

Optical Delay Lines (ODLs)



Standard 3U ODL



Mini ODL

Key Features:

- Delays 1ns to 1000 μ s or more (excluding the ODL Zero state delay)
- Frequencies: 1MHz to 6GHz or 100MHz to 67GHz
- Delay accuracy 1% std for delays > 0.5 μ s, 0.5% and 0.1% available.
- Displays Delay, Round-trip Distance, Range, and Altitude
- Customized solution; short delivery time
- Delay switching rate <10ms
- USB or Ethernet control API for automatic testing

Options:

- Optical as well as Pre and Post RF Amplifiers
- Delay expansion
- RF and Optical Bypass
- Fast delay switching <100 μ s, or <1 μ s
- Gain Control
- Bidirectional ODL; 2-way signal transmission
- DC Power
- Doppler modulation

Monitoring:

- Panel display and Nav. Switch. Remote interface USB and software or Web Server, SNMP, and REST

ODL Configurations:

- Single Delay ODL
- Multi Delay ODL
- Progressive Variable ODL forming up to 2²⁴ delay combinations
- Multipath ODL
- Mini ODL up to 32 μ s

Applications:

- Radar Calibration testing
- Extension of radar range site
- Clutter Canceler
- EW systems
- Altimeter

RFOptic's Optical Delay Line (ODL) series provides high-performance solutions for testing and calibrating of radar systems or for RF communications. The series consists of low-frequency models covering 1MHz to 6GHz, which address the L, S, and C bands and high-frequency models covering 100MHz to 67GHz addressing the L, S, C, X, Ku, K, Ka, and V bands. Mini Optical Delay Lines as well Altimeter Optical Delay Lines are available to address OEM and special applications.

The Optical Delay Line (ODL) provides a true time delay of wideband RF signals using low-loss optical fiber. The Input RF signal is converted to an optical signal, delayed by one or more single-mode optical fiber sections, and is converted back into an RF signal at the output. Amplification is designed in as needed to achieve the necessary RF performance.

ODLs are customized and typically used in Lab or production line settings. They can have a fixed delay or configured to form up to 2²⁴ delays using up to 24 predefined time delay values in a single ODL. RFOptic provides various Optical Delay Line configurations that can support delays from 1ns up to 1000 μ s or more. ODL's can be controlled remotely by software or manually through a navigation switch and LCD display.

RFOptic ODLs can be configured to support external delay fiber spool(s). Other options include RF and optical bypass, fast delay state switching <100 μ s, very fast switching, <1 μ s, amplitude control, bidirectional ODL (2-way signal transmission), and DC power.

RFOptic's Mini ODL solution is offered in a compact, enclosure and is recommended for OEM integration and when a short delay, up to 32 μ s is required.

RFOptic's Optical Delay Lines are used in a wide range of applications including EW, Radar and altimeter testing, calibration, and target simulation with optional Doppler modulation to simulate target movement.

Optical Delay Line – Standard parameters

Parameter	Unit	Specifications (Typical)
Main AC Supply	VAC	220/110 or DC
VSWR Input / Output	-	2:1
Input / Output impedance	Ohm	50
Delay Accuracy ^[3]	%	0.5
Delay Repeatability at +/- 5°C variations	%	0.05
Maximum Input No damage	dBm	20
Spurious without Post Amplifier	dBm	-90
Input / Output impedance	Ohm	50
Operating Temperature	°C	0 to +60
Storage Temperature	°C	-45 to +85
19" Rack Mounting	mm	440*500*133

Optical Delay Line – Customizable Parameters

Parameter	Unit	Specifications (Typical)
Frequency Range ^[1]	GHz	1MHz to 6GHz or 100MHz to 67GHz
Type, display mode	-	Time Delay, Altimeter/Range (1-way)
Delay steps	-	Up to 2 ²⁴ delay steps
Delay Range ^[2]	μs	0.001 to 1000
Bypass options	-	Optical/RF/None
Switching time	-	standard <10ms, <0.1ms or <1μs
RF performance, Gain, NF, IP1dBc, etc.	-	Per customer requirements
RF Connectors	-	SMA or 2.92mm
Fiber Connectors ^[4]	-	FC/APC or SC/APC
Control – Manual (front panel)	-	Navigation Switch
Control – Remote (rear panel)	-	USB / Ethernet (HTML, REST, SNMP)
Dimensions	-	19" 3U (440 x 500 x 133mm) or more based on ODL complexity

[1] Other frequencies upon request.

[2] Custom delay steps and range. The ODL zero state delay, which depends on the ODL complexity, is added to all delay states. Accurate delay value is displayed.

[3] For delay segments longer than 0.5μs, 1% standard accuracy, 0.1% accuracy optional.

[4] For external fiber spools.

For more information or to order, please fill out and submit the online [RFQ form](#) for a customized ODL/ALT ODL design quote.