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Find the *Colby Instruments CPDL* at our website: *Click HERE*

Colby Instruments

Programmable Delay Line Instruments (PDL Series)



- **Programmable delay**
- **Wide bandwidth (DC to 18 GHz) and DC coupled**
- **Extremely high precision resolution to 0.50 picoseconds**
- **Phase shift to 0.18 degree accuracy at 1 GHz**
- **Proven reliability, accuracy, and repeatability**
- **Completely passive wideband and suitable for analog and digital signal applications**
- **Free from jitter, noise, and phase noise**
- **Replace manual phase shifters with precision programmable delay**

Colby Instruments Programmable Delay Line (PDL) Series instruments offer wideband delay with industry leading resolution and precision programmable control in one easy to setup and use instrument. All PDL Series instruments are completely passive and are DC coupled with signal bandwidth up to 18 GHz. Programmable delay lines (or phase shifters) are suitable for both analog and digital waveform applications. The PDL-100A Series consists of several models at different total delay lengths.

Model PDL-100A-000

Programmable Delay Range from 0 to 625 picoseconds (0.18 degree resolution per 1 GHz). The PDL-100A utilizes the patented electromechanical trombone and offers delay range from 0 to 625 ps maximum delay with step size resolution to 0.50 picoseconds. Four SMA (female) connectors on the front panel allow for series connected (with step resolution to 0.50 ps) or parallel connected (with step resolution to 0.25 ps) operation. GPIB (IEEE488.2) protocol interface is standard.

Model PDL-100A-020 and PDL-100A-100

The PDL-100A-020 offers extendable delay range up to customer specified maximum total delay (typical is 20 ns) and maximum is 100 ns. The model PDL-100A-020 adds high frequency RF microwave relays and low-loss semi-rigid coaxial cable to extend total instrument delay to a customer specified maximum (max limit of 100 ns total). Typical instrument lengths are 5ns, 10ns, 20ns, and 100ns units.

Accuracy and Resolution

All PDL Series instruments are based on the patented electromechanical trombone. With the precision programmed stepper motor, resolution is offered to 0.50 picoseconds across the entire delay range. Accuracy and repeatability is to 0.1% +/1 0.20 ps.

Programmable Interface

Delay settings can be specified remotely via GPIB (IEEE488.2) protocol. Simple commands like “DEL 123.50 ps” are sent to the unit and the corresponding delay is realized. With all PDL Units, the programmable interface assures instrument repeatability, accuracy, and performance superior to any manual phase shifter or delay line generator available in the marketplace.

Colby Instruments

Custom Programmable Delay Line (CPDL) and HPDL-1A Series





- **Programmable delay to custom specifications**
- **Step resolution to 10 ps step sizes**
- **Customer specified total delay (up to 100 ns or more in CPDL)**
- **Value pricing alternative when high resolution to 0.50 ps is not required (HPDL-1A)**

Colby Instruments CPDL Custom Programmable Delay Line Series instruments offer completely customer specified maximum total delay and precision step size resolution to 10 ps minimum. The CPDL is excellent for applications that require a non-standard delay step size or extended total delay range up to 200 nanoseconds total.

The HPDL-1A is an excellent value priced offering for bandwidth requirements from DC to 1 GHz (max) and minimum fixed step size to 10 picoseconds.

Model CPDL

The Custom Programmable Delay Line (CPDL) unit offers custom tailored solutions to your specific application requirements. Total delay range can be specified up to a maximum of 100 ns and delay step size resolution to a minimum of 10 picoseconds. Delay is provided by precisely cut phase matched low-loss semi-rigid coaxial cable and high frequency RF microwave relays. For applications that require unique step sizes or non-standard total delay ranges, the CPDL offers an excellent custom tailored solution to meet your application requirements. Standard interfaces supported include GPIB(IEEE488.2), Ethernet(TCP/IP), and RS-232 Serial Port interface.

Phase Matched Units

Our precision production and manufacturing line enables us to offer phase matched CPDL units for differential signal application requirements. Dual units must be ordered at same time to assure precision phase matched units.

Model HPDL-1A

The HPDL-1A unit offers delay created with low-loss microwave clad material and RF relays directly attached to the printed circuit board (PCB). The HPDL-1A offers excellent value priced performance from DC to 600 MHz, and is usable up to 1000 MHz. Front panel manual controls offer easy to set delay with 10 ps resolution and a maximum delay range to 10.23 ns. GPIB and RS-232 interface is standard.

Comparison Table

	PDL-100A-000	PDL-100A-020	CPDL-100A	HPDL-1A
Delay Type	Electromechanical Trombone	Electromechanical Trombone, microwave relays, and semi-rigid coaxial cable	Microwave relays and semi-rigid coaxial cable	Low-loss microwave PCB material
Resolution	0.50 picoseconds	0.50 picoseconds	10 picoseconds	10 picoseconds
Delay Range	0 to 625 ps	0 to 20ns standard, other ranges available	Customer specified maximum range	0 to 10.23 ns
Phase Shift / Resolution per 1 GHz	225 degrees / 0.18 degree	3600 degrees / 0.18 degree	Custom	0.36 degree per 100 MHz. 368.28 deg max.
Frequency Range	DC to 18 GHz	DC to 18 GHz	Custom	DC to 1.0 GHz
Data Rate (NRZ)	DC to 40 Gb/s	DC to 40 Gb/s	Custom	DC to 2 Gb/s
Delay at 0 ns	1.60 ns	3.30 ns	Custom	4.40 ns
Connectivity	GPIB or Microterminal	GPIB or Microterminal	GPIB or Microterminal	GPIB or Rs-232
Power Handling	10W CW, 50W peak	10W CW, 50W peak	10W CW, 50W peak	2W CW, 10W peak
Repeatability	0.2 ps maximum	0.2 ps maximum	Custom	1 ps
Operating Life	500,000 operations	500,000 operations	400,000operations	200,000 operations
Maximum Settling Time	1 second	1 second	0.50 second	0.25 second
Operating Temparature Range	+10 to +30 degrees C	+10 to +30 degrees C	+10 to +30 degrees C	+10 to +30 degrees C
Absolute Accuracy	0.1 % +/- 0.2 ps	0.1 % +/- 5 ps to 10 ns	Custom	+/- 1%, +/- 3 ps per binary step
Weight	6.5 kg	7.3 kg	4 kg+	4.4kg
Physical Size	13 3/8” long x 12 7/8” wide x 5 ¼” high	13 3/8” long x 12 7/8” wide x 5 ¼” high	13 3/8” long x 12 7/8” wide x 5 ¼” high	13 3/8” long x 12 7/8” wide x 5 ¼” high

[1] Customer receives actual measured Insertion and Return Loss Data Report for each device manufactured.
[2] Rated lifetime is specified for maximum switching current of 100 ma (20 ma for HPDL-1A). Higher currents can be switched but the rated lifetime will be less.
[3] 19” Rack Mount Accessory and optional MT-100A Microterminal available separately.

For more information or to contact us directly to obtain a formal quotation:

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