connector: 12 channel MPO connector with 8-active channels
- GUI and control from a computer attached with USB cable
- Sampling Resolution: 40 fsec
- ADC resolution: 14 bits
- Jitter induced temporal error: +- 100 fsec
- Points in a captured 25 Gbps waveform: approx. 1000
- Time to complete 8-channel MPO measurement: 150 seconds
- Power consumption of main test unit: 30 W

ORDERING INFORMATION

WideOptix-SR4: Includes the WideOptix-SR4 main test unit, a USB cable, power adapter suitable for 230V or 120V mains connection, a single-user license to WideOptix Manager PC software.

Enquiries

CustomerCare@aem-test.com

Asia

AEM Singapore Pte. Ltd.
52 Serangoon North Ave
4 Singapore 555853

North America

AEM International (US)
5560 West Chandler Blvd. Suite 3
Chandler, Arizona 85226 USA