

# VOLTAGE-VARIABLE DELAY LINE

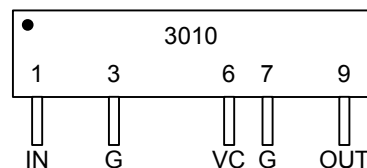
$T_R < 1\text{ns}$   
(SERIES 3010)



## 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

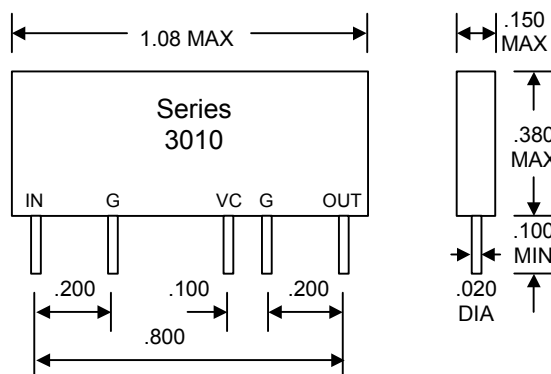
The 3010-series devices are continuously variable, single-input, single-output, passive delay lines. The signal input (IN) is reproduced at the output (OUT), shifted by a time ( $T_D$ ) which is adjusted via an applied control voltage (VC). This control voltage is positive for the 3010-P and negative 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

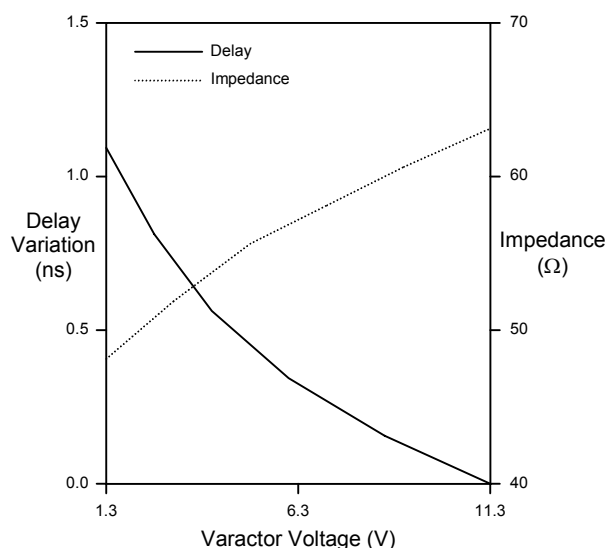
IN	Signal Input
OUT	Signal Output
VC	Control Voltage
G	Ground

## 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 $^{\circ}\text{C}$  to +80 $^{\circ}\text{C}$
- **Temperature coefficient:** 1000 PPM/ $^{\circ}\text{C}$  max



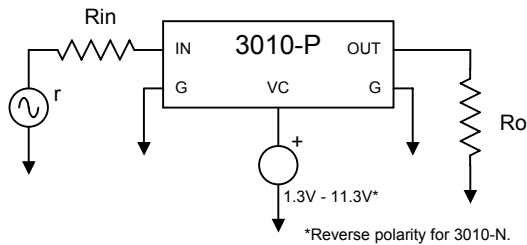
Package Dimensions



Typical Delay/Impedance Variation

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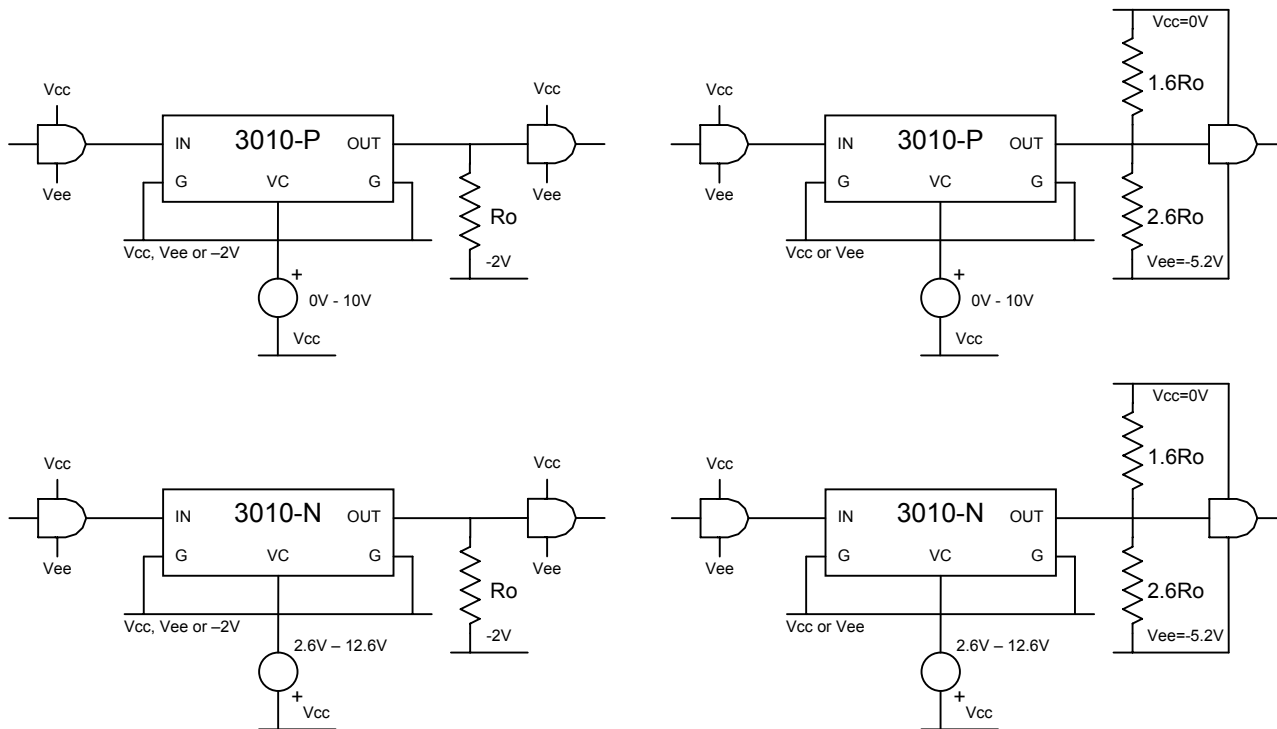
## TYPICAL APPLICATIONS



$r$ : Signal source impedance  
 $R_{in}$ : Input termination resistor  
 $R_o$ : Output termination resistor

- Set  $R_o$  to the median impedance value within the delay adjustment range ( $50\Omega - 60\Omega$ )
- Set  $R_{in} = R_{out} - r$

### 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

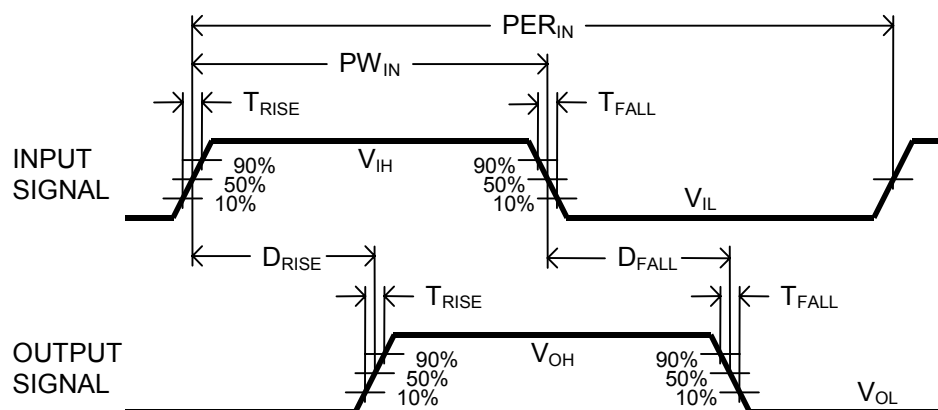
#### INPUT:

**Ambient Temperature:**  $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$   
**Input Pulse:** High = 1.8V typical  
 Low = 0.8V typical  
**Source Impedance:**  $50\Omega$  Max.  
**Rise/Fall Time:** 3.0 ns Max. (measured at 10% and 90% levels)  
**Pulse Width:**  $PW_{IN} = 500\text{ns}$   
**Period:**  $PER_{IN} = 1000\text{ns}$

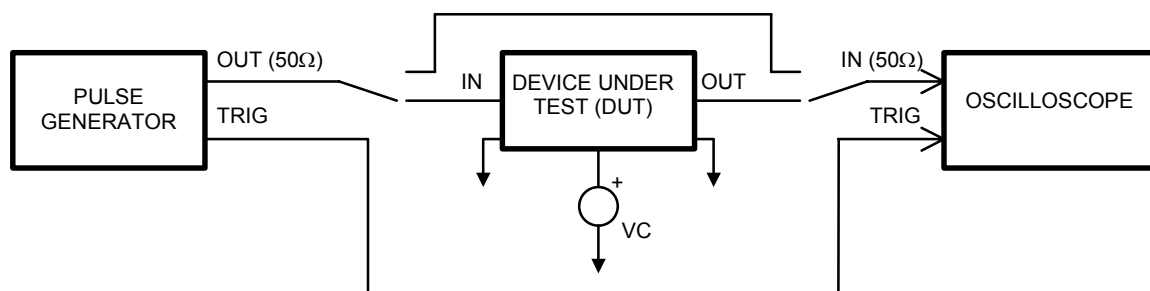
#### OUTPUT:

**$R_{load}$ :**  $50\Omega$   
 **$C_{load}$ :**  $<10\text{pf}$   
**Threshold:** 50% (Rising & Falling)

**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