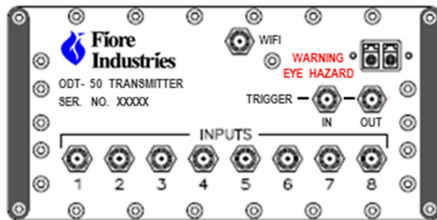


Data Sheet: 1251A (April 2017) **[Preliminary]**

Wideband Digitizing Optical Data Link Model ODS-5000 80 Hz – 3.0 GHz

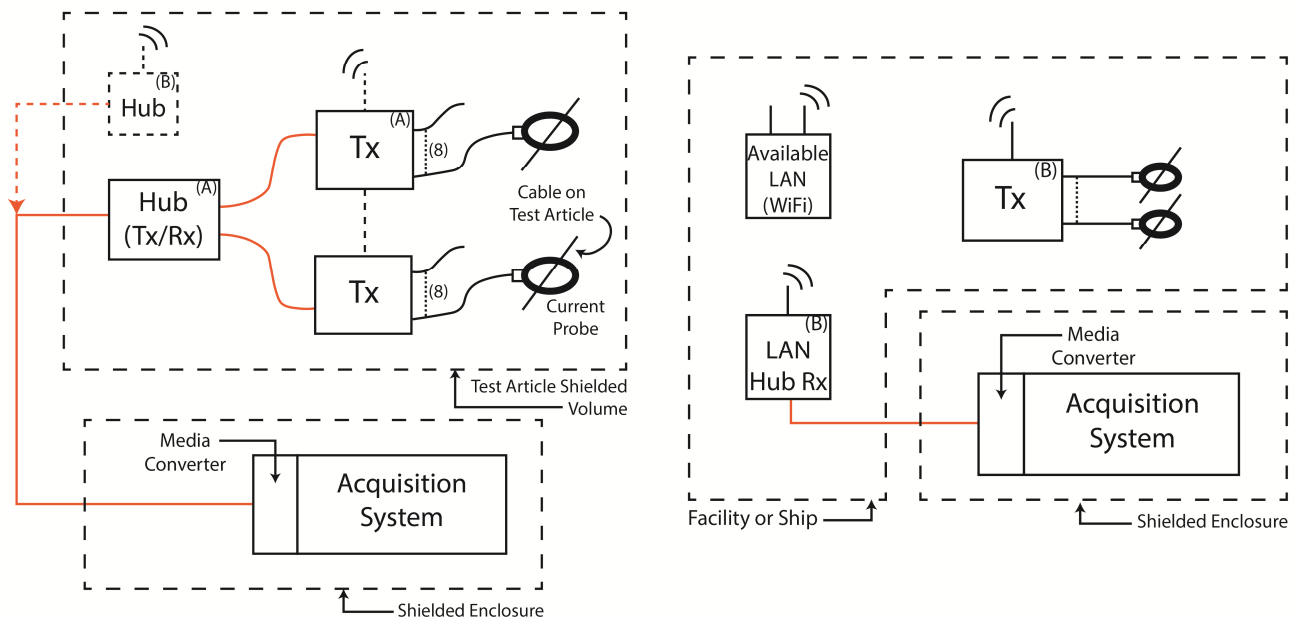
Combining the best state-of-the-art modular digitizing technologies from the Commercial Marketplace (USA) and System Integration Capabilities from Fiore Industries (USA), the ODS-5000 is the newest model in a range of wideband fiber optic data links, developed for use in EMP/EMC/HPM and lightning-strike test applications. The ODS-5000 supports digitizing data acquisition at the point of data capture (test point) using modular, high-speed digitizing technologies, concurrent channel acquisition (up to 4 simultaneous input channels), deep memory (1 Gpoint/input), and gain range from -55 to +50 dB (in 1 dB steps), with full remote control (as with the ODS-2200). Now produced exclusively by Fiore Industries, Inc. for the US and Non-Domestic Markets, utilizing the latest developments in modular ADC design, coupled with a rich remote control environment, the ODS-5000 is a unique product for supporting Electromagnetic Effects testing in harsh or Threat-level environments. The ODS-5000 provides low noise, wideband signal transmission from 80 Hz to 3.0 GHz (wider bandwidths are available). The ODS-5000 is designed to support test requirements involving current, voltage, and field measurements, both 50 ohm and high impedance, with differential mode versions available, and integrated measurements (using B-dot and D-dot sensors together with Fiore's in-line passive integrators, the FPI Series, in conjunction with the 1 MOhm input buffer). The relatively small size of the optical transmitter facilitates obtaining measurements in confined spaces and the remote control functionality enhances operations where facility testing time must be minimized.

The ODS-5000 also supports multiple modes of inter-transmitter and transmitter-to-acquisition system communications via industry-standard network (via fiber) and Wifi connections. The ODS-5000 can also be configured to connect into an existing Wifi network to use this network for data transfer and transmitter control. The basic system consists of an optical fiber (running TCP/IP network protocols) connected from a (presumably shielded) acquisition system to a transmitter (or network router/extender), then transmitters are interconnected via fibers to form a network over which data and control communications are transferred to/from the acquisition system. This configuration eliminates the extensive fiber network required by analog optical links. Further reduction of and possibly elimination of fiber connections can be accomplished using the "all-Wifi" configuration. Two possible configurations for deployment of the ODS-5000 are shown below.

The ODS-5000 consists of optical transmitters (ODT-50), battery packs, optical media converters, high speed optical fibers, and multi-station battery chargers. Each optical transmitter contains 8-inputs, with the capability to acquire data from four inputs simultaneously, increasing the system throughput by a

factor of four over the single-input selection approach used in other optical data systems. The ODT-50 transmitters and battery packs are shielded against EM environments to more than 100 kV/m and capable of operating without performance degradation over a wide temperature range (-20°C to +55°C). The ODS-5000 supports a variety of triggering modes, including trigger by channel, external triggering (at each transmitter), and trigger daisy-chaining between transmitters with one transmitter being the primary trigger source. The ODS-5000 system includes battery packs and chargers that are not backwards-compatible with the ODS-1800 & 2200 battery and charger hardware. The ODS-5000 battery chargers are available in multi-station rackmount & desktop configurations, as well as, a small, low-cost desktop, single-battery-pack charging unit. A system (consisting of one or more complete channels) is delivered with a PC-compatible, Optical Controller Application, which also provides a remote control interface (accessible via a TCP/IP optical media converter).

Configurations for ODS-5000 Deployment for EME Testing



ODS-5000 Optical Link Component Performance Specifications

| Parameter | Conditions | Value |
|---|---|---|
| Transmitter RF signal inputs | 1-of-8 selection (unselected inputs internally terminated in 50 Ohm) or 4 concurrently-selected | 50 Ohm, 8-way or 2x4 way input (differential input version available) |
| Cross-Talk/Isolation | All 8 inputs | >60 dB, dc to 3 GHz |
| Hi Z switchable input buffer | remotely selectable for any input | 50/1M Ohm, 8-way input |
| In-line Passive Integrator (available separately for use with the ODT-50) | attachable to any input | Time Constants available from: 0.1 µsec up to 10 µsec |
| 3dB bandwidth | maximum lower | 80 Hz |
| | typical lower | 60 Hz |
| | minimum upper | 3000 MHz |
| | typical upper | 3300 MHz |
| Full scale input signal range (50 Ohm inputs) | 105dB gain range, switchable in 1dB steps (maximum CW input power 0.5W; +27 dBm, or ±5 Vdc) | -50 dBm up to +55 dBm |
| | | 57 dBuV up to 162 dBuV |
| | | 1 mV _{peak} up to 178 V _{peak} |
| System gain (Transmitter) | Remotely selectable in 1dB steps | -55 dB up to +50 dB |
| SNR (p-p signal/rms noise) | typical (measured in a noise bandwidth of 3000 MHz) | > 48 dB |
| Equivalent Input Noise | at maximum input sensitivity | -168 dBm/Hz |
| Receiver output noise floor | typical (for system gains between -55dB and +33dB) | -135 dBm/Hz |
| Bandpass flatness | 100 Hz – 3.0 GHz | ± 1 dB maximum |
| Calibration Signals | Transmitter Internal, remotely selectable | Low Freq: 50 kHz |
| | | Hi Freq: 50 MHz fast risetime (harmonics to > 1.6 GHz) |
| Trigger Input/Output | 50 ohms/50 ohms | 3-5 Volts/5 Volts |
| Transmitter Wifi | Protocols Supported, a/b/g/n | Dual Band, 2.4 Ghz/5GHz |
| Transmitter Network (Optical) | TCP/IP | 1 GBit/sec |

Environmental & Power Specifications for ODS-5000 Components

| Parameter | Condition | Value |
|--|---|--|
| Operational temperature, ODT-50 | Transmitter with B-50 Battery Pack installed | -20 to +55°C, 0 to 95% relative humidity (non-condensing) |
| Storage temperature, ODT-50 | Transmitter without B-50 Battery Pack installed | -30°C to +70°C |
| EMI Hardening (ODT-50) | Transmitter with B-50 Battery Pack installed | Shielded to >100kV/m, with no operational degradation |
| Power consumption (Transmitter) ^[1] | Optical link On , fully charged B-50 Battery Pack (11Ah @ 12 volts) | <2900 mA (over temperature), >4 hours typical operation with optical link ON, before link cut-off ^[1] |
| | optical link Off (Standby), fully-charged B-50 Battery Pack (11 Ah @ 12 volts) | <1 mA (over temperature), >2600 hours before battery cut-off |
| Battery Pack, B-50 (automated battery voltage protection monitoring) | operation | -20 to +55°C (non-condensing) |
| | storage | -30°C to +70°C |

[1] Control system for transmitter and acquisition system applications includes power management functions; battery life for transient testing depends on transmitter **On** time.

Transmitter & Battery Pack input/output and physical specifications

| Input/Output Connectors | |
|---|-----------------------|
| Connector | Type |
| Transmitter Control/Data Input/Output Connector Type (optical – Digital Data), Duplex Connector | LC/APC* (Single-mode) |
| Transmitter Signal Input Connector Type (RF – Analog Data) | SMA(F) |
| Transmitter Trigger Input/Output Connector Type (RF – Analog) | SMA(F) |
| Transmitter Wifi Input Connector Type | SMA(F) |
| Optical Media Converter Input Connector Type (optical – Digital Data) | LC/APC (Single-mode) |

* Secondary optical connector used for daisy-chaining transmitters together.

| Physical Dimensions | |
|---|--|
| Component | Value |
| Transmitter (Model ODT-50 including installed battery **) | L: 5.74” (146 mm) W: 5.35” (136 mm) H: 2.64” (67 mm) Weight: 2.2 kg (4.4 lbs) |
| Battery Pack (Model B-50) | L: 2.02” (51 mm) W: 3.55” (90 mm) H: 2.12” (54 mm) |
| Battery Charger Chassis, 8-station (Model BC-50R) | L: 11.7” (298 mm) W: 19” (483 mm) H: 6.97” (177 mm) |
| Battery Charger Chassis, four-station (Model BC-50D) | L: 12.25” (311 mm) W: 10.25” (260 mm) H: 5.25” (146 mm) |
| Optical Fiber System, Model FS-5000 A/B/C/D/E/F/G/H Simplex Fiber: one Single-Mode (Digital Data), Two-section Reel provided for lengths >100m. | |

** Installation of battery pack does not change transmitter size.

Summary of ODS-5000 Model Numbers with component names

| ODS-5000 Model Number | Item Name/Description |
|-----------------------|---|
| ODT-50 | Digitizing Optical Transmitter, 8-RF Input ^[1] |
| B-50 | Battery Pack, 12 V, Li-Ion, 11 Ah |
| BC-50S | Battery Charger, Desktop, 1-Station |
| BC-50D | Battery Charger Chassis, Desktop, 4-Station |
| BC-50R | Battery Charger Chassis, Rackmount (6-charger stations) |
| FS-5000A | Optical Fiber System, Simplex Single-mode, 10 meter ^{[2][3]} |
| FS-5000B | Optical Fiber System, Simplex Single-mode, 30 meter ^{[2][3]} |
| FS-5000C | Optical Fiber System, Duplex Single-mode, 45 meter ^{[2][3]} |
| FS-5000D | Optical Fiber System, Duplex Single-mode, 100 meter (with reel) ^{[2][3]} |
| FS-5000E | Optical Fiber System, Duplex Single-mode, 200 meter (with reel) ^{[2][3]} |
| FS-5000F | Optical Fiber System, Duplex Single-mode, 300 meter (with reel) ^{[2][3]} |
| FS-5000G | Optical Fiber System, Duplex Single-mode, 500 meter (with reel) ^{[2][3]} |
| OC-5000 | Optical Controller & Software ^[4] |

- Notes:**
- [1] Specify at time of purchase, desired interconnection configuration for testing deployment; system provided with optical media converter.
 - [2] Specify length of fiber desired at time of purchase; standard lengths with model and part numbers are 10m, 30m, 45m, 100m, 200m, 300m, 400m, & 500m. Custom lengths are available. Contact Fiore Industries, Inc. for custom length pricing.
 - [3] Customers requiring interconnection of multiple fiber segments via optical patch panels can order Optical Patch Panels from Fiore Industries.
 - [4] Hardware controller optional; Controller Software application available at no charge on CD.

Support for system integration and custom data acquisition applications development, involving the ODS-5000, are available from Fiore Industries, Inc. For pricing and delivery of ODS-5000 components or integrated systems support, please contact Fiore Industries, Inc. (info@fiore-ind.com).



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