

## 3.0V, SOTiny™ Single-Supply 0.4Ω SPST (NO) CMOS Analog Switch

### Features

- Low On-Resistance: 0.4Ω Max (+2.7V Supply)
- 0.1Ω Max. On-Resistance Flatness at +25°C
- Fast Switching: 10ns Max.
- +1.5V to +3.6V Single-Supply Operation
- TTL/CMOS-Logic Compatible
- -25dB Off-Isolation at 100kHz
- 1nA Max. Off-Leakage at +25°C
- Packaging (Pb-free & Green available):
  - 5-pin Small Compact SOT23 (T)

### Applications

- Cellular Phones
- Communications Circuits
- Battery-Operated Equipment
- DSL Modems
- Audio and Video Signal Routing
- PCMCIA Cards

### Pin Description

SOT23	Name	Function
1	COM	Analog Switch, Common
2	NO	Analog Switch, Normally Open
3	GND	Ground
4	IN	Digital Control Input
5	V <sub>DD</sub>	Positive Supply Voltage
-	N.C.	No Internal Connection

#### Note:

1. NO and COM pins are identical and interchangeable. Any pin may be considered as an input or an output; signals pass.

### Truth Table

Input	Switch State
LOW	OFF
HIGH	ON

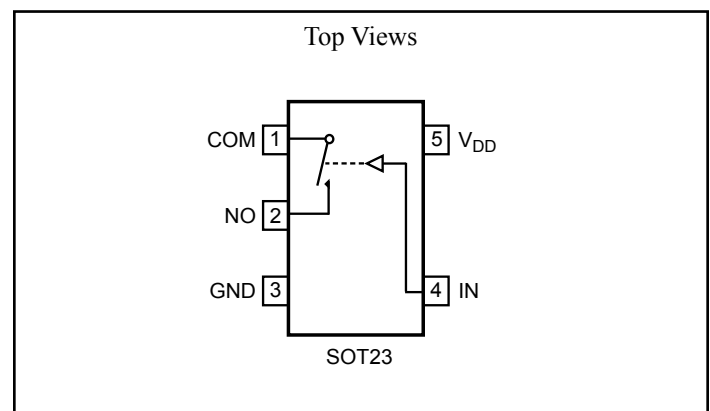
### Description

PI3A4626 is a single-pole/single-throw (SPST) normally open (NO) analog switch that operates from a single +1.5V to +3.6V supply.

The switch has 0.4Ω Max On-Resistance ( $R_{ON}$ ), with 0.1Ω Max  $R_{ON}$  flatness over the analog signal range when powered from a +3.0V supply. Leakage currents are less than 2nA and fast switching times are less than 10ns.

To minimize PC board area use, the device is available in a small compact SOT23 package.

### Block Diagrams/Pin Configurations



### Absolute Maximum Ratings

Voltages Referenced to GND

$V_{DD}$  ..... -0.5V to +3.6V

$V_{IN}$ ,  $V_{COM}$ ,  $V_{NC}$ ,  $V_{NO}$  <sup>(1)</sup> ..... -0.5V to  $V_{DD} + 0.3V$   
 or 30mA, whichever occurs first

Current (any terminal)..... ±200mA

Peak Current, COM, NO, NC  
 (Pulsed at 1ms, 10% duty cycle)..... ±400mA

### Thermal Information

Continuous Power Dissipation

SOT23 (derate 7.1mW/°C above +70°C)..... 0.5W

Storage Temperature ..... -65°C to +150°C

Lead Temperature (soldering, 10s) ..... +300°C

#### Note:

1. Signals on NC, NO, COM, or IN exceeding  $V_{DD}$  or GND are clamped by internal diodes. Limit forward diode current to 30mA.

**Caution:** Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions beyond those indicated in the operational sections of this specification is not implied.

### Electrical Specifications - Single +3.3V Supply

( $V_{DD} = +3.3V \pm 10\%$ ,  $GND = 0V$ ,  $V_{IH} = 1.4V$ ,  $V_{IL} = 0.5V$ )

Description	Parameters	Test Conditions	Package	Temp.(°C)	Min. <sup>(1)</sup>	Typ. <sup>(2)</sup>	Max. <sup>(1)</sup>	Units
<b>Analog Switch</b>								
Analog Signal Range <sup>(3)</sup>	$V_{ANALOG}$			Full	0		$V_{DD}$	V
On Resistance	$R_{ON}$	$V_{DD} = 2.7V$ , $I_{COM} = 100mA$ , $V_{NO}$ or $V_{NC} = +1.5V$		25			0.4	Ω
On-Resistance Match Between Channels <sup>(4)</sup>	$\Delta R_{ON}$		SOT23	Full			0.5	
				25			0.05	
				Full			0.06	
On-Resistance Flatness <sup>(5)</sup>	$R_{FLAT(ON)}$	$V_{DD} = 2.7V$ $I_{COM} = 100mA$ , $V_{NO}$ or $V_{NC} = 0.8V$ , 2.0V		25			0.1	Ω
				Full			0.1	
NO or NC Off Leakage Current <sup>(6)</sup>	$I_{COM(OFF)}$ or $I_{NC(OFF)}$	$V_{DD} = 3.3V$ , $V_{COM} = 0V$ , $V_{NO}$ or $V_{NC} = +2.0V$		25	-1		1	nA
				Full		-20		
COM On Leakage Current <sup>(6)</sup>	$I_{COM(ON)}$	$V_{DD} = 3.3V$ , $V_{COM} = +2.0V$ , $V_{NO}$ or $V_{NC} = +2.0V$		25	-2		2	
				Full		-20		20

**Electrical Specifications - Single +3.3V Supply (continued)**

 (V<sub>DD</sub> = + 3.3V ± 10%, GND = 0V, V<sub>IH</sub> = 1.4V, V<sub>IL</sub> = 0.5V)

Description	Parameters	Test Conditions	Temp (°C)	Min. <sup>(1)</sup>	Typ. <sup>(2)</sup>	Max. <sup>(1)</sup>	Units
<b>Logic Input</b>							
Input High Voltage	V <sub>IH</sub>	Guaranteed logic High Level	Full	1.4			V
Input Low Voltage	V <sub>IL</sub>	Guaranteed logic Low Level				0.5	
Input Current with Voltage High	I <sub>INH</sub>	V <sub>IN</sub> = 1.4V, all others = 0.5V		-1		1	μA
Input Current with Voltage Low	I <sub>INL</sub>	V <sub>IN</sub> = 0.5V, all other = 1.4V		-1		1	
<b>Dynamic</b>							
Turn-On Time	t <sub>ON</sub>	V <sub>DD</sub> = 3.3V, V <sub>NO</sub> or V <sub>NC</sub> = 2.0V, Figure 1	25			10	ns
			Full			10	
Turn-Off Time	t <sub>OFF</sub>		25			10	
			Full			10	
Charge Injection <sup>(3)</sup>	Q	C <sub>L</sub> = 1nF, V <sub>GEN</sub> = 0V, R <sub>GEN</sub> = 0Ω, Figure 2	25		50		pC
Off Isolation <sup>(7)</sup>	O <sub>IRR</sub>	R <sub>L</sub> = 50Ω, f = 100kHz, Figure 3			-25		dB
NC or NO Capacitance	C <sub>(OFF)</sub>	f = 1 MHz, Figure 4			130		pF
COM Off Capacitance	C <sub>COM(OFF)</sub>				130		
COM On Capacitance	C <sub>COM(ON)</sub>				270		
<b>Supply</b>							
Power Supply Range	V <sub>DD</sub>		Full	1.5		3.6	V
Positive Supply Current	I <sub>CC</sub>	V <sub>DD</sub> = 3.6V, V <sub>IN</sub> = 0V or V <sub>DD</sub>				100	nA

**Notes:**

1. The algebraic convention, where most negative value is a minimum and most positive is a maximum, is used in this data sheet.
2. Typical values are for DESIGN AID ONLY, not guaranteed or subject to production testing.
3. Guaranteed by design.
4. ΔR<sub>ON</sub> = R<sub>ON</sub> Max. - R<sub>ON</sub> Min.
5. Flatness is defined as the difference between the maximum and minimum value of On-Resistance measured.
6. Leakage parameters are 100% tested at maximum rated hot temperature and guaranteed by correlation at +25°C.
7. Off Isolation = 20log<sub>10</sub> [ V<sub>COM</sub> / (V<sub>NO</sub> or V<sub>NC</sub>) ]. See Figure 3.

**Electrical Specifications - Single +2.5V Supply**

 (V<sub>DD</sub> = +2.5V ± 10%, GND = 0V, V<sub>IH</sub> = 1.4V, V<sub>IL</sub> = 0.5V)

Description	Parameters	Test Conditions	Temp.(°C)	Min. <sup>(1)</sup>	Typ. <sup>(2)</sup>	Max. <sup>(1)</sup>	Units
<b>Analog Switch</b>							
Analog Signal Range <sup>(3)</sup>	V <sub>ANALOG</sub>			0		V <sub>DD</sub>	V
On-Resistance	R <sub>ON</sub>	V <sub>DD</sub> = 2.5V, I <sub>COM</sub> = -8mA, V <sub>NO</sub> or V <sub>NC</sub> = 1.8V	25			0.4	Ω
			Full			0.4	
On-Resistance Match Between Channels <sup>(4)</sup>	ΔR <sub>ON</sub>	V <sub>DD</sub> = 2.5V, I <sub>COM</sub> = -8mA, V <sub>NO</sub> or V <sub>NC</sub> = 0.8V, 1.8V	25			0.05	
			Full			0.06	
On-Resistance Flatness <sup>(5)</sup>	R <sub>FLAT(ON)</sub>		25			0.1	
			Full			0.1	
<b>Dynamic</b>							
Turn-On Time	t <sub>ON</sub>	V <sub>DD</sub> = 2.5V, V <sub>NO</sub> or V <sub>NC</sub> = 1.8V, Figure 1	25			10	ns
			Full			15	
Turn-Off Time	t <sub>OFF</sub>		25			10	
			Full			10	
Charge Injection <sup>(3)</sup>	Q	C <sub>L</sub> = 1nF, V <sub>GEN</sub> = 0V, R <sub>GEN</sub> = 0V, Figure 2	25		42		pC
<b>Logic Input</b>							
Input HIGH Voltage	V <sub>IH</sub>	Guaranteed logic high level	Full	1.4			V
Input LOW Voltage	V <sub>IL</sub>	Guaranteed logic Low level	Full			0.5	
Input HIGH Current	I <sub>INH</sub>	V <sub>IN</sub> = 1.4V, all others = 0.5V	Full	-1		1	μA
Input HIGH Current	I <sub>INL</sub>	V <sub>IN</sub> = 0.5V, all others = 1.4V	Full	-1		1	

**Notes:**

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2. Typical values are for DESIGN AID ONLY, not guaranteed or subject to production testing.
3. Guaranteed by design.
4. ΔR<sub>ON</sub> = R<sub>ON</sub> max. - R<sub>ON</sub> min.
5. Flatness is defined as the difference between the maximum and minimum value of On-Resistance measured.

**Electrical Specifications - Single +1.8V Supply**

 ( $V_{DD} = +1.8V \pm 10\%$ ,  $GND = 0V$ ,  $V_{IH} = 1.4V$ ,  $V_{IL} = 0.5V$ )

Description	Parameters	Test Conditions	Temp.(°C)	Min. <sup>(1)</sup>	Typ. <sup>(2)</sup>	Max. <sup>(1)</sup>	Units		
<b>Analog Switch</b>									
Analog Signal Range <sup>(3)</sup>	$V_{ANALOG}$			0		$V_{DD}$	V		
On-Resistance	$R_{ON}$	$V_{DD} = 1.8V$ , $I_{COM} = -4mA$ , $V_{NO}$ or $V_{NC} = 1.5V$	25			0.4	Ω		
			Full			0.8			
On-Resistance Match Between Channels <sup>(4)</sup>	$\Delta R_{ON}$	$V_{DD} = 1.8V$ , $I_{COM} = -4mA$ , $V_{NO}$ or $V_{NC} = 0.8V, 1.5V$	25			0.05			
			Full			0.06			
On-Resistance Flatness <sup>(5)</sup>	$R_{FLAT(ON)}$		25			0.4			
			Full			0.6			
<b>Dynamic</b>									
Turn-On Time	$t_{ON}$	$V_{DD} = 1.8V$ , $V_{NO}$ or $V_{NC} = 1.5V$ , Figure 1	25			15	ns		
			Full			15			
Turn-Off Time	$t_{OFF}$		25			10			
			Full			15			
Charge Injection <sup>(3)</sup>	$Q$		$CL = 1nF$ , $V_{GEN} = 0V$ , $R_{GEN} = 0V$ , Figure 2	25		29			pC
<b>Logic Input</b>									
Input HIGH Voltage	$V_{IH}$	Guaranteed logic high level	Full	1.4			V		
Input LOW Voltage	$V_{IL}$	Guaranteed logic Low level	Full			0.5			
Input HIGH Current	$I_{INH}$	$V_{IN} = 1.4V$ , all others = 0.5V	Full	-1		1	μA		
Input HIGH Current	$I_{INL}$	$V_{IN} = 0.5V$ , all others = 1.4V	Full	-1		1			

**Notes:**

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2. Typical values are for DESIGN AID ONLY, not guaranteed or subject to production testing.
3. Guaranteed by design.
4.  $\Delta R_{ON} = R_{ON} \text{ max.} - R_{ON} \text{ min.}$
5. Flatness is defined as the difference between the maximum and minimum value of On-Resistance measured.

### Test Circuits/Timing Diagrams

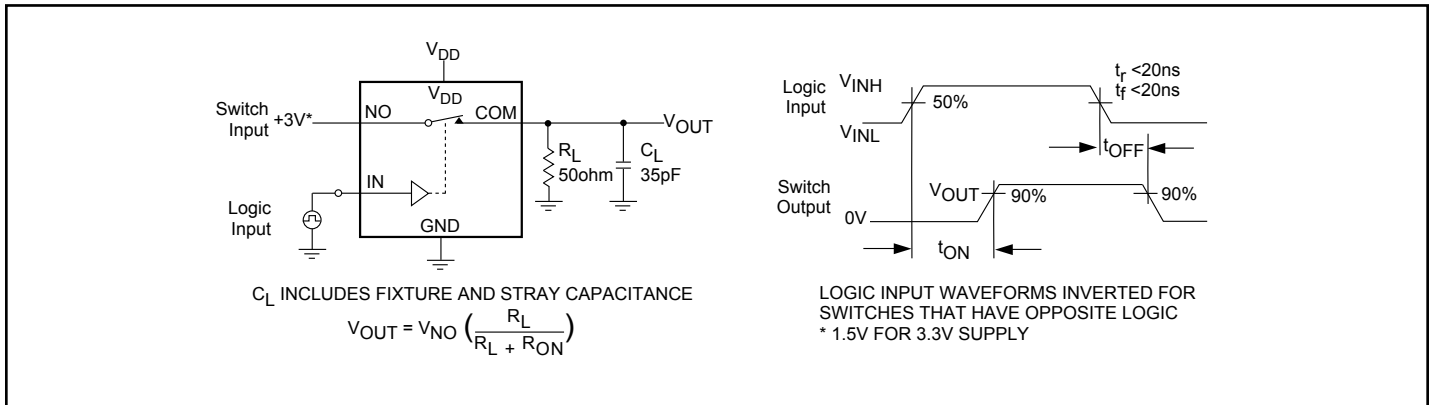


Figure 1. Switching Time

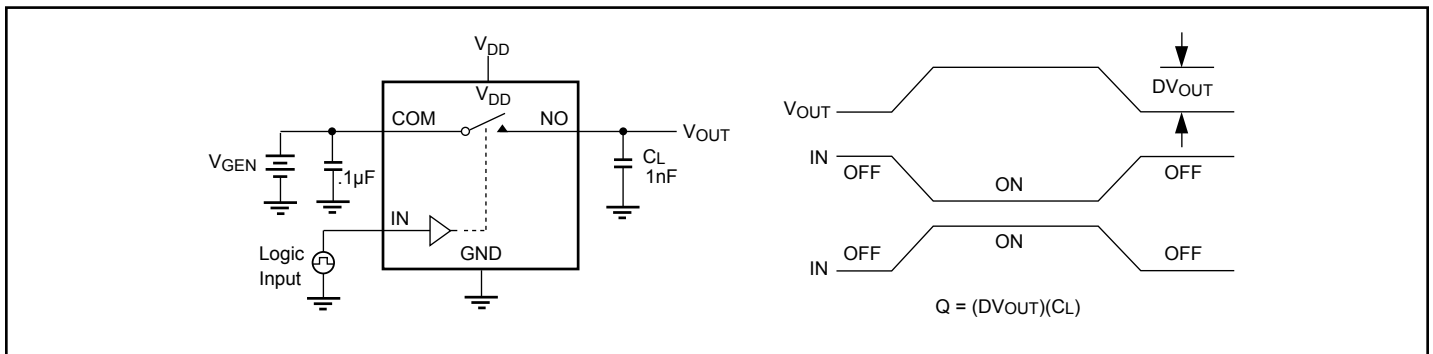


Figure 2. Charge Injection

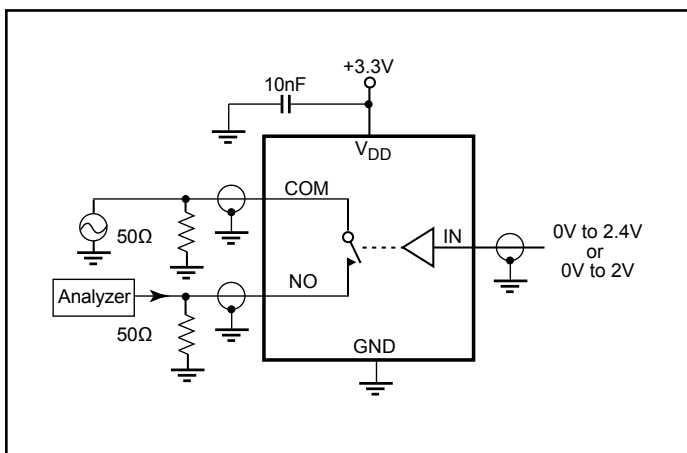


Figure 3. Off Isolation

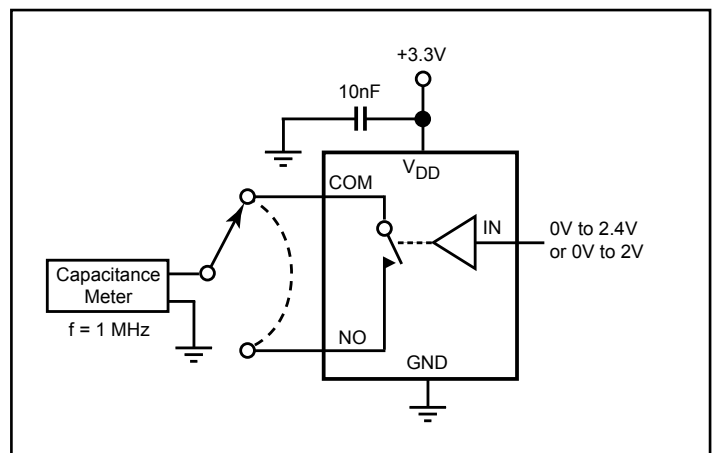
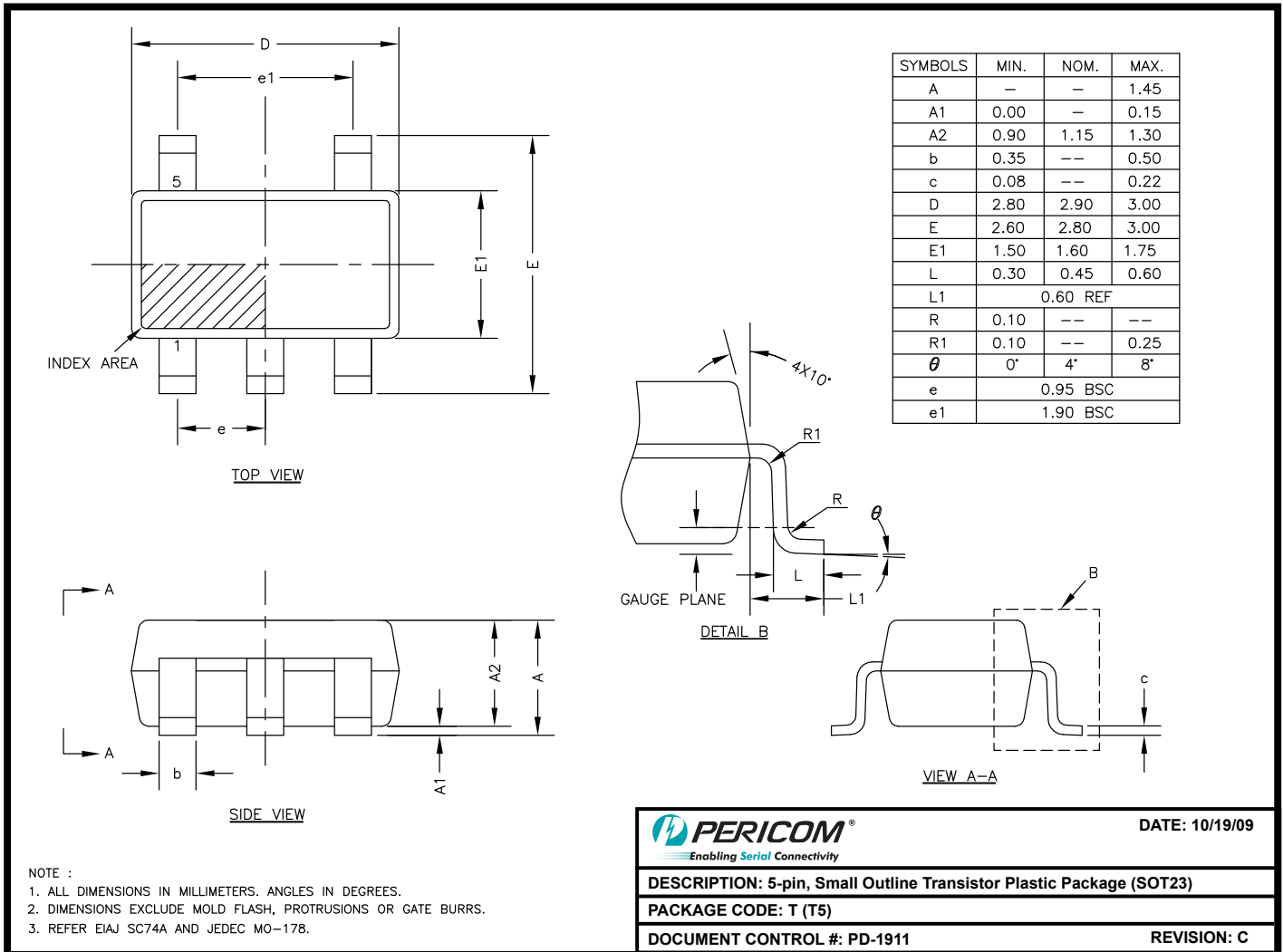


Figure 4. Channel On/Off Capacitance

**Packaging Mechanical: 5-Pin SOT23 (T)**



09-0130

**Note:**

- For latest package info, please check: <http://www.pericom.com/products/packaging/mechanicals.php>

**Ordering Information**

Ordering Code	Packaging Code	Package Description	Top Mark
PI3A4626TEX	T	Pb-free & Green, 5-pin Small Compact SOT23	ZD

**Notes:**

1. Thermal characteristics can be found on the company web site at [www.pericom.com/packaging/](http://www.pericom.com/packaging/)
2. X = Tape/Reel
3. Number of transistors = TBD