

**SOTINY™ Low-Voltage, Single-Supply,  
1-Ohm SPST CMOS Analog Switches**
**Features**

- 1-ohm max. On-Resistance
- 0.15-ohm max. On-Resistance Flatness at +25°C
- Fast Switching  
 $t_{ON} = 50\text{ns max.}$   
 $t_{OFF} = 50\text{ns max.}$
- +1.8V to +5.5V Single-Supply Operation
- TTL/CMOS-Logic Compatible
- -57dB Off-Isolation at 1MHz
- 4nA max. Off-Leakage at +25°C
- Packaging:  
 - 5-Pin SOT-23 (T)

**Description**

PI5A4626/PI5A4629, single-pole/single-throw (SPST) analog switches that operate from a single +1.8V to +5.5V supply, are normally open (NO). The PI5A4629 pinout is optimized for the highest SOT-23 package off-isolation available.

These switches have 1-ohm max On-resistance ( $R_{ON}$ ), with 0.12-ohm max  $R_{ON}$  flatness over the analog signal range when powered from a +5V supply. Leakage currents are 0.5nA and fast switching times are less than 50ns. They are packaged in a compact 5-pin SOT-23 package.

**Applications**

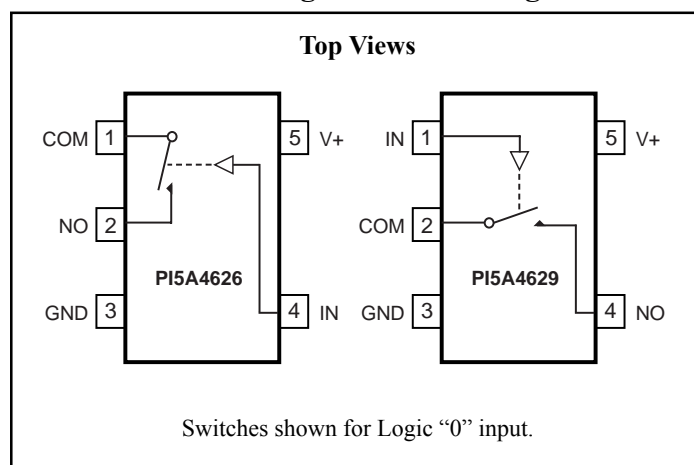
- Cellular Phones • Communications Circuits
- Battery-Operated Equipment • DSL Modems
- Audio and Video Signal Routing • PCMCIA Cards

**Pin Description**

Pin		Name	Function
4626	4629		
1	2	COM	Analog Switch, Common
2	4	NO	Analog Switch, Normally Open
3	3	GND	Ground
4	1	IN	Digital Control Input
5	5	V+	Positive Supply Voltage

**Note:**

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

**Functional Block Diagrams/Pin Configurations**

**Truth Table**

Input	Switch State
	PI5A4626 / PI5A4629
LOW	OFF
HIGH	ON

### Absolute Maximum Ratings

Voltages Referenced to GND

V+ ..... -0.5V to +5.5V

V<sub>IN</sub>, V<sub>COM</sub>, V<sub>NC</sub>, V<sub>NO</sub> (Note 1) ..... -0.5V to V+ +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

SOT-23 (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+ 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 +5V Supply

(V+ = +5V ± 10%, GND = 0V, V<sub>INH</sub> = 2.4V, V<sub>INL</sub> = 0.8V)

Parameter	Description	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>		Full	0		V+	V	
On Resistance	R <sub>ON</sub>	V+ 4.5V, I <sub>COM</sub> = -30mA, V <sub>NO</sub> or V <sub>NC</sub> = -2.5V	25		0.5	0.9	Ohm	
			Full			1.1		
On-Resistance Match Between Channels <sup>(4)</sup>	ΔR <sub>ON</sub>		25		0.03	0.05		
			Full			0.10		
On-Resistance Flatness <sup>(5)</sup>	R <sub>FLAT(ON)</sub>	V+ =5V, I <sub>COM</sub> = -30mA, V <sub>NO</sub> or V <sub>NC</sub> =1V, -2.5V, 4V	25		0.08	0.12		
			Full			0.15		
NO or NC Off Leakage Current <sup>(6)</sup>	I <sub>COM(OFF)</sub> or I <sub>NC(OFF)</sub>		V+ =5.5V, V <sub>COM</sub> = 0V, V <sub>NO</sub> or V <sub>NC</sub> = 4.5V	25	2	0.01	2	nA
				Full	-20		20	
COM On Leakage Current <sup>(6)</sup>	I <sub>COM(ON)</sub>	25		-4		4		
		Full		-40	0.3	40		

**Electrical Specifications - Single +5V Supply (continued)**

(V+ = + 5V ± 10%, GND = 0V, V<sub>INH</sub> = 2.4V, V<sub>INL</sub> = 0.8V)

Parameter	Symbol	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	2.4			V
Input Low Voltage	V <sub>IL</sub>	Guaranteed logic Low Level				0.8	
Input Current with Voltage High	I <sub>INH</sub>	V <sub>IN</sub> = 2.4V, all others = 0.8V		-1	0.005	1	µA
Input Current with Voltage Low	I <sub>INL</sub>	V <sub>IN</sub> = 0.8V, all others = 2.4V		-1	0.005	1	
<b>Dynamic</b>							
Turn-On Time	t <sub>ON</sub>	V+ = 5V, V <sub>NO</sub> or V <sub>NC</sub> = 2.5V, Figure 1	25		20	35	ns
			Full			40	
Turn-Off Time	t <sub>OFF</sub>		25		15	20	
			Full			35	
Charge Injection <sup>(3)</sup>	Q	C <sub>L</sub> = 1nF, V <sub>GEN</sub> = 0V, R <sub>GEN</sub> = 0 Ohm, Figure 2	25		40		pC
Off Isolation	OIRR	R <sub>L</sub> = 50 Ohms, f = 1MHz, Figure 3			-57		dB
Crosstalk <sup>(8)</sup>	X <sub>TALK</sub>	R <sub>L</sub> = 50 Ohms, f = 1MHz, Figure 4			-57		
NC or NO Capacitance	C <sub>(OFF)</sub>	f = 1MHz, Figure 5			83		pF
COM Off Capacitance	C <sub>COM(OFF)</sub>				83		
COM On Capacitance	C <sub>COM(ON)</sub>		f = 1MHz, Figure 6			170	
<b>Supply</b>							
Power-Supply Range	V+		Full	1.8		5.5	V
Positive Supply Current	I+	V <sub>CC</sub> = 5.5V, V <sub>IN</sub> = 0V or V+				0.5	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<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.
8. Between any two switches. See Figure 4.

### Electrical Specifications - Single +3.3V Supply

(V+ = +3.3V ± 10%, GND = 0V, V<sub>INH</sub> = 2.0V, V<sub>INL</sub> = 0.6V)

Parameter	Description	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+	V
On Resistance	R <sub>ON</sub>	V+=3V, I <sub>COM</sub> = -24mA, V <sub>NO</sub> or V <sub>NC</sub> = 2.0V	25		1.0	1.8	Ohm
			Full			2.2	
On-Resistance Match Between Channels <sup>(4)</sup>	Δ R <sub>ON</sub>	V+=3.3V, I <sub>COM</sub> = -24mA, V <sub>NO</sub> or V <sub>NC</sub> = 0.8V, 2.0V	25		0.04	0.5	
			Full		0.11		
On-Resistance Flatness <sup>(3,5)</sup>	R <sub>FLAT(ON)</sub>	V+=3.3V, I <sub>COM</sub> = -24mA, V <sub>NO</sub> or V <sub>NC</sub> = 0.8V, 2.0V	25		0.17	0.2	
			Full		0.25		
<b>Dynamic</b>							
Turn-On Time	t <sub>ON</sub>	V+=3.3V, V <sub>NO</sub> or V <sub>NC</sub> = 2.0V, Figure 1	25		30	40	ns
			Full			55	
Turn-Off Time	t <sub>OFF</sub>		25		20	25	
			Full			40	
Charge Injection <sup>(3)</sup>	Q	C <sub>L</sub> = 1nF, V <sub>GEN</sub> = 0V, R <sub>GEN</sub> = 0V, Figure 2	25		30		pC
<b>Supply</b>							
Positive Supply Current	I+	V+=3.6V, V <sub>IN</sub> = 0V or V+ All channels on or off	Full		0.5	1	μA
<b>Logic Input</b>							
Input HIGH Voltage	V <sub>IH</sub>	Guaranteed logic high level	Full	2			V
Input LOW Voltage	V <sub>IL</sub>	Guaranteed logic Low level	Full			0.6	
Input HIGH Current	I <sub>INH</sub>	V <sub>IN</sub> =2.4V, all others = 0.8V	Full	-1		1	μA
Input HIGH Current	I <sub>INL</sub>	V <sub>IN</sub> =0.8V, all others =2.4V	Full	-1		1	

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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 +2.5V Supply

(V+ = +2.5V ± 10%, GND = 0V, V<sub>INH</sub> = 1.8V, V<sub>INL</sub> = 0.6V)

Parameter	Description	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+	V
On Resistance	R <sub>ON</sub>	V+=2.5V, I <sub>COM</sub> = -8mA, V <sub>NO</sub> or V <sub>NC</sub> = 1.8V	25		1.5	2	Ohm
			Full			2.7	
On-Resistance Match Between Channels <sup>(4)</sup>	Δ R <sub>ON</sub>	V+=2.5V, I <sub>COM</sub> = -8mA, V <sub>NO</sub> or V <sub>NC</sub> = 0.8V,1.8V	25		0.13	0.16	
			Full		0.2		
On-Resistance Flatness <sup>(3,5)</sup>	R <sub>FLAT(ON)</sub>		25		0.25	0.3	
			Full		0.45		
<b>Dynamic</b>							
Turn-On Time	t <sub>ON</sub>	V+=2.5V, V <sub>NO</sub> or V <sub>NC</sub> = 1.8V, Figure 1	25		40	55	ns
			Full			70	
Turn-Off Time	t <sub>OFF</sub>		25		30	40	
			Full			55	
Charge Injection <sup>(3)</sup>	Q	C <sub>L</sub> = 1nF, V <sub>GEN</sub> = 0V, R <sub>GEN</sub> = 0V, Figure 2	25		20		pC
<b>Supply</b>							
Positive Supply Current	I+	V+=2.75V, V <sub>IN</sub> = 0V or V+ All channels on or off	Full		0.5	1	μA
<b>Logic Input</b>							
Input HIGH Voltage	V <sub>IH</sub>	Guaranteed logic high level	Full	1.8			V
Input LOW Voltage	V <sub>IL</sub>	Guaranteed logic Low level	Full			0.6	
Input HIGH Current	I <sub>INH</sub>	V <sub>IN</sub> =2.0V, all others = 0.8V	Full	-1		1	μA
Input HIGH Current	I <sub>INL</sub>	V <sub>IN</sub> =0.8V, all others =2.0V	Full	-1		1	

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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+ = +1.8V ± 10%, GND = 0V, V<sub>INH</sub> = 1.5V, V<sub>INL</sub> = 0.6V)

Parameter	Description	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+	V
On Resistance	R <sub>ON</sub>	V+=1.8V, I <sub>COM</sub> = -2mA, V <sub>NO</sub> or V <sub>NC</sub> = 1.5V	25		2.0	4	Ohm
			Full			5	
On-Resistance Match Between Channels <sup>(4)</sup>	ΔR <sub>ON</sub>	V+=1.8V, I <sub>COM</sub> = -2mA, V <sub>NO</sub> or V <sub>NC</sub> = 0.6V,1.5V	25		0.44	0.6	
			Full		0.7		
On-Resistance Flatness <sup>(3,5)</sup>	R <sub>FLAT(ON)</sub>		25		0.5	0.6	
			Full		0.9		
<b>Dynamic</b>							
Turn-On Time	t <sub>ON</sub>	V+=1.8V, V <sub>NO</sub> or V <sub>NC</sub> = 1.5V, Figure 1	25		65	70	ns
			Full			95	
Turn-Off Time	t <sub>OFF</sub>		25		40	55	
			Full			70	
Charge Injection <sup>(3)</sup>	Q	C <sub>L</sub> = 1nF, V <sub>GEN</sub> = 0V, R <sub>GEN</sub> = 0V, Figure 2	25		10		pC
<b>Supply</b>							
Positive Supply Current	I+	V+=2.0V, V <sub>IN</sub> = 0V or V+ All channels on or off	Full		0.5	1	μA
<b>Logic Input</b>							
Input HIGH Voltage	V <sub>IH</sub>	Guaranteed logic high level	Full	1.5			V
Input LOW Voltage	V <sub>IL</sub>	Guaranteed logic Low level	Full			0.6	
Input HIGH Current	I <sub>INH</sub>	V <sub>IN</sub> =1.5V, all others = 0.8V	Full	-1		1	μA
Input HIGH Current	I <sub>INL</sub>	V <sub>IN</sub> =0.8V, all others =1.5V	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.

Test Circuits/Timing Diagrams

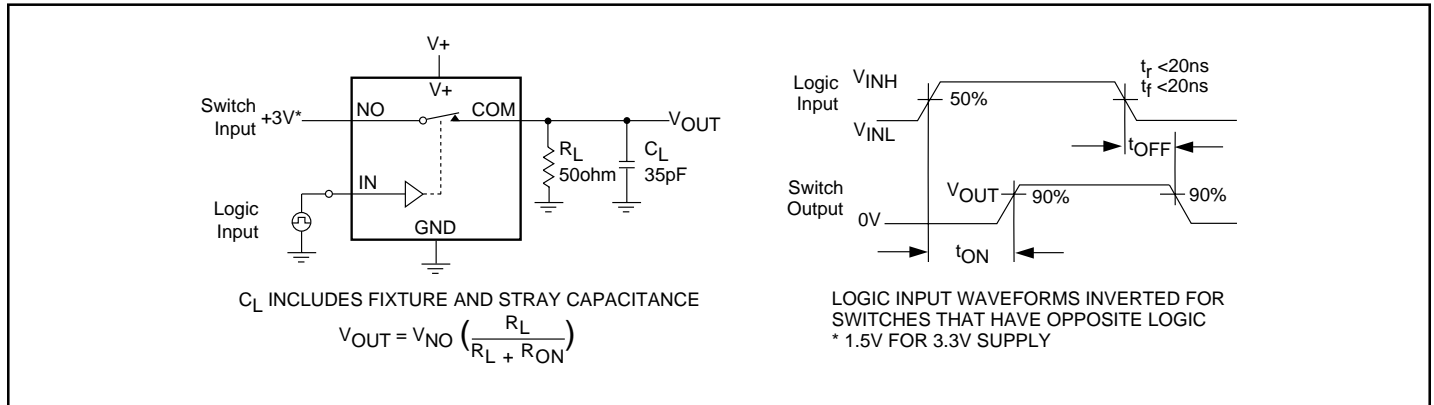


Figure 1. Switching Time

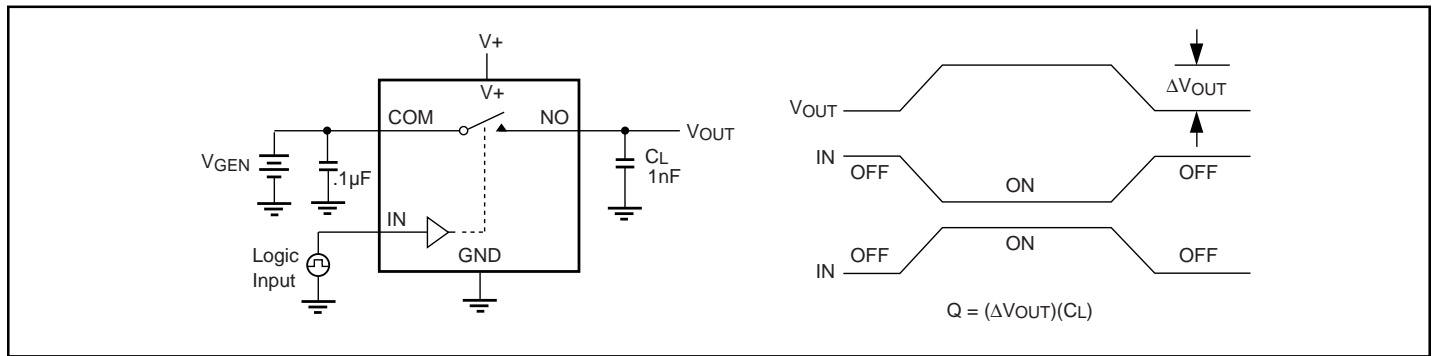


Figure 2. Charge Injection

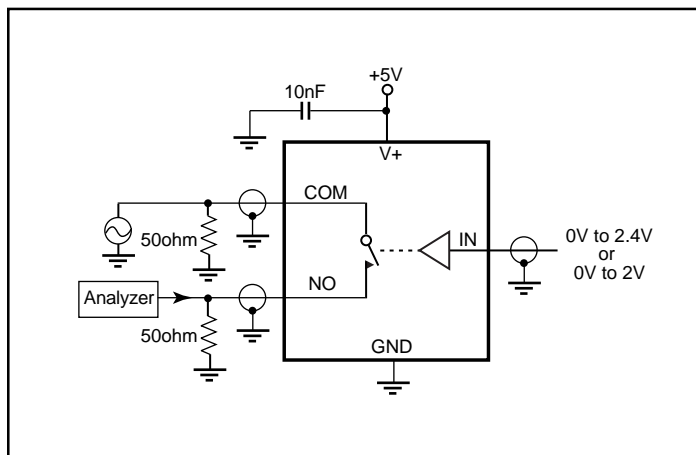


Figure 3. Off Isolation/On-Channel Bandwidth

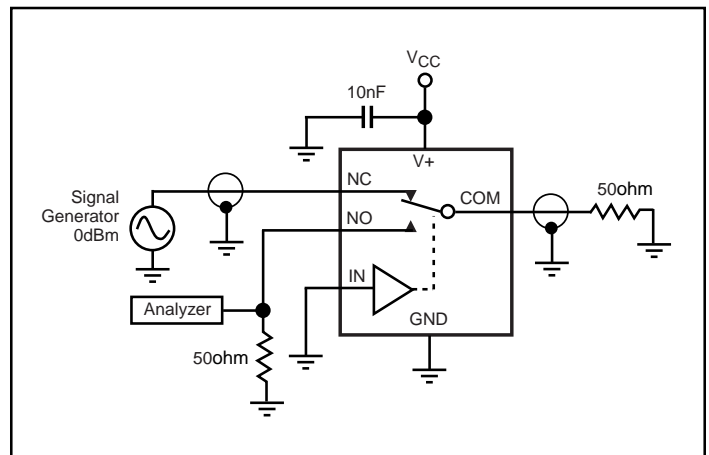
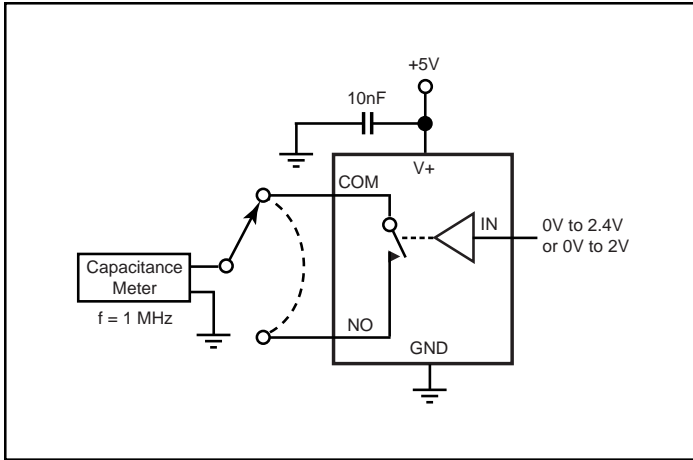
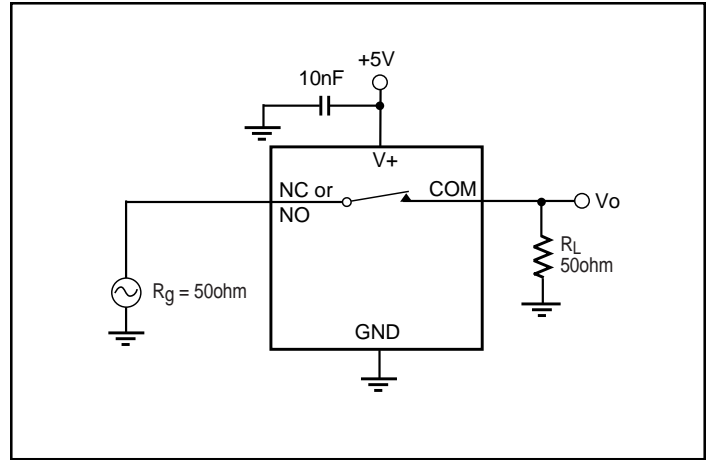
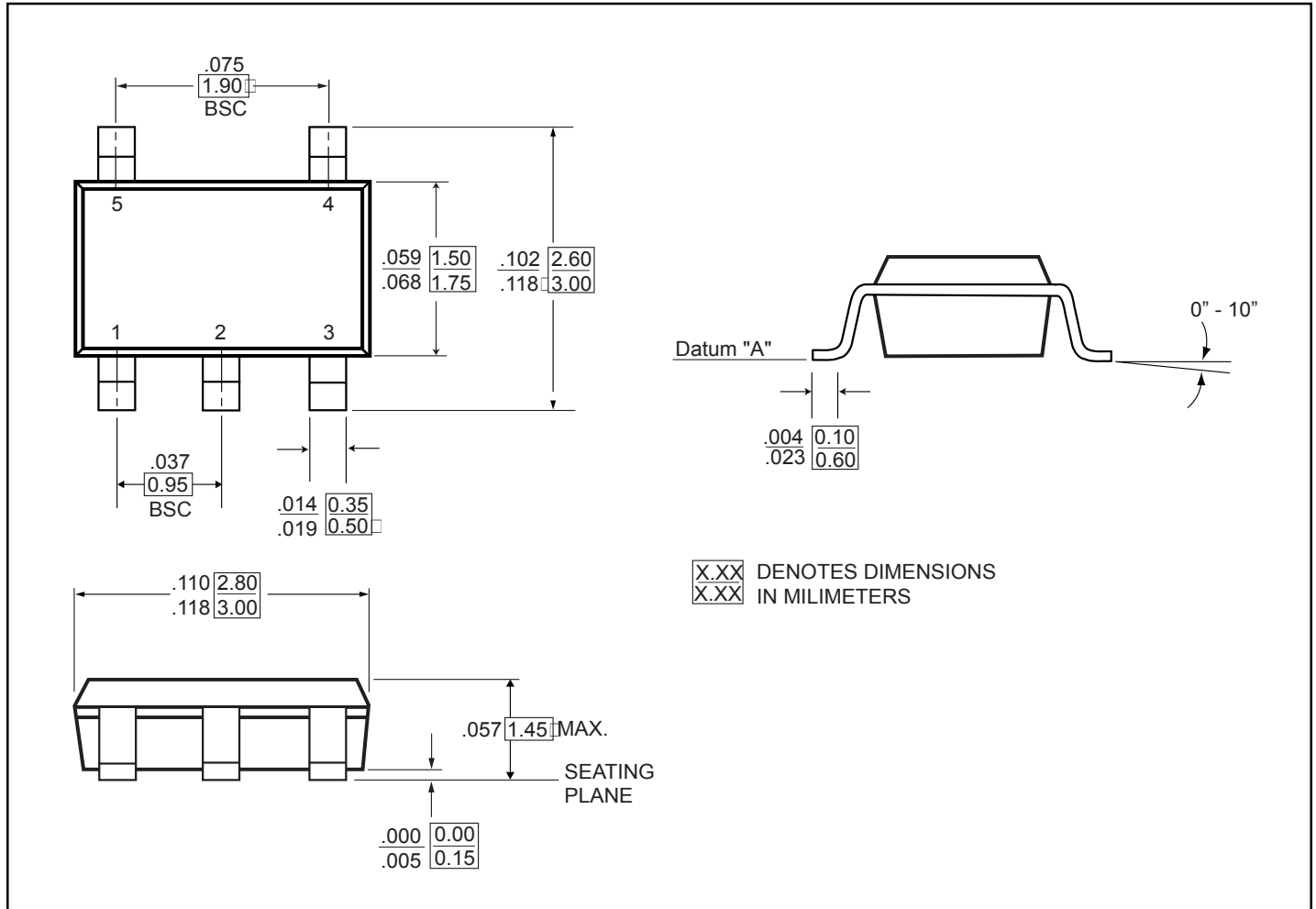


Figure 4. Crosstalk

**Test Circuits/Timing Diagrams (continued)**

**Figure 5. Channel On/Off Capacitance**

**Figure 6. Bandwidth**



**Packaging Mechanical: 5-Pin SOT-23 (T)**



**Ordering Information**

Ordering Code	Package Code	Package Description	Top Marking
PI5A4626TX	T	5-pin SOT-23	ZI
PI5A4629TX	T	5-pin SOT-23	ZH

**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 and reel
3. Number of transistors: 604 (both devices)