

# Optical Data Interface (ODI) Enables Faster Communications in Test and Measurement Equipment

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Next-generation applications in 5G communications, mil/aero systems, high-speed data acquisition, phased-array radar and communication research will support faster data rates than current generation solutions. Developing and testing these high-performance applications requires advanced instrumentation and embedded systems.

Current generation instruments, processors, storage, and embedded devices communicate over copper interfaces in standard form factors and traditional bench instrument designs. At increased data rates, signal integrity concerns over copper cable assemblies and connectors limit the reach and interoperability of systems.

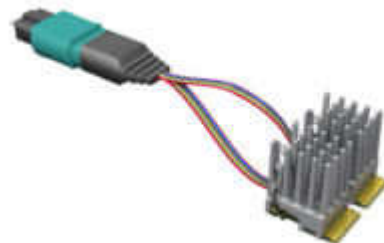
## The Optical Data Interface Standard

The new Optical Data Interface (ODI) is a new high-speed interface standard for advanced instrumentation and embedded systems. ODI enables higher data rates over longer distances and increases interoperability in an open system of connecting a fiber-optic data link between two devices regardless of functionality.

The ODI standard is designed around a standard optical connector, which may be placed anywhere on any device. The new standard defines a highly functional and expandable physical layer.

Key specifications include:

- 12-lane multimode optics
- 12.5/14.1 Gbps Data Rates
- Interlaken Protocol
- Flow Control

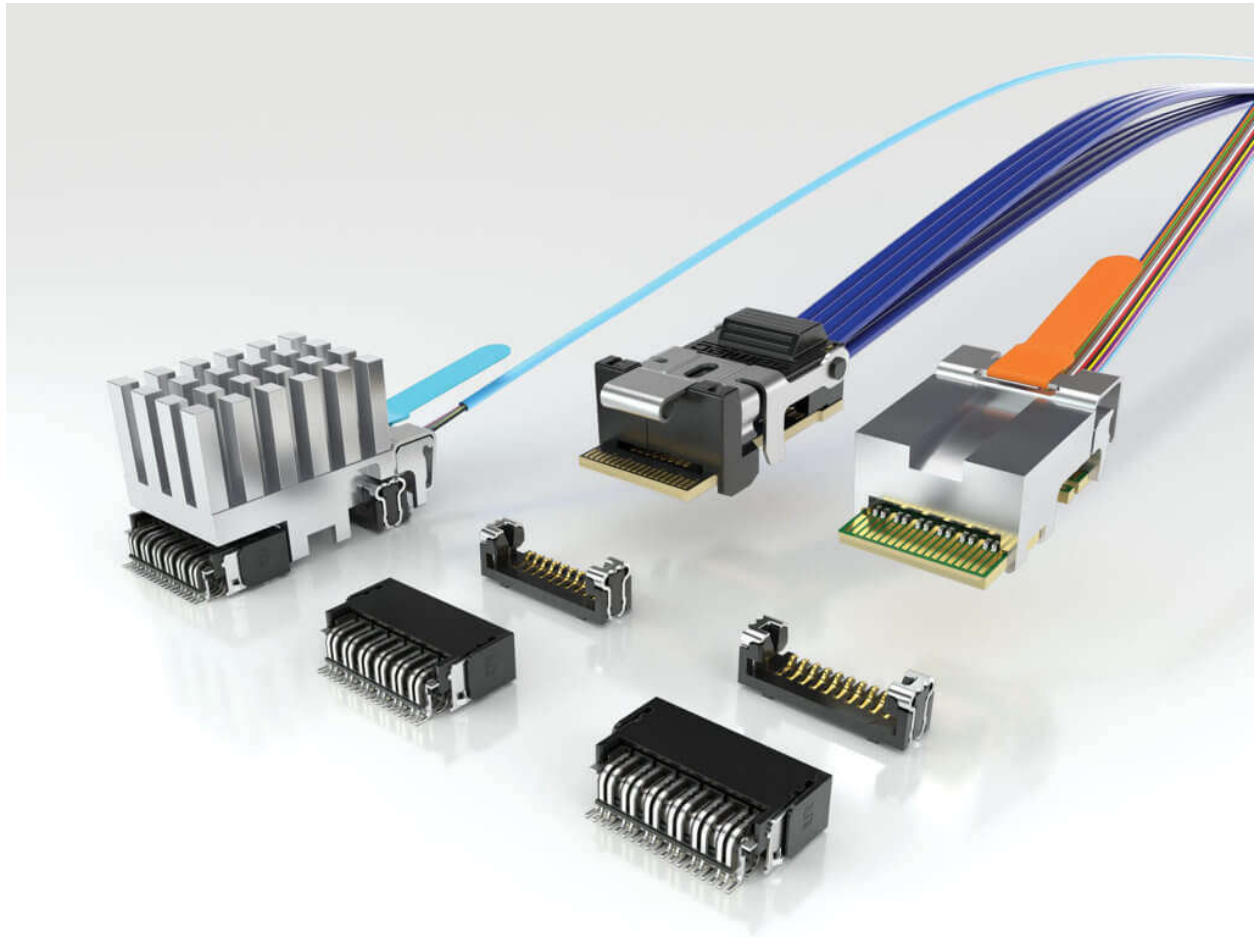


ODI uses Samtec's [FireFly™ Micro Flyover System™](#) as the physical layer. FireFly is the first interconnect system that gives a designer the flexibility of using micro footprint high-performance optical and low-cost copper interconnects interchangeably with the same connector system. It is available with x12 simplex or duplex optical transceivers to achieve 14 Gbps per channel, with x4 duplex systems in development to achieve 28 Gbps per channel.



“Samtec’s complete portfolio of preconfigured ODI optical interconnect solutions demonstrates Samtec’s commitment to support the ODI standard,” said Marc Verdiell, Chief Technology Officer of Samtec Optical Group.

“The FireFly optical engine coupled with ODI-compliant optical cable assemblies offers the test and measurement industry a ready-made ODI physical layer solution. Samtec will also offer standard 24-fiber ODI cable in standard lengths easing implementation of the ODI standard.”



Samtec FireFly copper and optical cable systems provide the flexibility to achieve higher data rates to 28 Gbps and/or greater distances, simplifying board design and enhancing performance. The system’s miniature footprint allows for greater density and closer proximity to the IC, enabling chip-to-chip, board-to-board, on-board and system-to-system connectivity.

## Expanding ODI Ecosystems

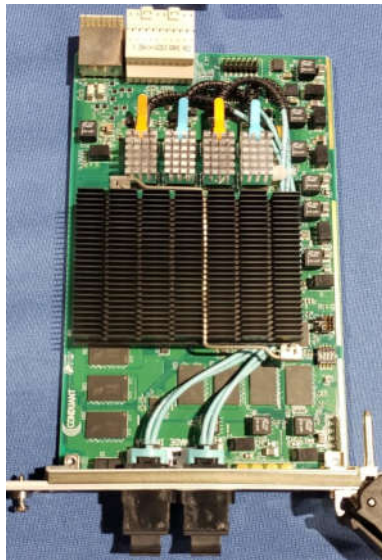
ODI functionality and flexibility make it a popular interface on test and measurement platforms. From waveform generators and optical bridges to digitizers, signal processors and data recorders, the ODI ecosystem continues to grow.

Here are some examples of the latest solutions now available on the market:

- [Keysight M8121A 12 GSa/S Arbitrary Waveform Generator](#)
- [Keysight M8131A 16/32 GSa/S Digitizer](#)
- [Keysight M8132A 640 Gb/s Digital Signal Processor](#)
- [Keysight M9411A VXT PXI Vector Transceiver](#)
- [Guzik ADP7000 Series 10-bit Digitizer](#)
- [Guzik DP7000 Digital Processor](#)
- [Guzik DP8000 Fiber Optics Bridge Card](#)
- [Conduant StreamStor® High Speed Recording System](#)

## Connecting ODI-Compliant Data Recorders to Xilinx Development Boards

High-speed data acquisition (DAQ) systems can be tough to develop. The analog front-end needs to be fine-tuned to a specific application. The digital back end converts and processes the data while combining many channels into a usable data stream.



FPGA development boards, like the [Xilinx® Virtex® Ultrascale+ FPGA VCU118 Development Kit](#), are often used to emulate these applications. They typically offer flexible copper and optical interfaces that can support popular interfaces like ODI.

Longmont, CO-based [Conduant recently developed a white paper](#) that details connecting their data recorder to the VCU118. [The Conduant StreamStor®](#) supports data recording and playback at rates up to 20 GB/s (160 Gb/s). StreamStor® leverages FireFly to connect to a VCU118.

FireFly is protocol agnostic, so StreamStor® can connect to almost any Xilinx FPGA development kit using any number of protocols. The Conduant HSS-8324 board provides the optical interface to the Cobra recorder via a 24-fiber MTP/MPO connector.

## Additional Resources

For more information about ODI, please visit the following links:

- [ODI Specification](#)

- [ODI Press Release](#)
- [ODI Article – “New optical interface standard aims at 5G”](#)

For more information about FireFly, please visit [www.samtec.com/firefly](http://www.samtec.com/firefly) or download the [FireFly Application Design Guide](#). For technical support and design assistance, please contact Samtec’s optical specialists at [firefly@samtec.com](mailto:firefly@samtec.com).

**About the Author:** Matthew Burns develops go-to-market strategies for Samtec’s Silicon to Silicon solutions. Over the course of the last 20+ years Mr. Burns has been a leader in design, technical sales and marketing in the telecommunications, medical and electronic components industries. Mr. Burns holds a B.S. in Electrical Engineering from Penn State University.