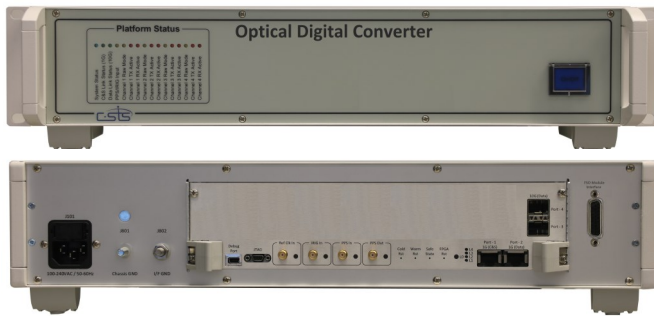


Optical Digital Converter



The Optical Digital Converter (ODC) provides reception and processing functionality of digital bitstreams output by free-space optical (FSO) receiver modules, capable of receiving data rates of up to 10Gbps. The ODC is ideal for use in FSO terminals, optical communication ground stations and for use in experimental setups for optical communication.

The ODC provides all required power, TM/TC and digital bitstream interfaces to the FSO receiver. The ODC provides the electrical, data extraction, protocol/data handling (incl. FEC) and status annotation functions. The digital bitstream interface to the FSO receiver is through an industry-standard SFP+ interface, which supports both copper and optical fibre connections. The recovered data is offloaded from the ODC using a dedicated 10Gbit TCP/IP streaming interface (SFP+, optical or copper) to a commercial server platform for data storage to local disks (SSD or HDD).



The standard 2U/19" enclosure provides a small footprint and can be used in a table top setup (with feet) or integrated into an 19" rack (feet removed).

The ODC can be upgraded with custom data processing (such as forward error correction decoding, protocol handling, deciphering, etc.) to support the needs of the program/project. Using the available time synchronisation inputs (PPS and IRIG), the ODC maintains an accurate hardware time (CUC) that is used to timestamp the received data as well a housekeeping telemetry as received from the FSO receiver. The ODC supports multiple data processing images.

The data storage interface is implemented using a low-latency TCP/IP stack directly within the hardware, capable of providing near line speed data streaming. This provides back-end independence, allowing commercial servers with standard 10G ethernet cards to be used. The ODC can be delivered with back-end software (Windows Server 2012/2016) for data storage/archiving.

The heart of the Optical Digital Converter is based on a hardware module designed and developed by C-STS. This module offers the combination of high interface count, galvanic isolation and FPGA based data routing & processing. Next to the FPGA technology, the module includes a multi-core ARM9 embedded processor running Linux and multiple 1G and 10G ports supporting TCP/IP and custom transceiver and digital bitstream interfaces.



The Optical Digital Converter is part of the suite of latest generation products from C-STS that provides a wide range of onboard interface front-ends, such as Discretes, Power (LCL), RS-422 (SDI), CAN, MIL-STD-1553, SpaceWire, WizardLink, SpaceFibre, FSO Detectors and many more.

Partners

This product is developed in collaboration with TNO and Hyperion Technologies. TNO is a research institute with a strong heritage in high-performance optics, including optical communication. Hyperion Technologies specializes in high performance, miniaturized components for small spacecraft.

This collaboration project is co-funded by the PPP Allowance made available by Holland High Tech, top sector High Tech Systems & Materials and the Ministry of Economic Affairs and Climate Policy, to stimulate public-private partnerships.

Technical Specifications

General

- Modular Implementation
- Gigabit LAN for Control and Monitoring via TCP/IP (via RJ45)
- 10Gbit LAN for Data Offloading via TCP/IP (using SFP+)
- External Time/Reference inputs, such as 10MHz, PPS and IRIG
- PPS output for synchronisation of external equipment

Data Processing and Conversion

- Hardware processing of digital bitstream from FSO receiver
- Bitstream Decoding, FEC Decoding and Data Extraction
- Hardware Timestamping of Recovered Data
- Supports 100Mbps, 1Gbps and 10Gbps FSO Receiver Front-Ends
- High-Speed Digital Interface to FSO Receiver (using SFP+)
- Command and telemetry interface to FSO Receiver (using RS-422)
- DC Power output to FSO Receiver (options: +3V3, +5V or +12V)
- Single D25-connector providing all Power and TM/TC Interfaces to FSO Receiver
- Support for multiple data processing images
- Data processing images can be switched run-time.

Project Specific Customisations (upon request)

- Custom FEC, protocols and processing can be supported in FW
- In-the-field upgradable (electronic distribution)

Environmental and Physical Specifications

Dimensions H x W x D	88.9 x 435 x 400 mm
Weight	5.3kg
Input Power Range	100-240VAC 50-60Hz
Operating Temperature Range	+10°C to +40°C
Operating Humidity	30% to 85% (non-condensing)
Storage Temperature	-20°C to +60°C
Storage Humidity	Up to 85% (non-condensing)

Experience

Building on over 30 years of experience in spacecraft EGSE systems; C-STS provides innovative high-tech solutions for ground-based systems in the domains of spacecraft simulation and testing as well as modem (spacecraft communication) and data processing systems. Supporting all phases of the spacecraft lifetime, from integration to flight and all phases in between.

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