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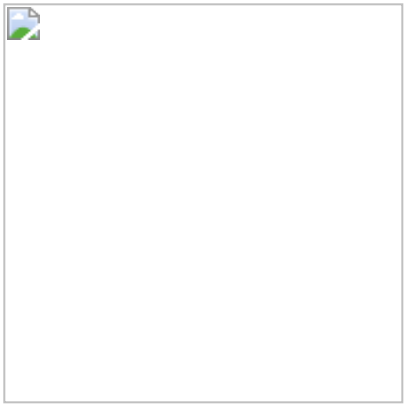
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THE PICOSECOND FIBEROPTIC SYSTEM (PFOS)

The Picosecond Fiberoptic System is a mainframe based instrument with a host of electronic and optoelectronic plug-in modules.Each module takes its power from the mainframe and has its electrical and/or optical input/output ports on its front panel. This is an extremely flexible system where individual modules can be utilized or complex systems can be configured. The PFOS LIST consists of the mainframes and modules listed immediately below.



PFOS LIST

- Mainframes, MF20, MF03
- Diode Lasers, PPL30K, PPL1M
- Photodetectors, Ultra high speed, PPD Series
- Photodetectors, Amplified high speed, PAD Series
- Photodectors, Photon counting, PPC Series
- Couplers, PFC Series
- Attenuators, POA Series
- Delay Generator, PDG20
- Sampler, PSU20
- Processor, TDR30 (This is a free standing instrument for use with certain PFOS configurations.)

The **MF20 Mainframe** This is a rack mountable mainframe which houses the plug-in modules and provides the basic power requirements for each module. There are eleven bays, each of which can accommodate and power any of the modules.



The **MF03 Mainframe** is a bench top style which may be preferred where only one or two modules require power such as a laser and detector or laser and attenuator. The MF03 has three bays and can be viewed with the PPL30K, PPL1M product.

Back to PFOS list.

The **PPD Series** detectors are the PFOS single bay wide modular version of the pigtailed PD series. They are connectorized (ST style) with a fiber optic cable with graded index communications type fiber. For larger area diodes, 100/140 core/clad fiber with a numerical aperture of 0.29 is used. For smaller area diodes, 50/125 core/clad fiber with a numerical aperture of 0.2 is used. Both fibers are suitable for use in singlemode measurements as well. The electrical output is via a 50 ohm SMA style connector on the front panel. The APD types may be operated in low gain or high gain via a front panel switch. The high gain bias voltage is controlled by a variable knob. For detailed detector specifications see the **PD Series** photodetectors specifications table.



Or ***Back to PFOS list.***

The **PAD Series** detectors are the PFOS single bay wide modular version of the pigtailed AD series. They are connectorized (ST style) with fiber optic cable with graded index communications type fiber. For larger area diodes, 100/140 core/clad fiber with a numerical aperture of 0.29 is used. For smaller area diodes, 50/125 core/clad fiber with a numerical aperture 0.2 is used. Both fibers are suitable for use in singlemode measurements as well. The electrical output is via a 50 ohm SMA style connector on the front panel. The APD types may be operated in low gain or high gain via a front panel switch. The high gain bias voltage is controlled by a variable knob. For detailed detector specifications see the **AD Series** amplified photodetectors specifications table.



Or ***Back to PFOS list.***

The **PPC Series** Photon Counting detectors provide the ultimate in detector sensitivity. These detectors increase the system sensitivity by 30 dB over the most sensitive conventional sampling system. Designed to be used in the PFOS system these detectors require the PDG20 Time Delay Generator and the TDR30 Processor for normal operation. The figures in the table below indicate the improved sensitivity which can be attained with the Photon Counter over the Sampling system. Note that the specifications apply to the particular wavelength indicated within the wavelength range.





OTDR Type	Units	Photon Counting	Sampling	Photon Counting	Sampling
Detector	-	PPC10	PAD230+PSU20	PPC20	PAD240+PSU20
Wavelength Range	nm	630-1060	680-1060	900-1750	900-1750
Laser Wavelength	nm	850	850	1300/1550	1300/1550
Laser Pulsewidth	ps	100	100	100	100
Laser Peak Power	mW	100	100	60	60
Fresnel Loss Budget	-				
...Real-Time	dB	90	60	60	30
...Two Minute Averaging Rayleigh	dB	107	77	78	48
Loss Budget	-				
...Real-Time	dB	15	Nil	Nil	Nil
...90 Sec Averaging	dB	32	Nil	Nil	Nil
Maximum Resolution	-				
...Single Point	mm	1	0.2	1	0.2
...Two Point	mm	30	5	30	5
Deadzone	cm	30	Zero	Zero	Zero

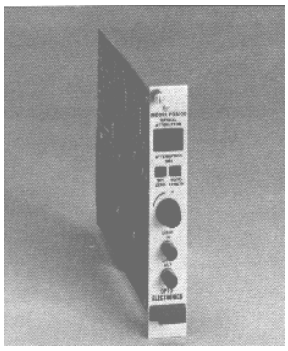
Back to PFOS list.

The **PFC Series** fiberoptic couplers are single bay modules designed to fit the mainframe and be compatible with the type of laser and detector chosen. These unit are low loss three or four port ST style connectorized devices with a one to one splitting ratio.

Characteristics	Units	PFC Model Number						
		6	10	50	62	100	200	400
Fiber Core Size	um	4	10	50	62.5	100	200	400
Configuration	6um	2x2	2x2	2x2	2x2	2x2	2x1	2x1
Excess Loss	-	<1	<0.7	<1	<1	<1	<2	<2
Directivity	dB	<50	<50	<40	<30	<30	<20	<25

Back to PFOS list.

The **POA series** calibrated optical attenuators are designed for use in the PFOS system for operation in conjunction with the model PPC Photon Counting Detector. This module finds use as a general purpose attenuator or as part of the millimeter resolution OTDR configuration of the PFOS system. The attenuators can be calibrated at more than one wavelength.The operating wavelength is chosen by a keystroke while a bright LED readout indicates the attenuation in dB. This single bay module slides into any available position in either mainframe.



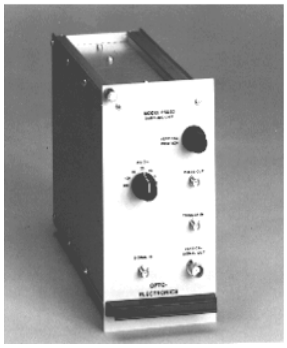
Characteristics	Units	POA Model Number					
		6	10	50	62	100	200
Core Diameter	um	4	9	50	62.5	100	200
Dynamic Range	dB	>70	>70	>70	>70	>70	>70
Excess Loss	dB	<2.0	<1.5	<1.0	<1.0	<1.0	<1.5
Return Loss	dB	>20	>20	>20	>20	>20	>20
Accuracy	dB	0.1	0.1	0.1	0.1	0.1	0.2

Back to PFOS list.

The **PDG20 Module** is a free running 33 KHz repetition rate trigger source and delay generator designed to drive the PPL30K diode laser sources and to provide an ultra low jitter delay for the PSU20 sampling unit or the PPC series Photon Counting Detectors. In addition the PDG20 serves as a time base for the PSU20 Sampler. It is this module with less than 3 ps jitter, coupled with the Opto-Electronics fast sources and detectors which makes the Millimeter Resolution OTDR possible. The trigger and delay outputs are via SMA style electrical connectors. The two bay wide PPC10 or three bay wide PPC20 slide into any available position in the mainframe.

Back to PFOS list.

The **PSU20 Module** is an externally triggered sampling unit with an extremely narrow sampling window. This unit, along with the PDG20 has been designed to operate as an electronic sampling pair which is necessary to analyze extremely short pulses encountered with the PFOS system. The pair is normally used in conjunction with the Opto-Electronics TDR30 Processor. The module is three bays wide and can be inserted in any available slot in the mainframe.



Back to PFOS list.

The **TDR30 Processor** is a stand alone unit designed to synchronize the PDG20 and PSU20 with the laser trigger and delayed detector/sampler trigger in a transmission or OTDR mode of operation. In addition, the TDR30 provides high speed averaging and signal processing to allow quick high resolution measurements.
Back to PFOS list.

Return to Product List

Return to Home Page

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