



PI3A125

SOT_{INY}™ Low Voltage SPST Analog Switch/Bus Switch

Features

- Low Voltage, SPST Switch
 - V_{CC} from 2.3V to 3.6V
- Low On-Resistance: 6 ohms at 3.0V
- CMOS Technology for Bus and Analog Applications
- Rail-to-Rail Signal Range
- Low Power: 30 μ W at 3.0V
- High Speed: 4ns
- High Off Isolation: 65dB at 1MHz
- High Bandwidth: 250MHz
- Extended Industrial Temperature Range: -40°C to 85°C
- Improved, Direct Replacement for SN74CBTLV1G125
- Packaging:
 - 5-pin SC70 (C)
 - 5-pin SOT-23 (T)

Applications

- Cell Phones
- Computer Peripherals
- Bus Isolation
- Servers/Routers
- Data Communications
- PDAs
- Portable Instrumentation
- Battery Powered Communications

Pin Description

Pin Number	Name	Description
1	$\overline{OE}$	Enable Logic Input
2	Port A	Input/Output (Bidirectional)
3	GND	Ground
4	Port B	Input/Output (Bidirectional)
5	V_{CC}	Positive Power Supply

Description

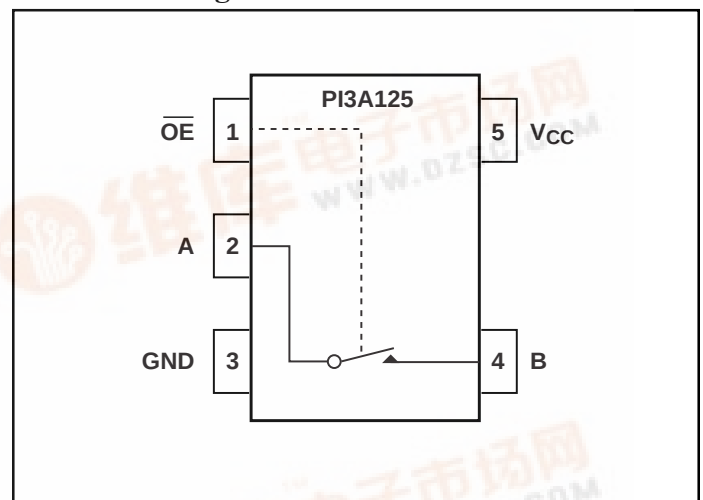
The PI3A125 is a high-speed CMOS SPST switch that can be used in analog or low-delay bus switch applications.

Specified over a wide operating power supply voltage range, 2.3V to 3.6V, the PI3A125 has a low maximum ON resistance of 10-ohm at 2.3V and 7 ohms at 3V. The CMOS device features rail-to-rail signal range. The switch is turned off when the $\overline{OE}$ input is high.

Power requirements at 3V are a low 30 μ W.

The PI3A125 is an improved, direct replacement for the SN74CBTLV1G125. Pericom improvements include lower resistance and detailed analog switch specifications.

Connection Diagram



Logic Function Table

$\overline{OE}$	Function
0	ON
1	OFF



Absolute Maximum Ratings & Thermal Information⁽¹⁾

Supply Voltage V_{CC}	–0.5V to 4.6V
Input Voltage Range, V_I	–0.5V to 4.6V
Continuous Channel Current	128mA
Package Thermal Impedance, θ_{JA}	
SOT23 package	206°C/W
SC70 package	252°C/W
Storage Temperature Range, T_{stg}	–65°C to 150°C

Notes:

1. Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “Recommended Operating Conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

Recommended Operating Conditions⁽¹⁾

			Min.	Max.	Units
V_{CC}	Supply Voltage		2.3	3.6	V
V_{IH}	High-Level Control Input Voltage	$V_{CC} = 2.3V$ to $2.7V$	1.7		
		$V_{CC} = 2.7V$ to $3.6V$	2		
V_{IL}	Low-Level Control Input Voltage	$V_{CC} = 2.3V$ to $2.7V$		0.7	
		$V_{CC} = 2.7V$ to $3.6V$		0.8	
T_A	Operating Free-Air Temperature		–40	85	°C

Note:

1. To ensure proper device operation, all unused control inputs of the device must be held at V_{CC} or GND.

DC Electrical Characteristics (Over the Operating temperature range, $T_A = -40^\circ\text{C}$ to 85°C)

Parameter	Description	Test Conditions	Supply Voltage	Min.	Typ	Max.	Units
V_{CC}	Analog Voltage Range		V_{CC}	2.3		3.6	V
R_{ON}	ON Resistance	$I_I = 64\text{mA}$, $V_I = 0V$	2.3V		7	9	Ω
		$I_I = 24\text{mA}$, $V_I = 0V$			7	9	
		$I_I = 15\text{mA}$, $V_I = 1.7V$			15	22	
R_{ON}	ON Resistance ⁽⁴⁾	$I_I = 64\text{mA}$, $V_I = 0V$	3V		5	6	
		$I_I = 24\text{mA}$, $V_I = 0V$			5	6	
		$I_I = 15\text{mA}$, $V_I = 2.4V$			10	13	
V_{IH}	Input High Logic Voltage		$V_{CC} = 2.3V$ to $2.7V$	1.7			V
			$V_{CC} = 2.7V$ to $3.6V$	2			
V_{IL}	Input Low Logic Voltage		$V_{CC} = 2.3V$ to $2.7V$			0.7	
			$V_{CC} = 2.7V$ to $3.6V$			0.8	
I_{IN}	Input Logic Current	$V_{IN} = \text{Logic High Minimum or } V_{IN} = \text{Logic Low Maximum}$	$V_{CC} = 2.7V$ to $3.6V$			± 1.0	μA
I_{OFF}	OFF State Leakage Current		$V_{CC} = 2.7V$ to $3.6V$			± 50	
I_{CC}	Quiescent Supply Current	$I_O = 0\text{mA}$, $V_I = V_{CC}$ or GND	$V_{CC} = 3.6V$			10	
C_{IN}	Control Input Capacitance	$V_I = 3V$ or 0	$V_{CC} = 3.6V$		2.5		pF
$C_{IO(OFF)}$	Capacitance of OFF Switch	$V_O = 3V$ or GND	$V_{CC} = 3.6V$		7		
$C_{IO(ON)}$	Capacitance of ON Switch	$f = 1\text{ MHz}$	$V_{CC} = 3.6V$		16		



Switch and AC Characteristics

Parameter	Description	Test Conditions	Supply Voltage	Min.	Typ	Max.	Units
t_{PD}	Propagation Delay	Note 3	$V_{CC} = 2.5V \pm 0.2V$			0.35	ns
			$V_{CC} = 3.3V \pm 0.3V$			0.25	
t_{EN}	Enable Turn ON Time		$V_{CC} = 2.5V \pm 0.2V$	1		5	
			$V_{CC} = 3.3V \pm 0.3V$	1		4.5	
t_{DIS}	Output Disable Turn OFF Time		$V_{CC} = 2.5V \pm 0.2V$	1		5	
			$V_{CC} = 3.3V \pm 0.3V$	1		4.1	
Q	Charge Injection		$V_{CC} = 3.3V$		7		pC
OIRR	Off Isolation	f = 1 MHz	$V_{CC} = 3.3V$		-65		dB
f_{3dB}	-3dB Bandwidth		$V_{CC} = 3.3V$		TBD		MHz

Notes:

2. All typical values are at $T_A = 25^\circ C$ and $V_{CC} = 3.3V$.
3. Propagation delay is the calculated RC time constant of the typical On-resistance of the switch and a total load capacitance of 50pF, when driven by an ideal voltage source with zero source impedance.

Test Circuits and Timing Diagrams

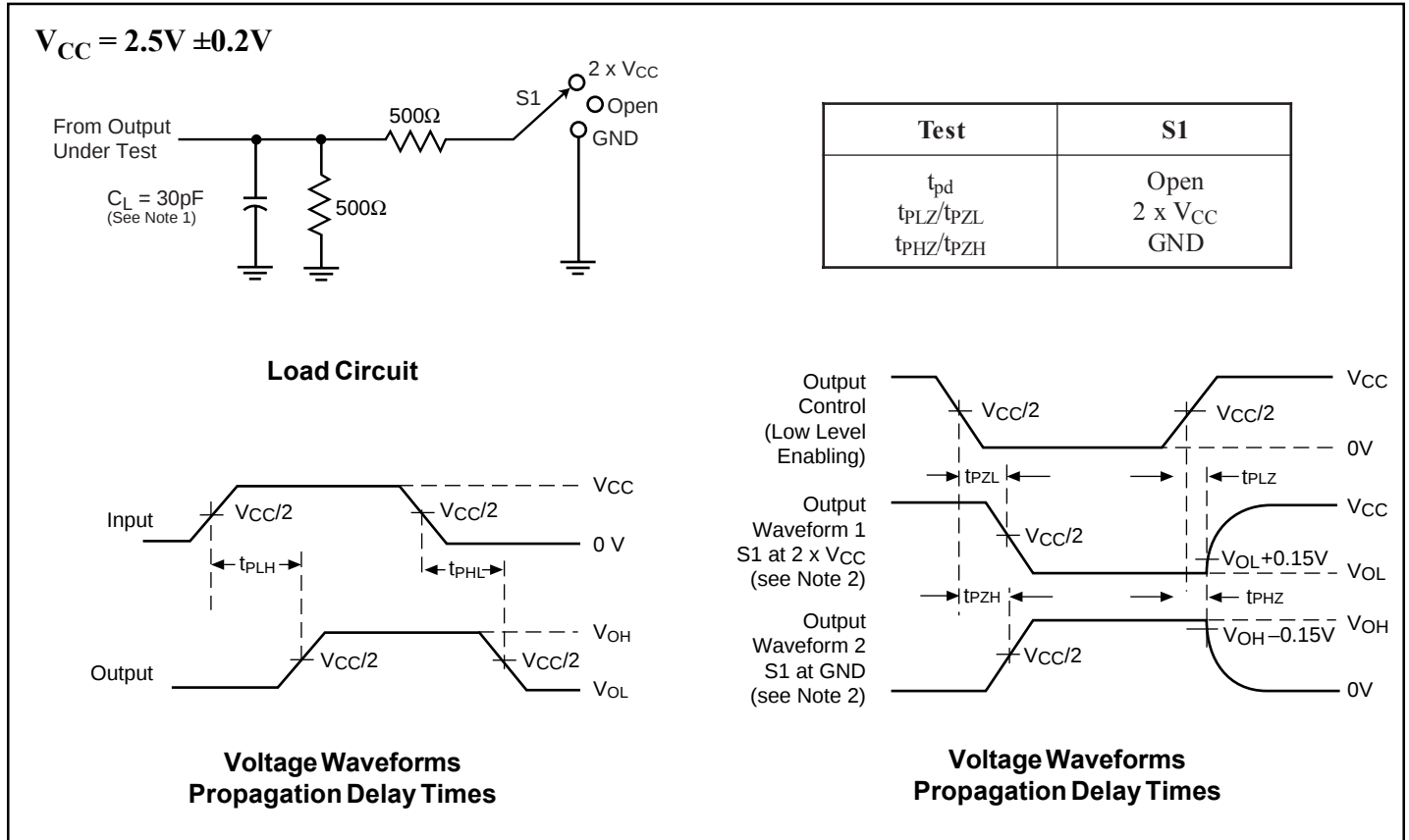


Figure 1. Test Circuit and Voltage Waveforms for $V_{CC} = 2.5V$

Notes:

1. C_L includes probe and jig capacitance.
2. Waveform 1 is for an output with internal conditions such that the output is LOW except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is HIGH except when disabled by the output control.
3. All input pulses are supplied by generators having the following characteristics: PRR < 10 MHz, $Z_O = 50\Omega$, $t_r \leq 2ns$, $t_f \leq 2ns$.
4. The outputs are measured one at a time with one transition per measurement.
5. t_{PLZ} and t_{PHZ} are the same as t_{dis} .
6. t_{PZL} and t_{PZH} are the same as t_{en} .
7. t_{PLH} and t_{PHL} are the same as t_{pd} .

Test Circuits and Timing Diagrams (continued)

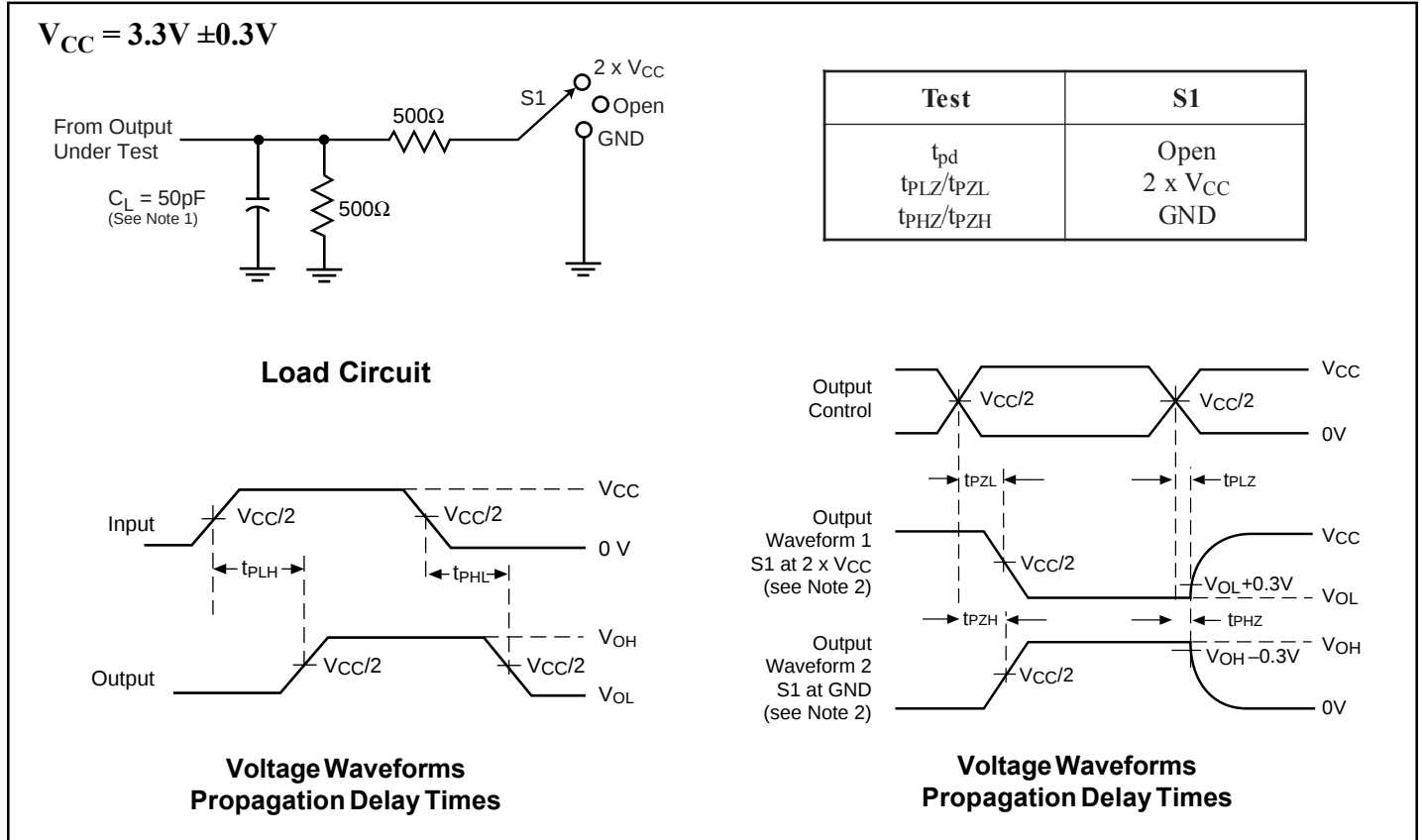


Figure 2. Test Circuit and Voltage Waveforms for $V_{CC} = 3.3V$

Notes:

1. C_L includes probe and jig capacitance.
2. Waveform 1 is for an output with internal conditions such that the output is LOW except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is HIGH except when disabled by the output control.
3. All input pulses are supplied by generators having the following characteristics: PRR < 10 MHz, $Z_O = 50\Omega$, $t_r \leq 2ns$, $t_f \leq 2ns$.
4. The outputs are measured one at a time with one transition per measurement.
5. t_{PLZ} and t_{PHZ} are the same as t_{dis} .
6. t_{PZL} and t_{PZH} are the same as t_{en} .
7. t_{PLH} and t_{PHL} are the same as t_{pd} .

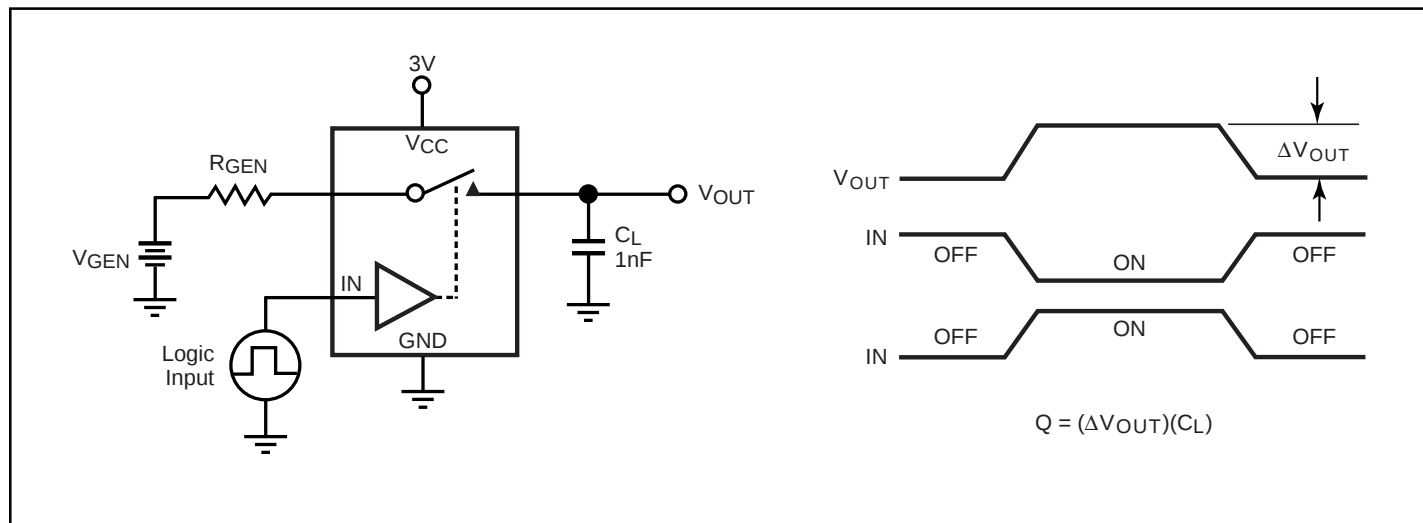


Figure 3. Charge Injection

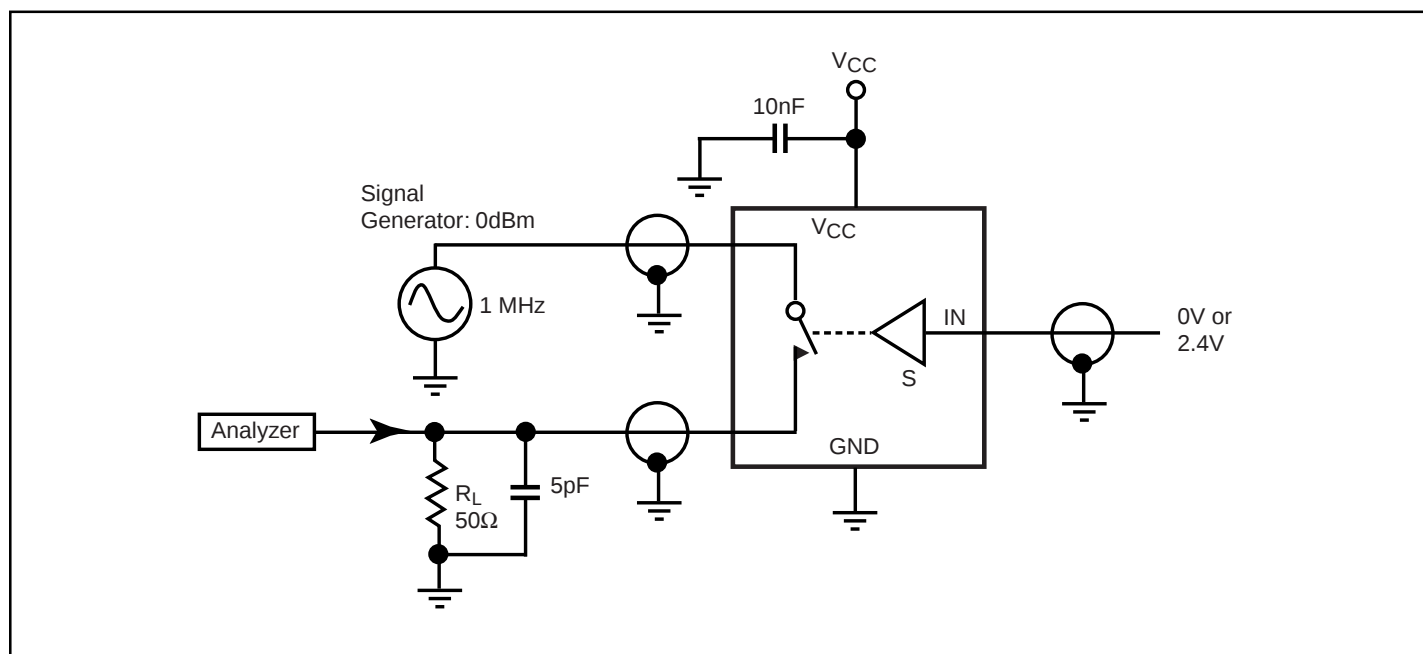


Figure 4. Off Isolation

Typical Application

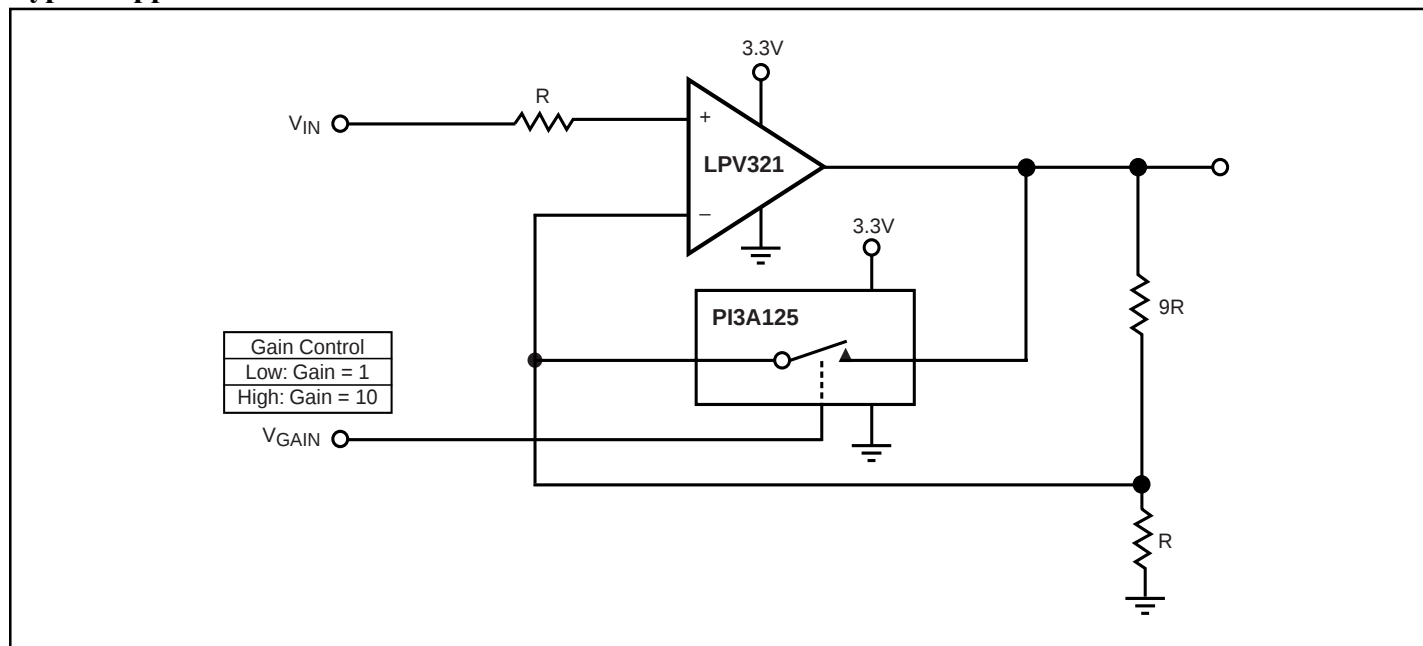


Figure 5. Programmable Gain Amplifier



Technical drawing of a 5-hole punch card showing dimensions in millimeters.

Top View Dimensions:

- Overall width: 2.00 BSC
- Distance between punch holes: 0.051
- Distance from edge to punch hole: 1.30 BSC
- Overall height: 0.079
- Punch hole diameter: 0.049
- Distance from edge to punch hole: 1.25 BSC
- Distance from edge to punch hole: 0.083
- Distance from edge to punch hole: 2.10 BSC
- Distance between punch holes: 0.026
- Distance between punch holes: 0.65 BSC
- Distance between punch holes: 0.006
- Distance between punch holes: 0.011
- Distance between punch holes: 0.15
- Distance between punch holes: 0.30

Side View Dimensions:

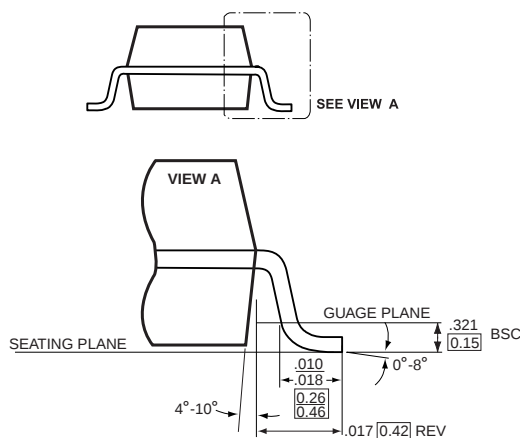
- Maximum height: 1.10 MAX
- Seating Plane

Legend:

XXX DENOTES DIMENSIONS
XXX IN MILLIMETERS

Notes:

1. Controlling
2. Ref. JEDS



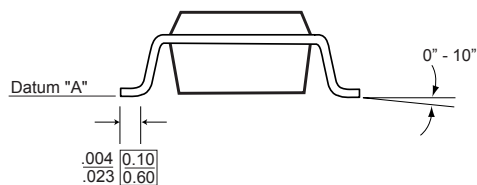
Technical drawing of a rectangular plate with dimensions and tolerances. The drawing includes a top view and a side view.

Top View Dimensions:

- Overall width: $1.90 \pm .075$ BSC
- Overall height: $2.60 \pm .102$
- Top edge thickness: $1.50 \pm .059$ / $1.75 \pm .068$
- Bottom edge thickness: $0.35 \pm .014$ / $0.50 \pm .019$
- Left edge thickness: $0.95 \pm .037$ BSC
- Right edge thickness: $0.50 \pm .014$ BSC

Side View Dimensions:

- Overall height: $3.00 \pm .110$ / $3.00 \pm .118$
- Seating Plane height: $1.45 \pm .057$ MAX.
- Seating Plane offset: $0.00 \pm .005$ / $0.15 \pm .005$



Ordering Code	Package Code	Package Description	Top Marking
PI3A125CX	C	5-pin SC70	ZW
PI3A125TX	T	5-pin SOT-23	ZW

1. Thermal Characteristics can be found on the world wide web at: <http://www.pericom.com/packaging/>
2. X = Tape and reel