

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

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.

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 _{DD}	Positive Supply Voltage
-	N.C.	No Internal Connection

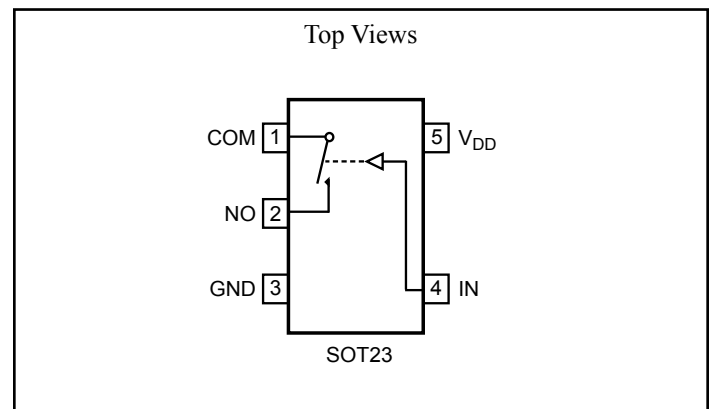
Note:

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

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} ⁽¹⁾ -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. ⁽¹⁾	Typ. ⁽²⁾	Max. ⁽¹⁾	Units
Analog Switch								
Analog Signal Range ⁽³⁾	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
			SOT23	Full			0.5	
On-Resistance Match Between Channels ⁽⁴⁾	ΔR_{ON}			25			0.05	
				Full			0.06	
On-Resistance Flatness ⁽⁵⁾	$R_{FLAT(ON)}$	$V_{DD} = 2.7V$ $I_{COM} = 100mA$, V_{NO} or $V_{NC} = 0.8V$, 2.0V		25			0.1	Ω
				Full			0.1	
NO or NC Off Leakage Current ⁽⁶⁾	$I_{COM(OFF)}$ or $I_{NC(OFF)}$	$V_{DD} = 3.3V$, $V_{COM} = 0V$, V_{NO} or $V_{NC} = +2.0V$		25	-1		1	nA
				Full	-20		10	
COM On Leakage Current ⁽⁶⁾	$I_{COM(ON)}$	$V_{DD} = 3.3V$, $V_{COM} = +2.0V$, V_{NO} or $V_{NC} = +2.0V$		25	-2		2	
				Full	-20		20	

Electrical Specifications - Single +3.3V Supply (continued)

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

Description	Parameters	Test Conditions	Temp (°C)	Min. ⁽¹⁾	Typ. ⁽²⁾	Max. ⁽¹⁾	Units
Logic Input							
Input High Voltage	V _{IH}	Guaranteed logic High Level	Full	1.4			V
Input Low Voltage	V _{IL}	Guaranteed logic Low Level				0.5	
Input Current with Voltage High	I _{INH}	V _{IN} = 1.4V, all others = 0.5V		−1		1	μA
Input Current with Voltage Low	I _{INL}	V _{IN} = 0.5V, all other = 1.4V		−1		1	
Dynamic							
Turn-On Time	t _{ON}	V _{DD} = 3.3V, V _{NO} or V _{NC} = 2.0V, Figure 1	25			10	ns
			Full			10	
Turn-Off Time	t _{OFF}		25			10	
			Full			10	
Charge Injection ⁽³⁾	Q	C _L = 1nF, V _{GEN} = 0V, R _{GEN} = 0Ω, Figure 2	25		50		pC
Off Isolation ⁽⁷⁾	O _{IRR}	R _L = 50Ω, f = 100kHz, Figure 3			-25		dB
NC or NO Capacitance	C _(OFF)	f = 1 MHz, Figure 4			130		pF
COM Off Capacitance	C _{COM(OFF)}				130		
COM On Capacitance	C _{COM(ON)}	f = 1 MHz, Figure 4			270		
Supply							
Power Supply Range	V _{DD}		Full	1.5		3.6	V
Positive Supply Current	I _{CC}	V _{DD} = 3.6V, V _{IN} = 0V or V _{DD}				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_{ON} = R_{ON} Max. - R_{ON} 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 = 20log₁₀ [V_{COM} / (V_{NO} or V_{NC})]. See Figure 3.

Electrical Specifications - Single +2.5V Supply

(V_{DD} = +2.5V ± 10%, GND = 0V, V_{IH} = 1.4V, V_{IL} = 0.5V)

Description	Parameters	Test Conditions	Temp.(°C)	Min. ⁽¹⁾	Typ. ⁽²⁾	Max. ⁽¹⁾	Units	
Analog Switch								
Analog Signal Range ⁽³⁾	V _{ANALOG}			0		V _{DD}	V	
On-Resistance	R _{ON}	V _{DD} = 2.5V, I _{COM} = −8mA, V _{NO} or V _{NC} = 1.8V	25			0.4	Ω	
			Full			0.4		
On-Resistance Match Between Channels ⁽⁴⁾	ΔR _{ON}	V _{DD} = 2.5V, I _{COM} = −8mA, V _{NO} or V _{NC} = 0.8V, 1.8V	25			0.05		
			Full			0.06		
On-Resistance Flatness ⁽⁵⁾	R _{FLAT(ON)}		25			0.1		
			Full			0.1		
Dynamic								
Turn-On Time	t _{ON}		V _{DD} = 2.5V, V _{NO} or V _{NC} = 1.8V, Figure 1	25			10	ns
		Full				15		
Turn-Off Time	t _{OFF}	25				10		
		Full				10		
Charge Injection ⁽³⁾	Q	C _L = 1nF, V _{GEN} = 0V, R _{GEN} = 0V, Figure 2	25		42		pC	
Logic Input								
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:

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_{ON} = R_{ON} max. - R_{ON} 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 ± 10%, GND = 0V, V_{IH} = 1.4V, V_{IL} = 0.5V)

Description	Parameters	Test Conditions	Temp.(°C)	Min. ⁽¹⁾	Typ. ⁽²⁾	Max. ⁽¹⁾	Units
Analog Switch							
Analog Signal Range ⁽³⁾	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 ⁽⁴⁾	ΔR _{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 ⁽⁵⁾	R _{FLAT(ON)}		25			0.4	
			Full			0.6	
Dynamic							
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 ⁽³⁾	Q	CL = 1nF, V _{GEN} = 0V, R _{GEN} = 0V, Figure 2	25		29		pC
Logic Input							
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:

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_{ON} = R_{ON} max. - R_{ON} min.
5. Flatness is defined as the difference between the maximum and minimum value of On-Resistance measured.

Test Circuits/Timing Diagrams

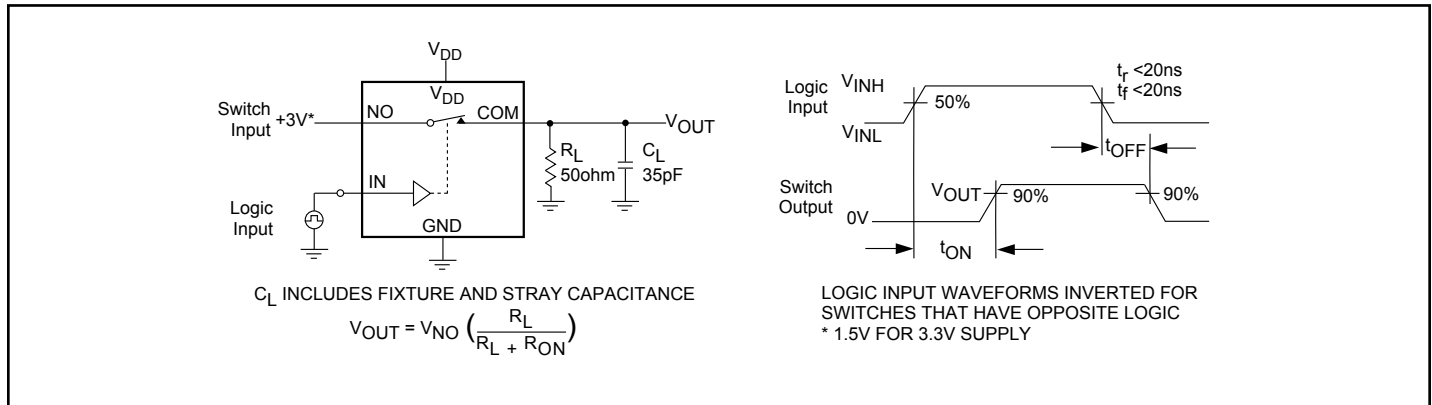


Figure 1. Switching Time

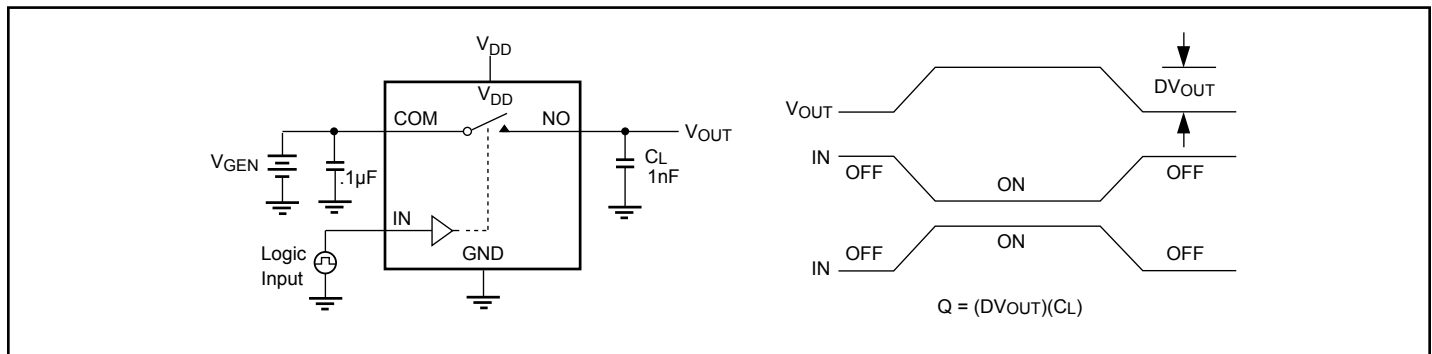


Figure 2. Charge Injection

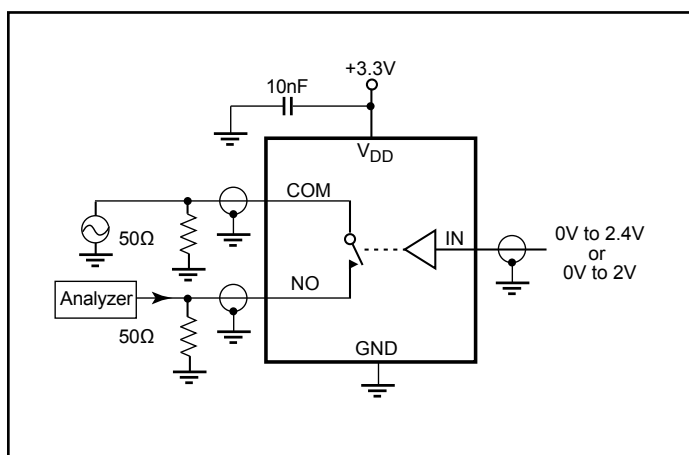


Figure 3. Off Isolation

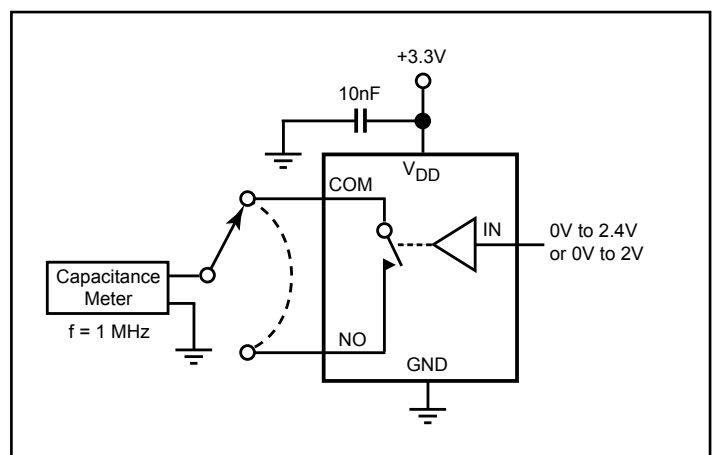
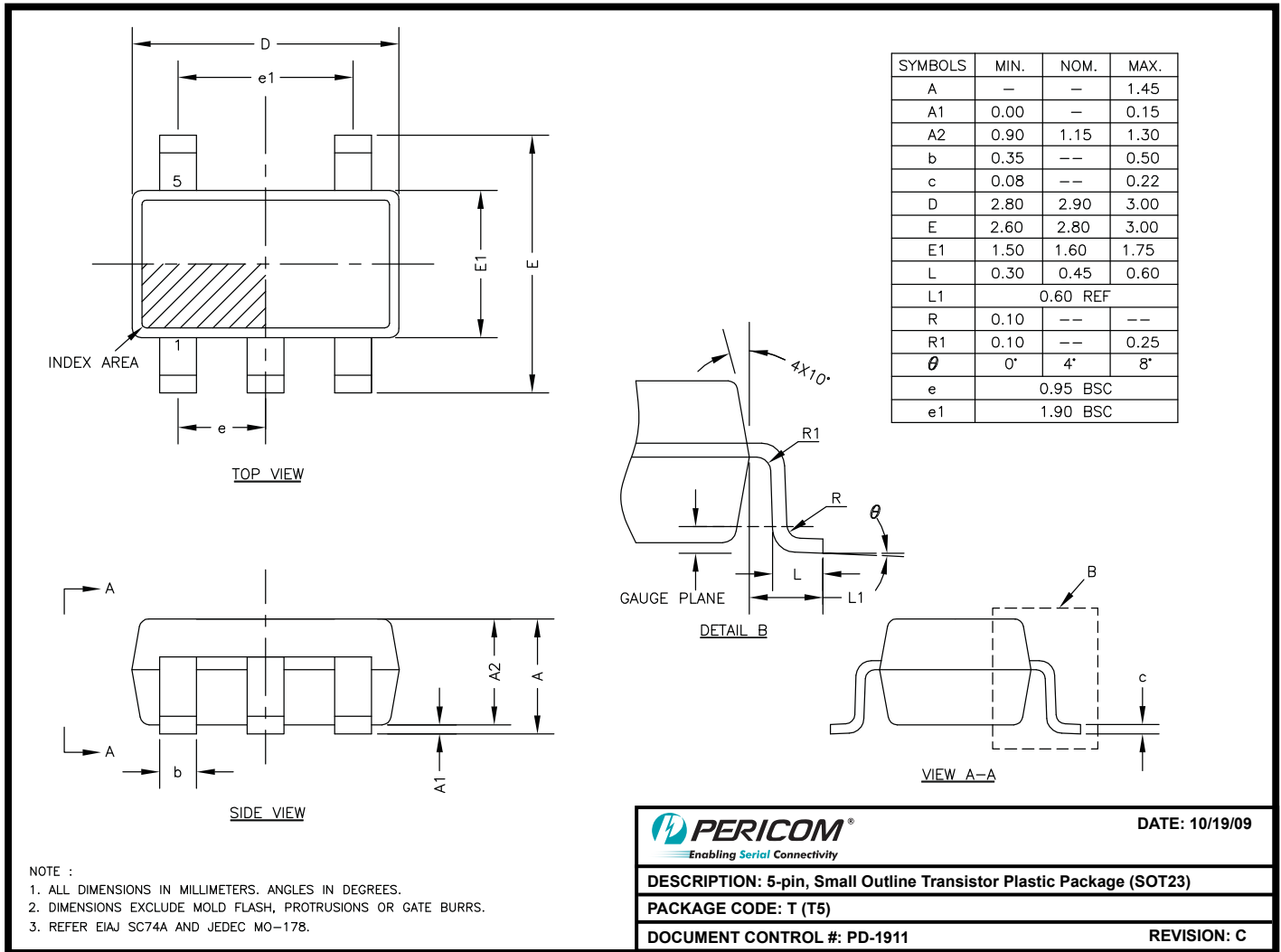


Figure 4. Channel On/Off Capacitance

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/
2. X = Tape/Reel
3. Number of transistors = TBD