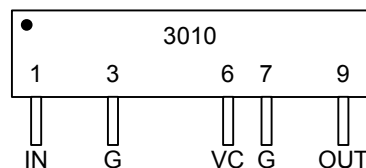


**VOLTAGE-VARIABLE DELAY LINE**

$T_R < 1\text{ns}$   
(SERIES 3010)

**FEATURES**

- Varactor Technology
- Fast rise time for high frequency applications
- Delay continuously adjustable from 2.4ns to 3.4ns
- Very narrow device (SIP package)
- Stackable for PC board economy
- Epoxy encapsulated
- Meets or exceeds MIL-D-23859C

**PACKAGE**

3010-P: Positive control voltage  
3010-N: Negative control voltage

**FUNCTIONAL DESCRIPTION**

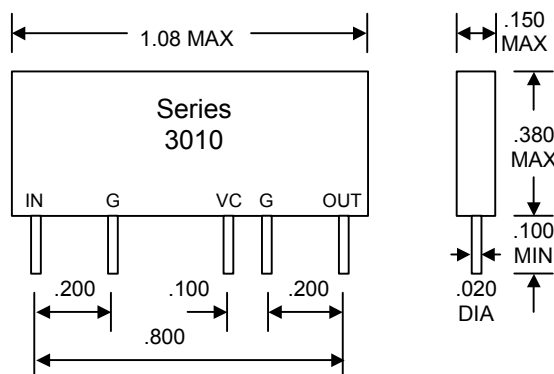
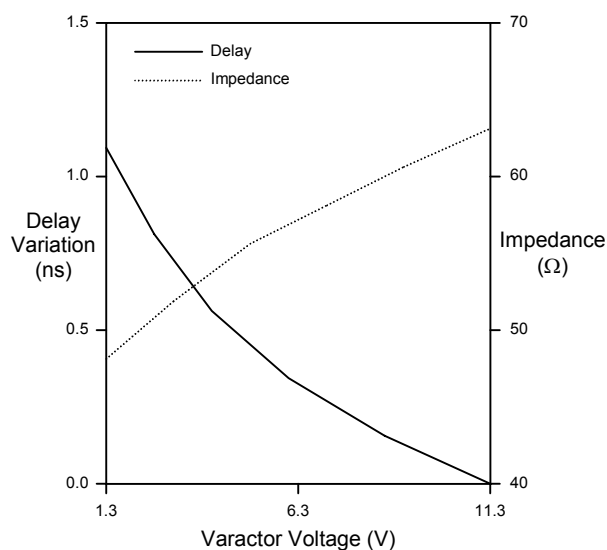
The 3010-series devices are continuously variable, single-input, single-output, passive delay lines. The signal input (IN) is reproduced at the output (OUT), shifted by a time ( $T_D$ ) which is adjusted via an applied control voltage (VC). This control voltage is positive for the 3010-P and negative for the 3010-N. The characteristic impedance of the line is nominally 50 ohms. The rise time ( $T_R$ ) of the lines is no more than 1ns, resulting in a 3dB bandwidth of at least 300MHz. The delay resolution is limited only by that of the control voltage.

**PIN DESCRIPTIONS**

IN	Signal Input
OUT	Signal Output
VC	Control Voltage
G	Ground

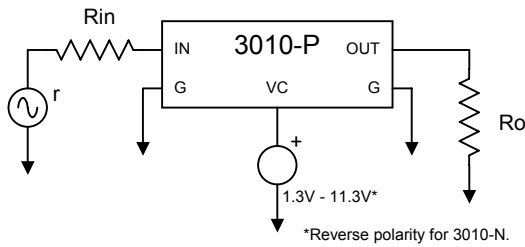
**SERIES SPECIFICATIONS**

- **Varactor voltage range (3010-P):** 1.3V (max  $T_D$ ) to 11.3V (min  $T_D$ )
- **Varactor voltage range (3010-N):** -1.3V (max  $T_D$ ) to -11.3V (min  $T_D$ )
- **Range of delay variation:** 1.0ns minimum
- **Minimum delay:** 2.4ns  $\pm$  0.25ns
- **Impedance:** 45 $\Omega$  - 68 $\Omega$
- **Output rise time:** 1.0ns max
- **Bandwidth:** 300MHz min
- **Overshoot/preshoot:**  $\pm$  20% max
- **Operating temperature:** -10 $^{\circ}$ C to +80 $^{\circ}$ C
- **Temperature coefficient:** 1000 PPM/ $^{\circ}$ C max

**Package Dimensions****Typical Delay/Impedance Variation**

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## TYPICAL APPLICATIONS

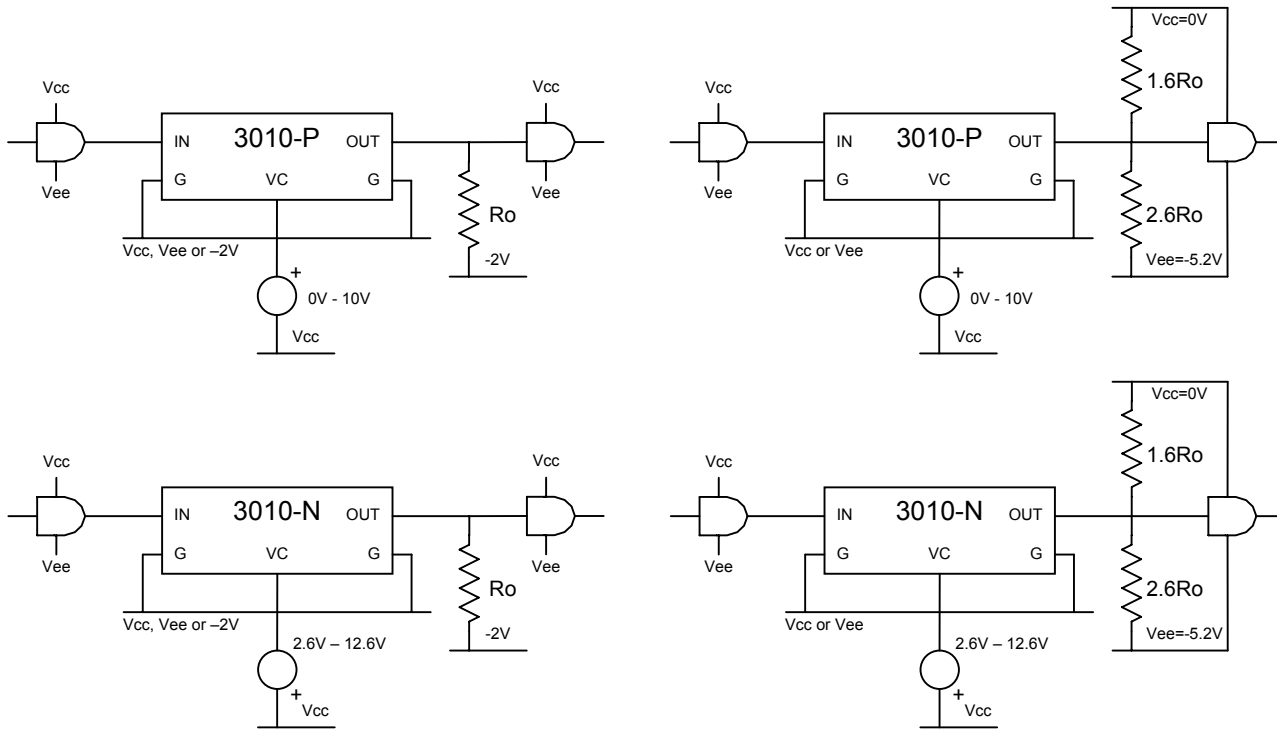


r: Signal source impedance  
 Rin: Input termination resistor  
 Ro: Output termination resistor

- Set Ro to the median impedance value within the delay adjustment range (50Ω - 60Ω)
- Set Rin = Rout - r

\*Reverse polarity for 3010-N.

### Analog Interface



**ECL with -2V Termination**

**ECL without -2V Termination**

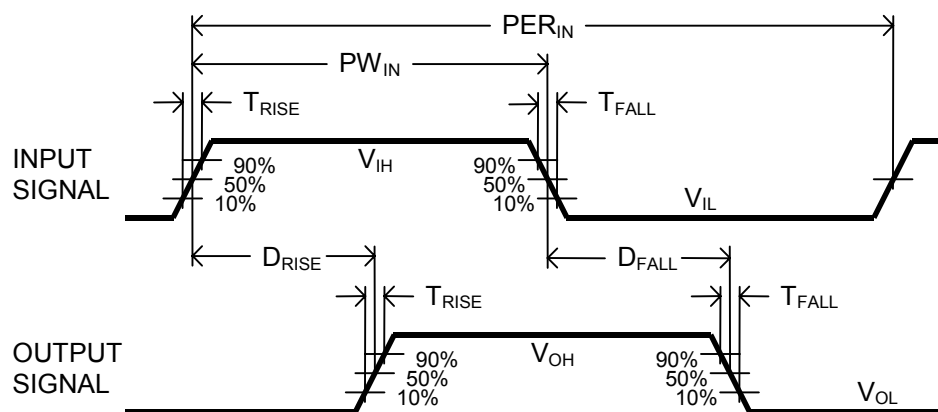
Note: The varicap voltage is referenced to the DC level of the input signal. In the case of ECL applications, a voltage of 0V to 10V (2.6V to 12.6V for the 3010-N) should be applied at pin 6, because the signal line has -1.3V DC level. This assumes the ECL signal has approximately 50% duty cycle.

## PASSIVE DELAY LINE TEST SPECIFICATIONS

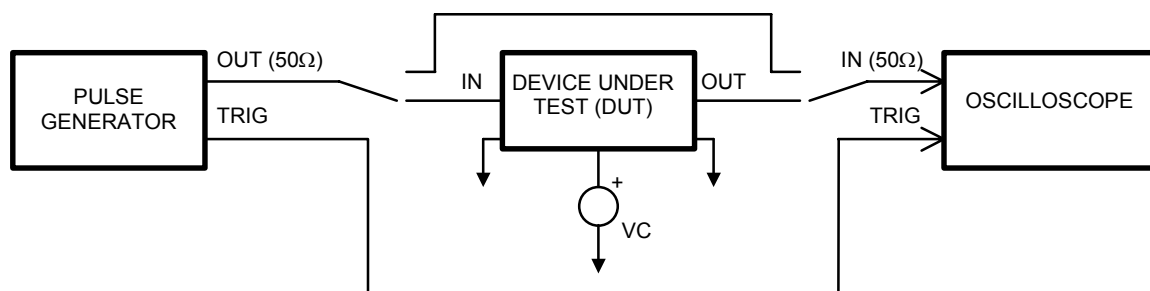
### TEST CONDITIONS

<b>INPUT:</b>		<b>OUTPUT:</b>	
<b>Ambient Temperature:</b>	25°C ± 3°C	<b>R<sub>load</sub>:</b>	50Ω
<b>Input Pulse:</b>	High = 1.8V typical Low = 0.8V typical	<b>C<sub>load</sub>:</b>	<10pf
<b>Source Impedance:</b>	50Ω Max.	<b>Threshold:</b>	50% (Rising & Falling)
<b>Rise/Fall Time:</b>	3.0 ns Max. (measured at 10% and 90% levels)		
<b>Pulse Width:</b>	PW <sub>IN</sub> = 500ns		
<b>Period:</b>	PER <sub>IN</sub> = 1000ns		

**NOTE:** The above conditions are for test only and do not in any way restrict the operation of the device.



**Timing Diagram For Testing**



**Test Setup**