



**NOTE: The ODS-1800 is to be replaced by the ODS-2200 in 2016**

## ODS-1800 1.8 GHz Optical Data Acquisition Link



Combining the best state-of-the-art optical link technologies from EG&G (USA) and Opcom Research (UK), the ODS-1800 is the newest model in a range of wideband analog fiber optic data links, developed for use in EMP/EMC and lightning strike test applications. Utilizing the latest developments in analog design and optical link technology from Opcom Research, the ODS-1800 provides low noise, wideband signal transmission from 60 Hz to 1.8 GHz. The system is designed to support test requirements involving current, voltage, and field measurements, both 50 ohm and high impedance, and integrated (using B-dot and D-dot sensors together with Opcom's in-line passive integrators, in conjunction with the 1M $\Omega$  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-1800 consists of optical transmitters, battery packs, receiver chassis, and high speed optical fibers. Configurations are available with 1 to 8 channels per receiver chassis and will support multiple receiver chassis. A one-, two- or four-channel desktop receiver

chassis configuration is also available. Each receiver channel has a dedicated optical transmitter (ODT-18) which is capable of monitoring 8 separate test points, selectable one-at-a-time by remote control. The ODT-18 transmitters and battery packs are shielded against EMI environments to more than 100 kV/m and capable of operating without degradation over a wide temperature range (-20°C to +55°C). The ODS system includes battery chargers which are available in a multi-station desktop or rack mount configuration, as well as a small desktop single battery pack unit.

The ODS system is available in two configurations: The ODS-1800, which incorporates the latest generation of DFB laser/monomode fiber technology, achieving the ultimate in bandwidth, low noise and linearity, yet still embodying the rugged reliability required of this data acquisition system. The ODS-1800 model is now the system of choice for most applications, and is recommended by Opcom for all levels of EMP/EMC and lightning simulation testing. The second configuration, designated the ODS-1600 (**now obsolete**), incorporates an upgraded version of the FP laser/multimode fiber technology used in the original ODS-1500 system. The ODS-1600 has the same full functionality and features of the ODS-1800, but with a slightly lower frequency response (80Hz to 1750MHz typical), and a poorer noise performance due to laser/fiber modal noise. The ODS-1600 may be a practical, or cost effective, choice for deployment in test sites where significant numbers of multimode fiber optic cables are already installed into the facility.

The ODS-1800 provides a link gain programmable in 1 dB steps from -55 dB to +50 dB. The optical data transmitters include two remote-controlled, calibration signal generators. A low frequency version (50 kHz) is used for checking the integrity of probes connected to the transmitter inputs. A high frequency version (50 MHz) is used for verification of the link's band pass characteristics out to >1200 MHz.

All transmitter and optical link functions are remotely controlled via a 10BaseT network connection from an Optical Data System Controller, a PC-based program which can be installed on any PC-compatible platform running Windows 2000/XP. The controller interface provides direct access to all transmitter and calibration functions. Optional hardware is available to provide integrated probe verification capabilities.

### **Manual, Small System Operation**

With the desktop receiver chassis, the ODS-1800 can be configured and operated in a small system, stand-alone configuration with 1 or more channels, using the ACU-14PC Optical Controller. The system can be operated manually from the Optical Controller or via remote control from a separate PC, running Customer-specific data acquisition software. The manual interface consists of mouse and keyboard inputs (an optional touch screen interface and/or flat panel configuration is available). The remote control interface is a 10/100BaseT (TCP/IP) interface which uses a basic TCP/IP Socket Interface supported on any Windows 98SE/ME/2000/XP Operating System. Interface drivers are available which can be integrated with C, Visual Basic, LabVIEW, and MATLAB data acquisition applications software.

## **Production Mode Operation**

The ODS-1800 is ideally designed to support large-scale, production mode EM testing for test articles containing hundreds to thousands of individual test points. The optical link control and calibration functions can be integrated into a large-scale data acquisition system to support automated instrumentation verification, system calibration, and measurement acquisition using one to 255 optical data channels (each with 8 inputs at the transmitter). The ODS-1800 Controller and Receiver components are specifically designed to support characterization of instrumentation and storage of these profiles for use in automated verification functions, which can be initiated/requested by an external data acquisition application. EG&G can also provide an SQL 2000-compatible database product which supports test planning, and a low level Continuous Wave (using network analyzers), LabVIEW-based data acquisition system which automatically verifies instrumentation, schedules measurement acquisition, automatically removes instrumentation effects, and processes transfer functions from the acquired data. A transient data acquisition system (using high-speed digitizers) is currently under development.

## **Non-Remote Control Applications**

The ODT-18 transmitters support a “non-remote control” mode which allows the transmitter power up default state to be redefined and stored in flash ROM in the transmitter. This supports use of the transmitters for applications where only a single fiber (data) is desired. This alternative power up state can be defined and stored using the Optical Data System controller. Thereafter, when a battery pack is installed into the transmitter, it will power up in the alternate, pre-defined state and remain in that state until the battery pack goes into cut-off.

## **EM Testing Accessories**

EG&G provides a broad range of standard EM testing instrumentation and accessories for use with the ODS-1800 Optical Data System. These include sensor cabling, electromagnetic sensors (free field and surface effects types), current probes (single wire, bulk current, inline-coaxial), voltage probes (inline pickoff), passive integrators, etc. EG&G can also provide custom instrumentation configurations from individual sensor components to fully-integrated, large scale data acquisition systems (including all system hardware and software design and implementation). Fully integrated EMI testing and data processing software systems are currently available to support both high level pulse and low level CW testing from 100 Hz to 1.8 GHz. These systems include complete planning and acquisition control interfaces along with automated data processing to remove instrumentation effects in real time.

### ODS-1800 Optical Link Component Performance Specifications

Parameter	Conditions	Value
Transmitter signal inputs	1-of-8 selection (unselected inputs internally terminated in 50 Ohm)	50 Ohm, 8-way input
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-18)	attachable to any input	Time Constants from: 0.1 $\mu$ sec up to: 10 $\mu$ sec
3dB bandwidth	maximum lower	80 Hz
	typical lower	60 Hz
	minimum upper	1800 MHz
	typical upper	2000 MHz
Output signal level	full scale into 50 Ohm (at <0.2dB gain compression)	0 dBm
		107 dBuV
		632 mVp-p
Full scale input signal range (50 Ohm inputs)	105dB, switchable in 1dB steps (maximum cw input power 0.5W) (maximum dc input voltage $\pm$ 5V)	-50 dBm up to +55 dBm
		57 dBuV up to 162 dBuV
		1 mVpeak up to 178 Vpeak
System gain	remotely selectable in 1dB steps	-55 dB up to +50 dB
SNR (p-p signal/rms noise)	typical (measured in a noise bandwidth of 1800 MHz)	> 48 dB
Equivalent Input Noise	at maximum input sensitivity	-168 dBm/Hz
Receiver output noise floor	typical (for system gains between -55dB and +35dB)	-135 dBm/Hz
Bandpass flatness	120 Hz – 1.6 GHz	$\pm$ 1 dB maximum
Receiver AGC dynamic range	typical	6 dB optical power

### Environmental & Power Specifications for the ODT-18 Transmitter, OPC-L2 Battery Pack, ODR-18M Receiver Module, & ODR-18E/F/G/H Receiver Chassis

Parameter	Condition	Value
Operational temperature	Transmitter with OPC-L2 Battery Pack installed	-20 to +55°C, 0 to 95% relative humidity (non-condensing)
	Receiver Chassis	0°C to 45°C, 0 to 95% relative humidity (non-condensing)
Storage temperature	Transmitter without OPC-L2 Battery Pack installed	-30°C to +70°C
	Receiver Module (standalone, not installed in Chassis)	-30°C to +70°C
Power consumption (Transmitter)	optical link <b>On</b> , fully charged OPC-L2 Battery Pack (3.4 Ah @ 7.4 volts)	<100 mA (over temperature), 24 hours typical operation before battery cut-off
	optical link <b>Off</b> (Standby), fully charged OPC-L2 Battery Pack (3.4 Ah @ 7.4 volts)	<1 mA (over temperature), >2000 hours before battery cut-off
Battery Pack, OPC-L2 (automated battery voltage monitoring and cut-off for deep discharge protection)	operation	-20 to +55°C (non-condensing)
	storage	-30°C to +70°C
Power consumption (ODR-18E/F/G Receiver Chassis w/8 Rx Modules)	110/240 Vac, 50-60 Hz Input (auto-sensing)	< 20 Watts
		.5 A @ 120 Vac/.25 A @ 240 Vac

### Transmitter, Receiver, & Battery Pack input/output and physical specifications

Input/Output Connectors		Physical Dimensions	
Connector	Type	Component	Value
Transmitter Output Connector Type (optical – Analog Data)	FC/APC	Transmitter (ODT-18 including attached battery)	L: 5.0" (127 mm) W: 5.4" (136 mm) H: 2.7" (68 mm)
Transmitter Input/Output Connector Type (optical – Digital Control Data)	ST	Battery Pack (OPC-L2)	L: 1.02" (26 mm) W: 4.29" (109 mm) H: 2.7" (69 mm)
Transmitter Input Connector Type (RF – Analog Data)	SMA(F)	Receiver Module (ODR-18M)	L: 4.25" (108 mm) W: 0.87" (22 mm) H: 3.46" (88 mm)
Receiver Input Connector Type (optical – Analog Data)	FC/APC	Receiver Chassis (ODR-18E/F)	L: 12.25" (311 mm) W: 19" (483 mm) H: 5.25" (133 mm)
Receiver Input/Output Connector Type (optical – Digital Control Data)	ST	Receiver Chassis (ODR-18G)	L: 11.7" (298 mm) W: 19" (483 mm) H: 6.97" (177 mm)
Receiver Module Output Connector Type (RF – Analog Data)	SMA (F) (Receiver Chassis output is N-type Female)	Receiver Chassis (ODR-18H) 2-4 channel versions	L: 12.25" (311 mm) W: 10.25" (260 mm) H: 5.75" (146 mm)
Receiver Chassis ODR-18E (Rackmount version)	Optical Inputs <b>(Front Panel)</b> FC/APC & ST		
	RF Outputs <b>(Rear Panel)</b> N-type Female		
Receiver Chassis ODR-18F (Rackmount version)	Optical Inputs <b>(Rear Panel)</b> FC/APC & ST		
	RF Outputs <b>(Front Panel)</b> N-type Female		
Receiver Chassis ODR-18G (Rackmount version)	Optical Inputs <b>(Front Panel)</b> FC/APC & ST		
	RF Outputs <b>(Front Panel)</b> N-type Female		
Receiver Chassis ODR-18H (Schroff Case with handle)	Optical Inputs <b>(Front Panel)</b> FC/APC & ST		
	RF Outputs <b>(Front Panel)</b> N-type Female		

Support for system integration and custom data acquisition applications development, involving the ODS-1500/1600/1800, is available from EG&G Technical Services, Inc., Albuquerque Operations.

For pricing and delivery of the ODS-1800 please contact Opcom Research Limited.