

VARIABLE OPTICAL DELAY LINE (VODL)

Compact free-space optical system for precision optical path variation of more than 300 ps (10 cm) up to 12 ns (around 4 m)

Exail's VODL product line enables highly precise and stable control of optical delay up to 12ns, corresponding to several meters of optical delay.

The optical delay can be continuously adjusted using a micrometer screw (manual option) or a motorized actuator (piloted option).

The VODL component is athermal, requiring no external control to stabilize the optical path delay.

Thanks to its patented device, Exail's VODLs show low insertion loss and constant IL uniformity over the full delay range. Its compact design and customization abilities makes it very simple to integrate in every optical system.



Features

- Extremely compact design
- Patented device allowing Low insertion Loss
- Single Mode and polarization maintaining fiber versions
- Optical wavebands covered: 800 nm, 1060 nm, 1310 nm, 1575 nm, 2100 nm
- Highly customizable

Applications

- Coherent Beam Combining (CBC)
- Optical communication systems
- Optical measurement and characterization systems (metrology)
- Optical Coherence Tomography (OCT)
- Optical Time Division Multiplexing (OTDM)
- Optical auto-correlation
- Optical Computing and Optical Buffers
- Pump-probe measurements

Options

- Variable Optical Attenuation (VOA)
- Optical Reference Path (ORP)

Related Equipment

- MINT Optical Line Interferometer
- WT-MINT Delay Line Interferometer
- COH90 90° Optical Hybrid
- COH180 180° Optical Hybrid
- NIR-MPX series phase modulators
- NIR-MPZ series phase modulators

SHORT DELAY VODL - PERFORMANCE HIGHLIGHTS

Parameter	Symbol	Description	Unit	Comment
Delay range	DR	300 600	ps	
Versions	M P	Manual Piloted		Products versions highly customizable
Insertion Loss Maximum	IL	0.8	dB	
Insertion loss Uniformity	Δ IL	< 0.3	dB	
Polarization extinction Ratio	PER	> 20	dB	
Piloted VODL delay resolution		5	fs	

LONG DELAY VODL - PERFORMANCE HIGHLIGHTS

Parameter	Symbol	Description	Unit	Comment
Delay range	DR	3 - 12	ns	
Version	P	Piloted		
Packaging size	-	750 x 400 x 129	mm ³	
Insertion Loss Maximum	IL	≤ 2.0	dB	
Insertion loss Uniformity	Δ IL	≤ 0.5	dB	
Polarization extinction Ratio	PER	> 20	dB	
Piloted VODL delay resolution		10 - 40	fs	

SHORT DELAY VODL

Delays of 300 ps (10 cm) and 600 ps (20 cm)

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Unit
Maximum input power	OP _{in}	-	300	mW
Storage temperature range	STR	-10	+40	°C
Humidity	RH	5	85	%
Operating temperature range	OTR	10	35	°C

OPTICAL CHARACTERISTICS @1575 nm

Parameter		Min	Typ	Max	Unit	Conditions/ Remarks
Operating wavelength (λ)		1520	1575	1630	nm	
Insertion losses (IL)	SM	-	-	0.8	dB	Over full delay range
	PM	-	-	1.0	dB	
UL Uniformity (ΔIL)		-	-	0.3	dB	
Polarization Dependent Losses (PDL)		-	-	0.3	dB	
Polarization Extinction Ratio (PER)		20	-	-	dB	For PM fiber type
Optical Return Loss (ORL)		35	50	-	dB	

OPTICAL CHARACTERISTICS @1310 nm

Parameter		Min	Typ	Max	Unit	Conditions/ Remarks
Operating wavelength (λ)		1260	1310	1360	nm	
Insertion losses (IL)	SM	-	-	1.0	dB	Over full delay range
	PM	-	-	1.2	dB	
UL Uniformity (ΔIL)		-	-	0.3	dB	
Polarization Dependent Losses (PDL)		-	-	0.3	dB	
Polarization Extinction Ratio (PER)		20	-	-	dB	For PM fiber type
Optical Return Loss (ORL)		35	50	-	dB	

OPTICAL CHARACTERISTICS @800 nm

Parameter		Min	Typ	Max	Unit	Conditions/ Remarks
Operating wavelength (λ)		780	800	820	nm	
Insertion losses (IL)	SM	-	-	1.0	dB	Over full delay range
	PM	-	-	1.2	dB	
UL Uniformity (ΔIL)		-	-	0.3	dB	
Polarization Dependent Losses (PDL)		-	-	0.3	dB	
Polarization Extinction Ratio (PER)		20	-	-	dB	For PM fiber type
Optical Return Loss (ORL)		35	50	-	dB	

OPTICAL CHARACTERISTICS @1060 nm

Parameter		Min	Typ	Max	Unit	Cond./Remarks
Operating wavelength (λ)		1010	1060	1110	nm	
Insertion losses (IL) ⁽¹⁾	SM	-	-	1.0	dB	Over full delay range
	PM	-	-	1.2	dB	
UL Uniformity (Δ IL) ⁽¹⁾		-	-	0.3	dB	
Polarization Dependent Losses (PDL) ^{(1) (2)}		-	-	0.3	dB	
Polarization Extinction Ratio (PER) ^{(1) (3)}		20	-	-	dB	For PM fiber type
Optical Return Loss (ORL)		35	50	-	dB	

Parameter		Min	Typ	Max	Unit	Cond./Remarks
Operating wavelength (λ)		2070	2100	2130	nm	
Insertion losses (IL)	SM	-	-	1.0	dB	Over full delay range
	PM	-	-	1.2	dB	
UL Uniformity (Δ IL)		-	-	0.3	dB	
Polarization Dependent Losses (PDL)		-	-	0.3	dB	
Polarization Extinction Ratio (PER)		20	-	-	dB	For PM fiber type
Optical Return Loss (ORL)		35	50	-	dB	

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- Version: **M** (Manual) or **P** (Piloted)
- Delay range: **300** (300 ps), **600** (600 ps), **1200** (1200 ps), **3000** (3000 ps), **6000** (6000 ps), **9000** (9000 ps), **12000** (12000 ps)
- Central wavelength: **1575** (1575 nm), **1310** (1310 nm), **1060** (1060 nm), **2100** (2100 nm)
- Fiber type: **SM** (Single Mode SMF28)
PM (Polarization Maintaining Panda type)
- Input connector: **FU** (FC/UPC), **FA** (FC/APC), **SU** (SC/UPC), **LU** (LC/UPC), **LA** (LC/APC), **SA** (SC/APC), **EA** (E-2000)
- Output connector: **FU** (FC/UPC), **FA** (FC/APC), **SU** (SC/UPC), **LU** (LC/UPC), **LA** (LC/APC), **SA** (SC/APC), **EA** (E-2000)
- Options : **VOA** (Variable Optical Attenuator)
ORP (Optical Reference Path)
VOA-ORP (VOA and ORP options)

LONG DELAY VODL

Delays of 3 ns (1 m), 6 ns (2 m), 9 ns (3 m), 12 ns (4 m)

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Unit
Maximum input power	OP _{in}	-	300	mW
Storage temperature range	STR	-10	+40	°C
Humidity	RH	5	85	%
Operating temperature range	OTR	10	35	°C

OPTICAL CHARACTERISTICS @1575 nm

Parameter		Min	Typ	Max	Unit	Conditions/ Remarks
Operating wavelength (λ)		1520	1575	1630	nm	
Insertion losses (IL)	SM	-	1.5	2.0	dB	Over full delay range
	PM	-	2.0	2.5	dB	
UL Uniformity (ΔIL)		-	-	0.5	dB	
Polarization Dependent Losses (PDL)		-	-	0.3	dB	
Polarization Extinction Ratio (PER)		20	-	-	dB	For PM fiber type
Optical Return Loss (ORL)		35	50	-	dB	

OPTICAL CHARACTERISTICS @1310 nm

Parameter		Min	Typ	Max	Unit	Conditions/ Remarks
Operating wavelength (λ)		1260	1310	1360	nm	
Insertion losses (IL)	SM	-	1.5	2.5	dB	Over full delay range
	PM	-	2.0	2.5	dB	
UL Uniformity (ΔIL)		-	-	0.5	dB	
Polarization Dependent Losses (PDL)		-	-	0.3	dB	
Polarization Extinction Ratio (PER)		20	-	-	dB	For PM fiber type
Optical Return Loss (ORL)		35	50	-	dB	

08-2025 - VODL - ED1 / SP-VODL-ST

LONG DELAY VODL

Delays of 3 ns (1 m), 6 ns (2 m), 9 ns (3 m), 12 ns (4 m)

Ordering information

VODL-

Version: **M** (Manual) or **P** (Piloted)

Delay range: **300** (300 ps), **600** (600 ps),
1200 (1200 ps), **3000** (3000 ps), **6000** (6000 ps),
9000 (9000 ps), **12000** (12000 ps)

Central wavelength: **1575** (1575 nm), **1310** (1310 nm),
1060 (1060 nm), **2100** (2100 nm)

Fiber type: **SM** (Single Mode SMF28)
PM (Polarization Maintaining Panda type)

Input connector: **FU** (FC/UPC), **FA** (FC/APC), **SU** (SC/UPC),
LU (LC/UPC), **LA** (LC/APC), **SA** (SC/APC),
EA (E-2000)

Output connector: **FU** (FC/UPC), **FA** (FC/APC), **SU** (SC/UPC),
LU (LC/UPC), **LA** (LC/APC), **SA** (SC/APC),
EA (E-2000)

Options : **VOA** (Variable Optical Attenuator)
ORP (Optical Reference Path)
VOA-ORP (VOA and ORP options)

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