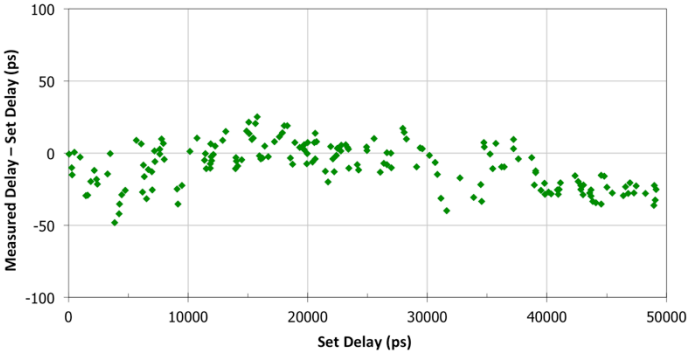
Picosecond Delayer



MPD Picosecond Delayer is a module capable to generate output pulses with user-selectable delay and output pulse duration, in respect to the rising or falling edge of the input signal. This new instrumentation, completely based on solid-state components, sets a new milestone with best in class precision, time-jitter and stability over a wide range of temperatures, not even matched by standard coaxial cables.

Fine adjustable picosecond delayer
10ps resolution and programmable output width

Very high bandwidth and low jitter
Up to 380 MHz with random jitter of 5ps RMS

Dual output
TTL and NIM

High performance uniformity
INL between +50ps & -100ps

Frequency divider
Input frequency can be divided by a factor up to 999

MODULE FEATURES

- 50 ns maximum delay range
- 10 ps step
- TTL and NIM output pulses
- up to 380 MHz bandwidth (NIM output)
- programmable output width from 1 ns to 250 ns
- INL between +50 ps and -100 ps over full-scale range and for all temperatures
- random jitter typ. 5 ps RMS
- < 1 ms programming time
- USB interface
- All solid state, no coax cables

BIOMEDICAL APPLICATION

- Correlation Measurements
- Spectroscopy
- Time-correlated single photon counting
- Optical Tomography

INDUSTRIAL APPLICATION

- Streak camera synchronization
- Short gate acquisition experiments

QUANTUM APPLICATION

- Quantum Cryptography
- Single-photon source characterisation

ASTRONOMY APPLICATION

- Optical Range Finding, LIDAR & LADAR

Overview

The MPD Picosecond Delayer is a module capable to generate output pulses (both NIM and TTL) with user-selectable delay and output pulse duration, in respect to the rising or falling edge of an input signal. It can act also as a frequency divider by a user selectable positive integer ranging from 1 to 999.

This new instrumentation, completely based on solid-state components, sets a new milestone with best in class precision, time-jitter and stability over a wide range of temperatures, not even matched by normal coaxial cables.

The delayer features a 50 ns nominal full scale range with a 10 ps step delay resolution, whilst the output pulse duration is also user controllable from 1 ns to 250 ns with a nominal step of 3.3 ns.

The excellent integral non linearity error is comprised between +50 ps and -100 ps over the full scale range and for all operating temperatures. This exceptional performance makes the picosecond delayer the perfect choice for any experimental set-up where signals must be delayed with high accuracy and stability of characteristics over a broad range of delays and temperatures.

The low random jitter makes it also successfully suitable in any Time Correlated Single Photon Counting application.

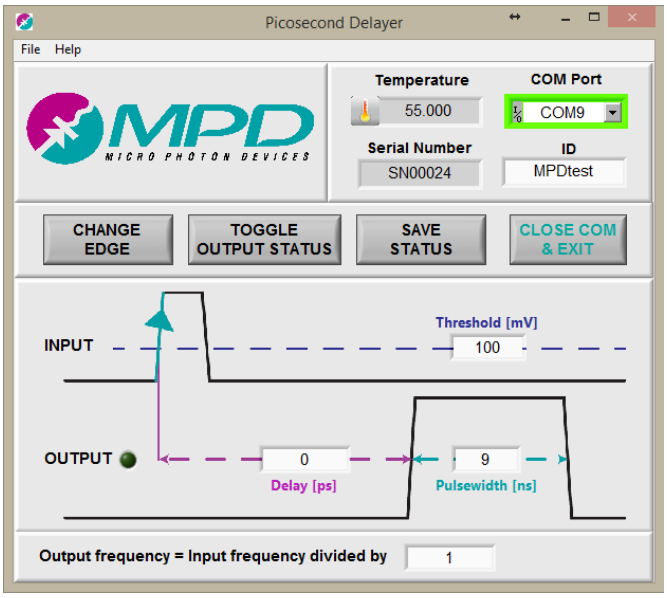
The picosecond delayer can be either controlled using the embedded keypad and display or remotely through a USB connection by a very simple software interface. It also accepts remote commands through a Serial “Virtual COM”. Commands are simply ASCII strings sent over the virtual COM by any program communicating with a RS-232.

PC Interface

The MPD Picosecond Delayer can be operated through a PC interface that allows the control of the delayer settings with a simple and user friendly window. The window shows always the current status of the delayer.

In order to change the delay or the durations of the output pulses, the desired values shall be entered in the correct input boxes and, after pressing the enter key, the delayer gets immediately updated.

It is also possible to select the input signal edge and “save” the whole configuration of the delayer that will be loaded at the next switch on.



Specifications

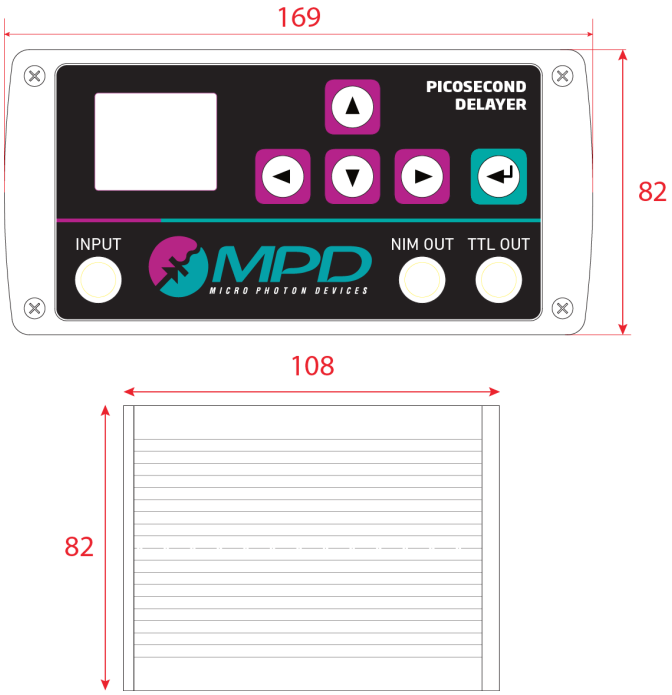
Parameter	Symbol	Description	Min.	Typ.	Max.	Unit
Input high voltage	V_{IN_High}				3	V
Input low voltage	V_{IN_low}		-2			V
Input differential range	$V_{D,MAX}$		-2		2	V
Input termination	R_{IN}			50		Ω
Input voltage overdrive	V_{OV}		100			mV
Input pulse width	t_{IN}		100			ps
Input Slew Rate	SR		100			V/μs
Input overdrive dispersion		100 mV < V_{OV} < 1 V		10		ps
Input slew rate dispersion		2 V/ns < SR < 10 V/ns		15		ps
Input Edge				Neg/ Pos		
Input Threshold	V_{TH}		-2		2	V
Input threshold resolution	ΔV_{TH}		10	18	30	mV
NIM Output low logic level	V_{NIM_High}	50 Ω termination required		0		V
NIM Output high logic level	V_{NIM_Low}	50 Ω termination required		-800		mV
NIM Output Bandwidth	BW_{NIM}		300	380		MHz
TTL Output Bandwidth	BW_{TTL}		100	120		MHz
TTL Output low logic level	V_{TTL_Low}	50 Ω termination required		0		V
TTL Output high logic level	V_{TTL_High}	50 Ω termination required	2.4			V
Propagation delay INPUT - NIM OUT	t_{PD_NIM}		12	15	18	ns
Propagation delay INPUT - TTL OUT	t_{PD_TTL}		16	19	22	ns
Delay programmable range	t_{RANGE}	Equivalent to t_{DELAY} (max)	45	50	55	ns
Delay programmable range Temperature variation	Δt_{RANGE} (T)			75		ps/°C
Random timing jitter (RMS)	Rt_{jitter}	t_{DELAY} = 0 ns		2	5	ps
		$t_{DELAY} = t_{range}$		5	12	ps
Delay step	Δt_{DELAY}			10		ps
Delay integral non linearity	INL	Full scale range	-100		50	ps
Input frequency divider factor	n		1		999	
OUTPUT pulse duration	t_{OUTPUT}		1		250	ns
OUTPUT pulse step	Δt_{OUT}	Pulse width incremental step		3.3		ns
OUTPUT off time	t_{NIM_OFF}, t_{TTL_OFF}	t_{NIM_OFF} and t_{TTL_OFF} are not guaranteed to be the equal on a module.	1	3		ns
OUTPUT pulse width jitter	$t_{OUT,jitter}$	% of pulse duration			1	%
OUTPUT pulse width INL	$t_{OUT,INL}$	Referred to Applied value, NIM OUT	max (±5%, 1 ns)			
OUTPUT pulse width difference between TTL and NIM (TTL-NIM)	$\Delta t_{TTL-NIM}$			1		ns
Programming time	t_{PROG}	Not valid for input edge change		1	2	ms
Power supply			12 V – 1 A			

Designed and built compliant with the European Union Directive 2011/65/CE (also known as RoHS 2)

System requirements

- USB 1.1 and 2.0 interface
- Picosecond Delayer software
  - Microsoft Windows XP, Vista, 7, 8, 32 or 64 bit versions
- Virtual COM
  - Microsoft Windows XP, Vista, 7, 8, 32 or 64 bit versions
  - Linux Ubuntu 12.04 LTS, Fedora Core 15 or compatible distributions, 32 or 64 bit versions. Different distributions should work, but were not tested.
  - Mac OS X 10.7.5 and above

Mechanical drawings



Ordering Information

The Picosecond Delayer can be ordered directly from Micro Photon Devices or its representatives. For a complete list of representatives, visit our website at www.micro-photon-devices.com. The ordering code is the following:

$PSD - 065 - A - MOD

Warranty

A standard legal warranty according to local legislation applies following shipment. Any warranty is null and void if the module case has been opened or if the absolute maximum ratings are exceeded. Specifications are subject to change without any notice. Document version 2.3 – July 2018.

Contacts

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