



# Photonic Time Delay Module

## N-Bit, Lossless Variable

### Product Description

This optical switch base variable time delay turn-key module provides N-bit ( $N \geq 10$ ) Photonic Time Delay resolution by selectively routing optical signals through N fiber segments having different lengths. Each fiber segment is defined to have the delay as

$$\Delta T_i = 2^{(i-1)} \delta T, i = 1, 2, \dots, N$$

Where  $\delta T$  is the increment of time delay. Therefore, the module provides N-bit of digitally variable time delay, having the total time delay as

$$\Delta T_{Total} = (2^N - 1) \delta T$$

N and  $\delta T$  can be defined by the customer. The optical loss difference can be compensated by using optical amplifiers incorporated in the optic fiber segments. Lossless module is achievable.

### Performance Specifications

N-bit Photonic Delay Module		Min	Typical	Max	Unit
Wavelength band		1535	1550	1565	nm
Insertion Loss <sup>[1]</sup>	LLTD (Loss compensated)		0	0.5	dB
	LSTD (Loss not compensated)	TDB			
Cross Talk	CL type	40	50	60	dB
	NS type	30	40	50	
	MEMS type	45	50	60	
Switching Time	CL type		50	100	$\mu$ s
	NS type		150	300	ns
	MEMS type		5	10	ms
Repetition Rate <sup>[2]</sup>	CL type			2	kHz
	NS type			100	kHz
	MEMS type			10	Hz
Delay Time Range <sup>[3]</sup>		0.05		TBD <sup>[4]</sup>	ns
Polarization Dependent Loss			0.25	0.5	dB
IL Uniformity <sup>[5]</sup>			1.0	1.5	dB
Return Loss		50			dB
Operating Temperature		0		60	$^{\circ}$ C
Optical Power Handling			0		dBm
Storage Temperature		-40		85	$^{\circ}$ C
Fiber Type		SMF-28 or equivalent			
Package Dimension <sup>[6]</sup>		19" mount rack base			

[1]: Defined at the input power from -10dBm to 0dBm. The loss will be determined by the switch type and delay bit number for LSTD module.

[2]: Defined in each switch.

[3]: The minimum delay can be as short as 0.01ns if necessary, please contact us.

[4]: The maximum delay is defined by the bit number and delay increment.

[5]: Between the different time delays

[6]: The height of 19" mount rack will be determined by the total time delay.

### Features

- High Resolution
- Large Delay Range
- High Reliability
- Low Insertion Loss
- Amplifier Balanced

### Applications

- True time delay evaluation
- Instrumentation

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## Control Interface

- 1) USB or RS232 with PC GUI
- 2) TTL (GUI for system set-up only is available upon request)

## Module Example (19-bit delay line in 6RU 19" rack)



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

## Ordering Information

	Resolution	Wavelength	Switch type	Package	Fiber Type	Control interface	Delay Range	Connector
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> - <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	8bit = 08 10 bit = 10 N bit = N	1550nm = 5 1310nm = 3	CL & latching = 2 NS & non-latching = 3 MEMS non-latching = 4 MEMS latching = 5 CL & MEMS Combination = 6 Special = 0	3RU=3 4RU=4 5RU=5 6RU =6 Special=0	SMF-28=1 Special=0	TTL = 1 <sup>[1]</sup> USB = 2 RS232 = 3	0	<input type="checkbox"/>
Loss-less Time Delay = LLTD Time Delay without Loss compensation = LSTD							Customized = 0	FC/PC=2 FC/APC=3 SC/PC=4 SC/APC=5 ST/PC=6 LC/APC=7 Special = 0

[1]: High repeat rate in NS or CL type switching must use TTL control through D-shape connector.