Mach-Zehnder interferometer K-Clock Box

780-925 nm, 1225-1375 nm

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The KCLK Series k-Clock Box is a timing device for swept-source Optical Coherence Tomography, designed to linearize the sampling of interferometric signals in k-space ($k=2\pi/\lambda$) rather than time or wavelength. It uses a Mach-Zehnder interferometer (MZI) with a fixed optical path difference (OPD) to generate zero crossings at uniform k-intervals, which are converted into digital pulses that trigger the analog-to-digital converter (ADC) for precise, k-linear data acquisition. The unit includes a fiber coupler network that provides both the k-clock and a power monitor signal to track laser output power and wavelength, with low polarization sensitivity. The spacing between k-clock pulses is determined by the MZI's OPD, with larger OPD yielding higher clock frequencies and denser sampling. Powered via an external ±12 V, 250 mA supply (included), the KCLK box is essential for OCT systems and other applications requiring k-linear sampling, such as optical frequency domain reflectometry (OFDR) and swept-wavelength interferometry.

Features

- Non-Mechanical High Reliability
- Accurate and Reproducible Position Control
- Fast Scan Speeds

Applications

- Laser Display
- Micromachining
- Laser Tweezers
- Optical Inspection
- Heterodyne Interferometer

Specifications

Parameter		Min	Typical	Max	Unit
Wavelength	model 850	780		925	nm
	model 1300	1225		1375	
Free Spectral Range MZI Output			103.3 ±5%		GHz
Fiber Type	model 850		Nufern 780-HP		
	model 1300		Corning SMF28		
Optical Input, Output			FC/APC pigtail, 50cm long		
Insertion Loss [1]	model 850		< 1.5	3.0	dB
	model 1300		< 0.7	1.0	
Detector Material/Type	model 850		Si / PIN		
	model 1300		InGaAs / PIN		
Detector Wavelength Range	model 850	320		1000	nm
	model 1300	800		1700	
Scan Angle	model 850		0.53		A/W
	model 1300		1.0		
Bandwidth (3dB) Power Monitor, MZI-Output			DC - 200		MHz
Conversion Gain Power Monitor [2]	model 850		30 ±25%		V/W
	model 1300		60 ±25%		
Conversion Gain MZI Output [2]	model 850		30 ±25%		V/W
	model 1300		60 ±25%		
Saturation Power	model 850		100		mW
	model 1300		50		
Max. Input Power (photodiode damage threshold)			250		mW
Electrical Outputs, Impedance			SMA, 50		Ω
DC-offset Electrical Outputs			< ±5		mV
Power Supply			±12V, 250mA		

Notes:

[1]. Includes connector losses of the Input and Output pigtail, measured at center wavelength

[2]. Referred to the output power; high impedance load, half value with 50 Ohm load

* All accuracy data are valid at 23 ± 5°C and 45 ±15% humidity

Note: The specifications provided are for general applications with a cost-effective approach. If you need to narrow or expand the tolerance, coverage, limit, or qualifications, please [click this link]:

Rev 04/07/25

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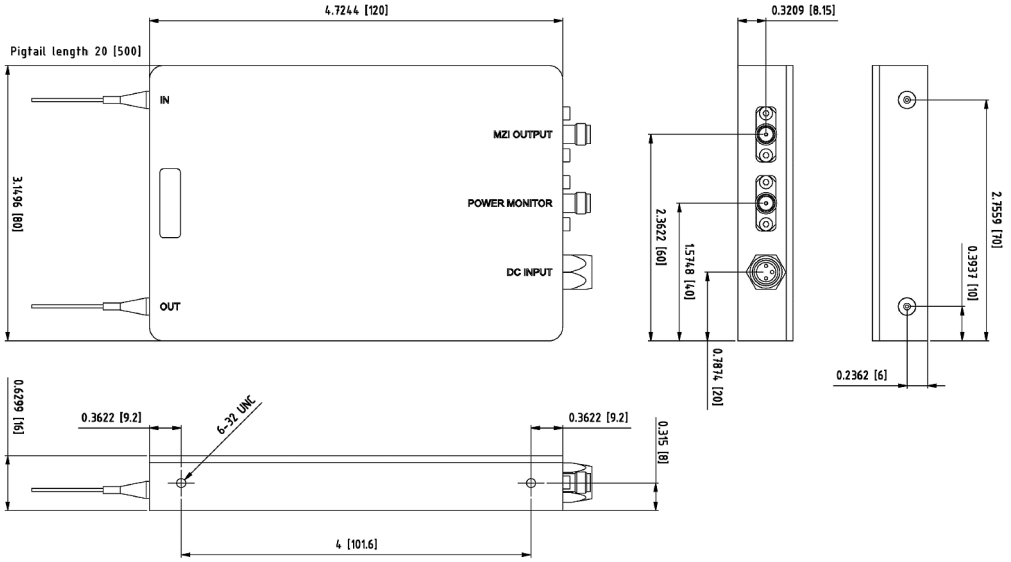
Mechanical Dimensions (inch [mm])



*Product dimensions may change without notice. This is sometimes required for non-standard specifications.

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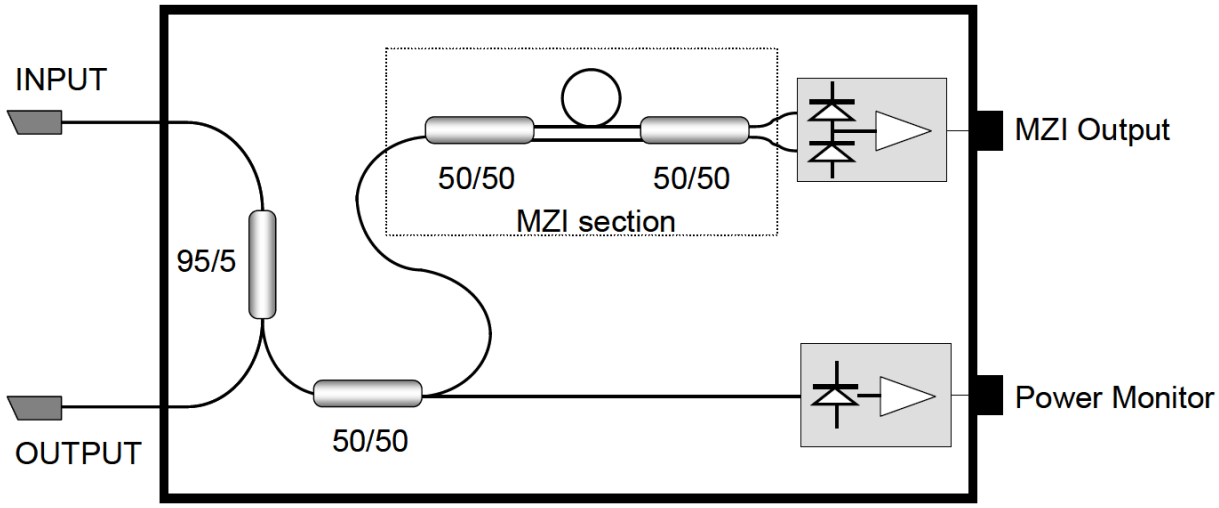
Functional Block Diagram

The K-Clock Box consists ~50 cm long INPUT and OUTPUT pigtails with FC/APC connectors to be connected to your application.



Ordering Information (Part Number)

	☐	☐	☐☐	☐	☐	☐	☐
Prefix	**Configuration**	**Wavelength**	**OPD**	**Fiber Type**	**Fiber Cover**	**Connector[1]**	**Power Monitor**
KCLK-	Standard = 1	1225-1375nm = 1 780-925nm = 2 Special = 0	2mm = 02 5mm = 05 8mm = 08 10mm = 10 13nm = 13 Special = 00	SM28 = 1 780HP = 7	0.9mm Tube = 1	FC/APC = 1	None = 1 Yes = 2 Special = 0

[1]. The default connector configuration uses fiber with 0.9 mm buffer protection. The connector cannot be installed directly onto bare fiber because the bare fiber is prone to damage during shipping. However, the connector can be assembled on bare fiber if a 3 cm protective loose tube is added for reinforcement. The customer may remove this protective tube after testing. The optical power handling of a standard connector is less than 0.5 W for SMF-28 fiber and decreases further for smaller-core fibers.

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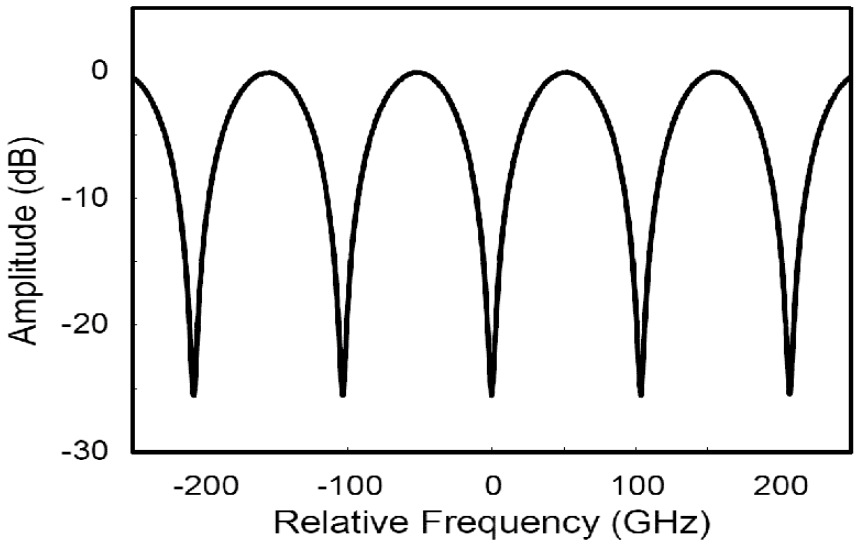
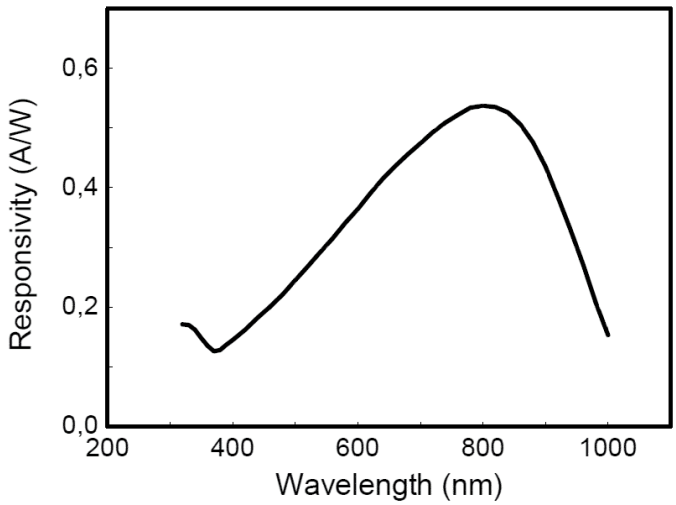
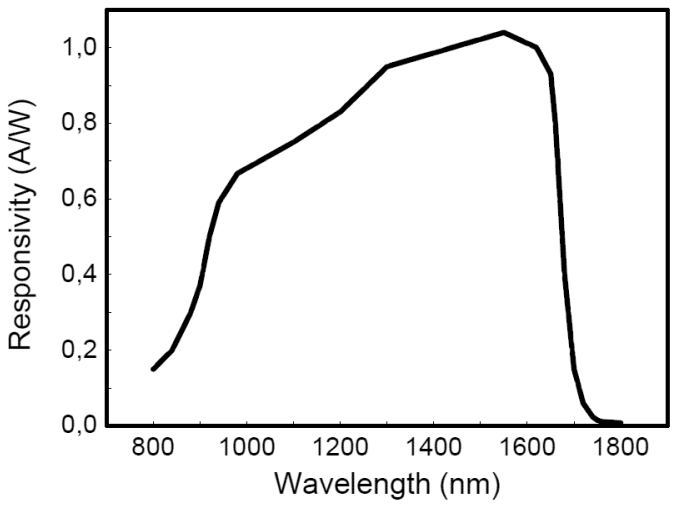
Typical Response







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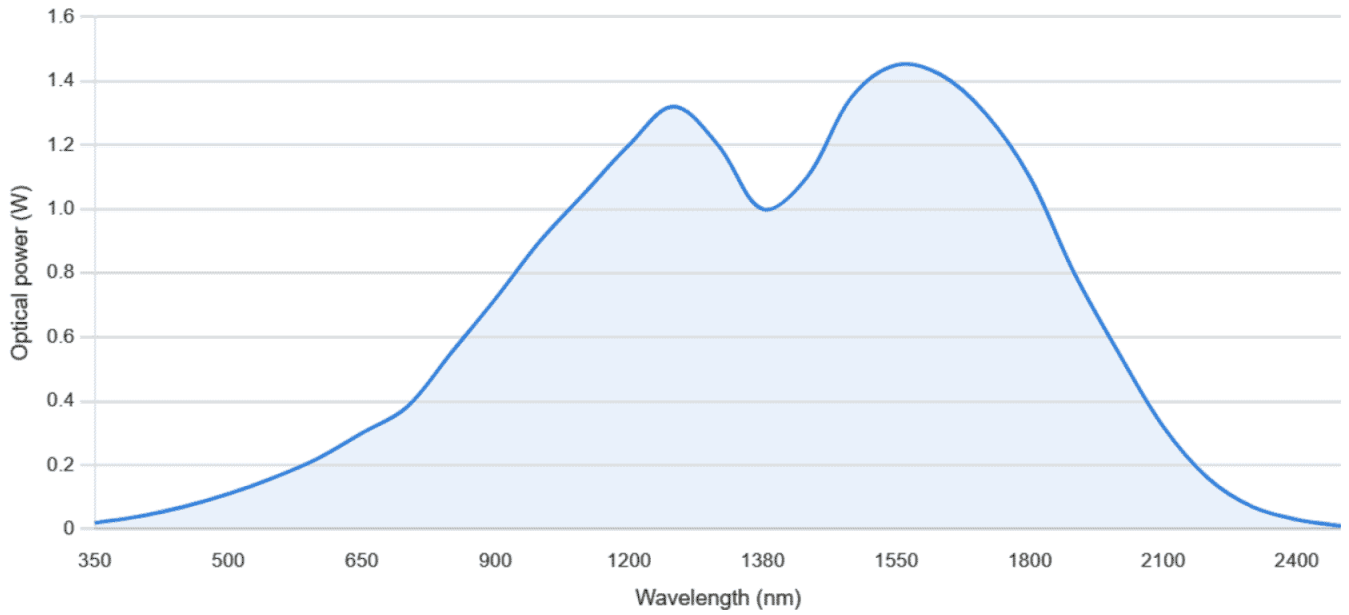
Regular Single Mode / Polarization Maintaining Fiber Optical Power Handing vs Wavelength



Single mode fiber optical power is limited by nonlinear effects in addition to absorption that increase loss and generate heat. The curve shows the approximate safe CW power envelope for standard single-mode fiber. Actual limits depend on fiber design, core size, length, and laser characteristics. Specialty fibers can significantly increase the power limit.

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P +1 781-935-1200 E sales@photonwares.com W www.agiltron.com

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