

**Dual, Wide Bandwidth Analog Switches**
**Features**

- Single-Supply Operation (+2V to +6V)
- Rail-to-Rail Analog Signal Dynamic Range
- Low On-Resistance (7.2-ohm with 5V supply)  
Minimizes Distortion and Error Voltages
- On-Resistance Flatness, 3-ohm typ.
- Low Charge Injection Reduces Glitch Errors.  $Q = 1.6\text{pC}$  typ.
- High Speed.  $t_{\text{ON}} = 7\text{ns}$  typ.
- Wide -3dB Bandwidth: 326 MHz
- High-Current Channel Capability: >100mA
- TTL/CMOS Logic Compatible
- Low Power Consumption ( $5\mu\text{W}$  typ.)
- Packaging (Pb-free & Green Available)  
— 8-pin, 118 mil plastic MSOP (U)

**Applications**

- Audio, Video Switching and Routing
- Battery-Powered Communication Systems
- Computer Peripherals
- Telecommunications
- Portable Instrumentation
- Mechanical Relay Replacement
- Cell Phones
- PDAs

**Description**

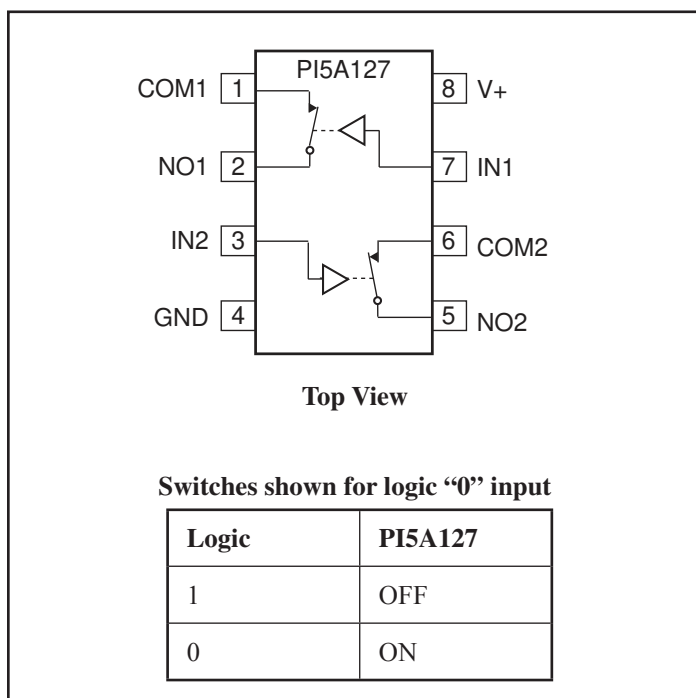
The PI5A127 is a dual SPST (single-pole single-throw) analog switches designed for single supply operation. These high-precision devices are ideal for low-distortion audio, video, signal switching and routing.

The PI5A127 is a normally closed (NC) switch.

Each switch conducts current equally well in either direction when on. When off, they block voltages up to  $V+$ .

These switches are fully specified with +5V and +3.3V supplies. With +5V, they guarantee <10 -ohm ON-resistance. On-resistance matching between channels is within 2-ohm. On-resistance flatness is less than 5-ohm over the specified range. These switches also guarantee fast switching speeds ( $t_{\text{ON}} < 20\text{ns}$ ).

These products are available in 8-pin SOIC and MSOP plastic packages for operation over the industrial temperature range ( $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ ).

**Functional Diagrams, Pin Configurations and Truth Tables**


### Absolute Maximum Ratings

Voltages Referenced to GND

$V_+$ .....	-0.5V to +7V
$V_{IN}, V_{COM}, V_{NC}, V_{NO}$ (Note 1) .....	-0.5V to $V_+ + 2V$
.....	or 30mA, whichever occurs first
Current (any terminal except COM, NO, NC) .....	30mA
Current, COM, NO, NC .....	100mA
(Pulsed at 1ms, 10% duty cycle) .....	120mA

### Thermal Information

Continuous Power Dissipation

-6 (derate 7mW/°C above +70°C) .....	550mW
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 ( $V_+ = +5V \pm 10\%$ , GND = 0V, $V_{INH} = 2.4V$ , $V_{INL} = 0.8V$ )

Parameter	Symbol	Conditions	Temp. (°C)	Min. <sup>(2)</sup>	Typ. <sup>(1)</sup>	Max. <sup>(2)</sup>	Units	
<b>Analog Switch</b>								
Analog Signal Range <sup>(3)</sup>	$V_{ANALOG}$		Full	0		$V_+$	V	
On Resistance	$R_{ON}$	$V_+ = 4.5V, I_{COM} = -30mA,$ $V_{NO} \text{ or } V_{NC} = +2.5V$	25		7.2	10	W	
			Full			12		
On-Resistance Match Between Channels <sup>(4)</sup>	$DR_{ON}$		25		0.20	2		
			Full			4		
On-Resistance Flatness <sup>(5)</sup>	$R_{FLAT(ON)}$	$V_+ = 5V,$ $I_{COM} = -30mA,$ $V_{NO} \text{ or } V_{NC} = 1V, 2.5V, 4V$	25		2.72	3.5	nA	
			Full			4		
NO or NC Off Leakage Current <sup>(6)</sup>	$I_{NO(OFF)}$ or $I_{NC(OFF)}$		$V_+ = 5.5V, V_{COM} = 0V,$ $V_{NO} \text{ or } V_{NC} = 4.5V$	25		0.18		
				Full	-200			200
COM Off Leakage Current <sup>(6)</sup>	$I_{COM(OFF)}$	$V_+ = 5.5V,$ $V_{COM} = +4.5V, V_{NO}$ $\text{ or } V_{NC} = \pm 0V$		25		0.20		
				Full	-200		200	
COM On Leakage Current <sup>(6)</sup>	$I_{COM(ON)}$		$V_+ = 5.5V, V_{COM} = +4.5V$ $V_{NO} \text{ or } V_{NC} = +4.5V$	25		0.20		
				Full	-200		200	

**Notes:**

- The algebraic convention, where the most negative value is a minimum and the most positive is a maximum, is used in this data sheet.
- Typical values are for DESIGN AID ONLY, not guaranteed or subject to production testing.
- Guaranteed by design
- $\Delta R_{ON} = R_{ON \text{ max}} - R_{ON \text{ min}}$ .
- Flatness is defined as the difference between the maximum and minimum value of ON-resistance measured.
- Leakage parameters are 100% tested at maximum rated hot temperature and guaranteed by correlation at +25°C.

**Electrical Specifications - Single +5V Supply** ( $V_+ = +5V \pm 10\%$ ,  $GND = 0V$ ,  $V_{INH} = 2.4V$ ,  $V_{INL} = 0.8V$ )

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	$V_{IH}$	Guaranteed logic High Level	Full	2			V
Input Low Voltage	$V_{IL}$	Guaranteed logic Low Level				0.8	
Input Current with Voltage High	$I_{INH}$	$V_{IN} = 2.4V$ , all others = 0.8V		-1	0.005	1	
Input Current with Voltage Low	$I_{INL}$	$V_{IN} = 0.8V$ , all others = 2.4V		-1	0.005	1	
<b>Dynamic</b>							
Turn-On Time	$t_{ON}$	$V_{CC} = 5V$ , Figure 1	25		7	15	ns
			Full			20	
Turn-Off Time	$t_{OFF}$		25		1	7	
			Full			10	
Charge Injection <sup>(3)</sup>	Q	$C_L = 1nF$ , $V_{gen} = 0V$ , $R_{gen} = 0\Omega$ , Figure 2	25		1.6	10	pC
Off Isolation	OIRR	$R_L = 50\Omega$ , $C_L = 5pF$ , $f = 10MHz$ , Figure 3			-43		dB
Crosstalk	Xtalk	$R_L = 50\Omega$ , $C_L = 5pF$ , $f = 10 MHz$ , Figure 4			-43		
NC or NO Capacitance	C(off)	$f = 1kHz$ , Figure 5				5.5	pF
COM Off Capacitance	Ccom(off)					5.5	
COM On Capacitance	Ccom(on)			$f = 1kHz$ , Figure 6			
-3dB Bandwidth	BW	$R_L = 50\Omega$ , Figure 7		Full		326	
Distortion	D	$R_L = 10$			0.2		%

continued

Parameter	Symbol	Conditions	Temp(°C)	Min. <sup>(1)</sup>	Typ. <sup>(2)</sup>	Max. <sup>(1)</sup>	Units
<b>Supply</b>							
Power-Supply Range	V+		Full	2		6	V
Positive Supply Current	I+	V+ = 5.5V, V <sub>IN</sub> = 0V or V <sub>CC</sub> , V+ All Channels on or off				1	μA

**Notes:**

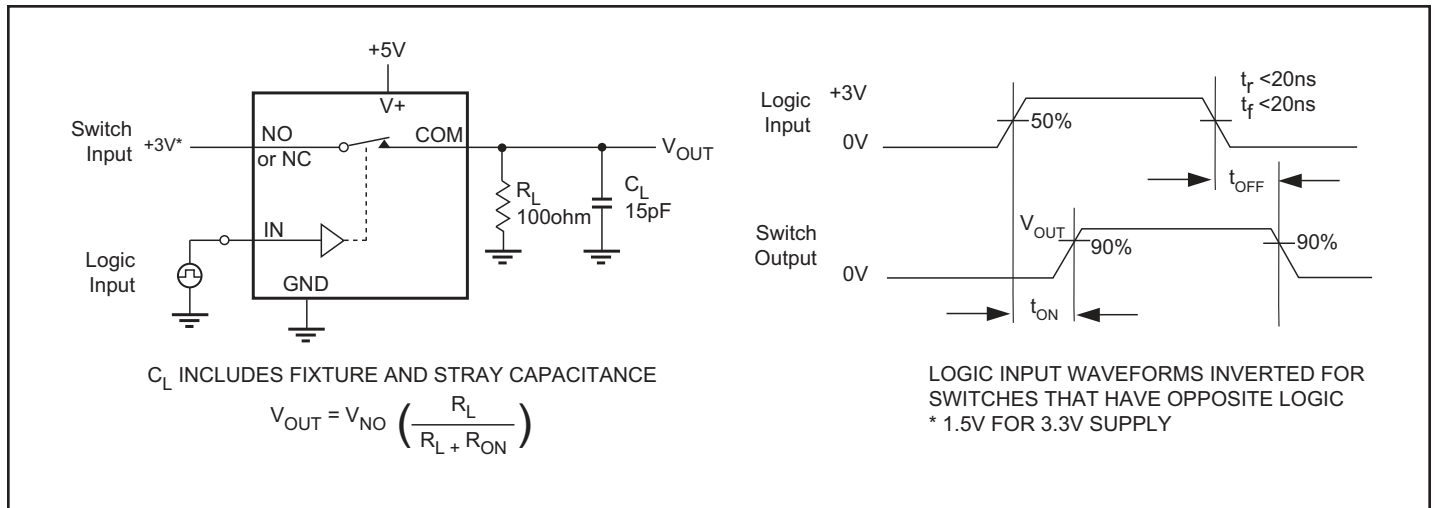
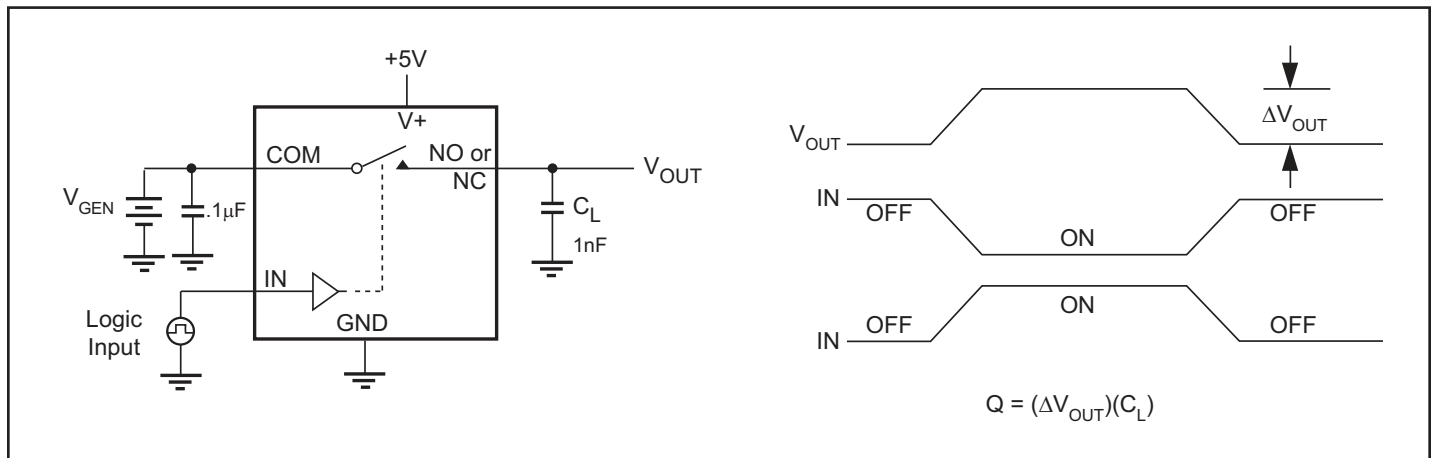
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2. Typical values are for DESIGN AID ONLY, not guaranteed or subject to production testing.
3. Guaranteed by design.

**Electrical Specifications - Single +3.3V Supply** ( $V_+ = +3.3V \pm 10\%$ ,  $GND = 0V$ ,  $V_{INH} = 2.4V$ ,  $V_{INL} = 0.8V$ )

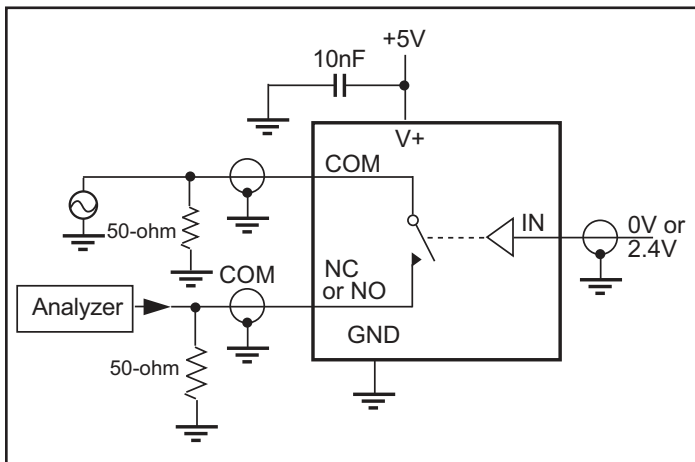
Parameter	Symbol	Conditions	Temp.(°C)	Min. <sup>(1)</sup>	Typ. <sup>(2)</sup>	Max. <sup>(1)</sup>	Units
<b>Analog Switch</b>							
Analog Signal Range <sup>(3)</sup>	$V_{ANALOG}$			0		$V_+$	V
On-Resistance	$R_{ON}$	$V_+ = 3V, I_{COM} = -30mA,$ $V_{NO}$ or $V_{NC} = 1.5V$	25		12	18	$\Omega$
			Full			22	
On-Resistance Match Between Channels <sup>(4)</sup>	$\Delta R_{ON}$	$V_+ = 3.3V, I_{COM} = -30mA,$ $V_{NO}$ or $V_{NC} = 0.8V, 2.5V$	25		1	1	
			Full			2	
On-Resistance Flatness <sup>(3,5)</sup>	$R_{FLAT(ON)}$		25		3.5	4	
			Full			5	
<b>Dynamic</b>							
Turn-On Time	$t_{ON}$	$V_+ = 3.3V, V_{NO}$ or $V_{NC} = 1.5V$ , Figure 1	25		14	25	ns
			Full			40	
Turn-Off Time	$t_{OFF}$		25		4.5	12	
			Full			20	
Charge Injection <sup>(3)</sup>	Q	$C_L = 1nF, V_{GEN} = 0V,$ $R_{GEN} = 0V$ , Figure 2	25		1.3	10	pC
<b>Supply</b>							
Supply Current	$I_+$	$V_+ = 3.6V, V_{IN} = 0V$ or $V_+$ All Channels on or off	Full			1	$\mu A$

**Notes:**

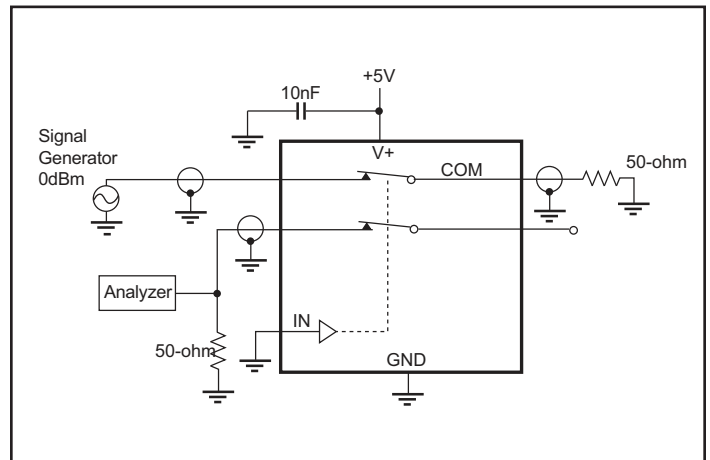
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2. Typical values are for DESIGN AID ONLY, not guaranteed or subject to production testing.
3. Guaranteed by design
4.  $\Delta R_{ON} = R_{ON\ max} - R_{ON\ min}$ .
5. Flatness is defined as the difference between the maximum and minimum value of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

**Test Circuits/Timing Diagrams**

**Figure 1. Switching Time**

**Figure 2. Charge Injection**

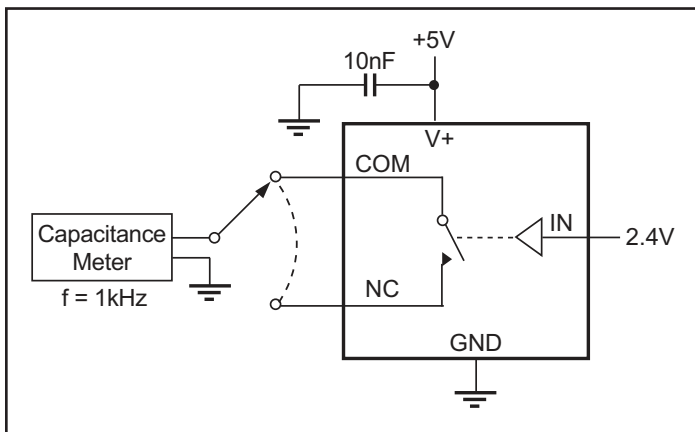
**Test Circuits/Timing Diagrams (continued)**



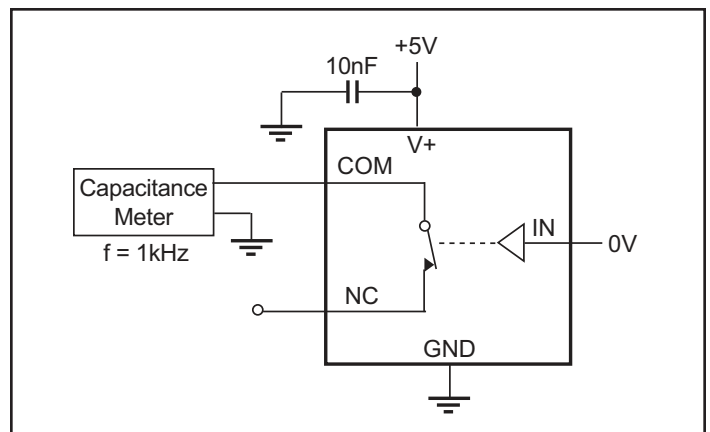
**Figure 3. Off Isolation**



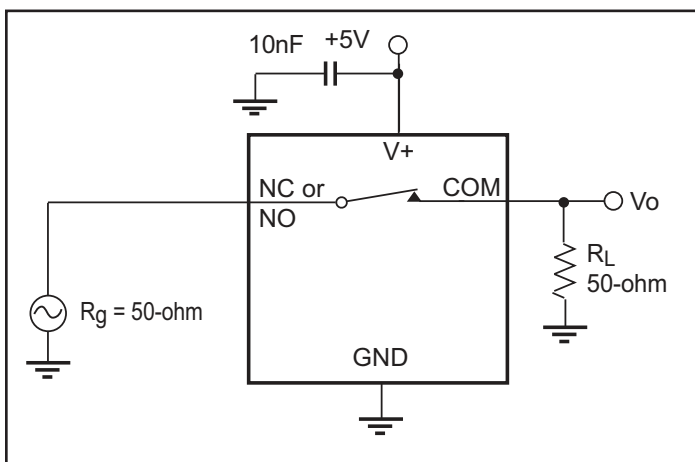
**Figure 4. Crosstalk**



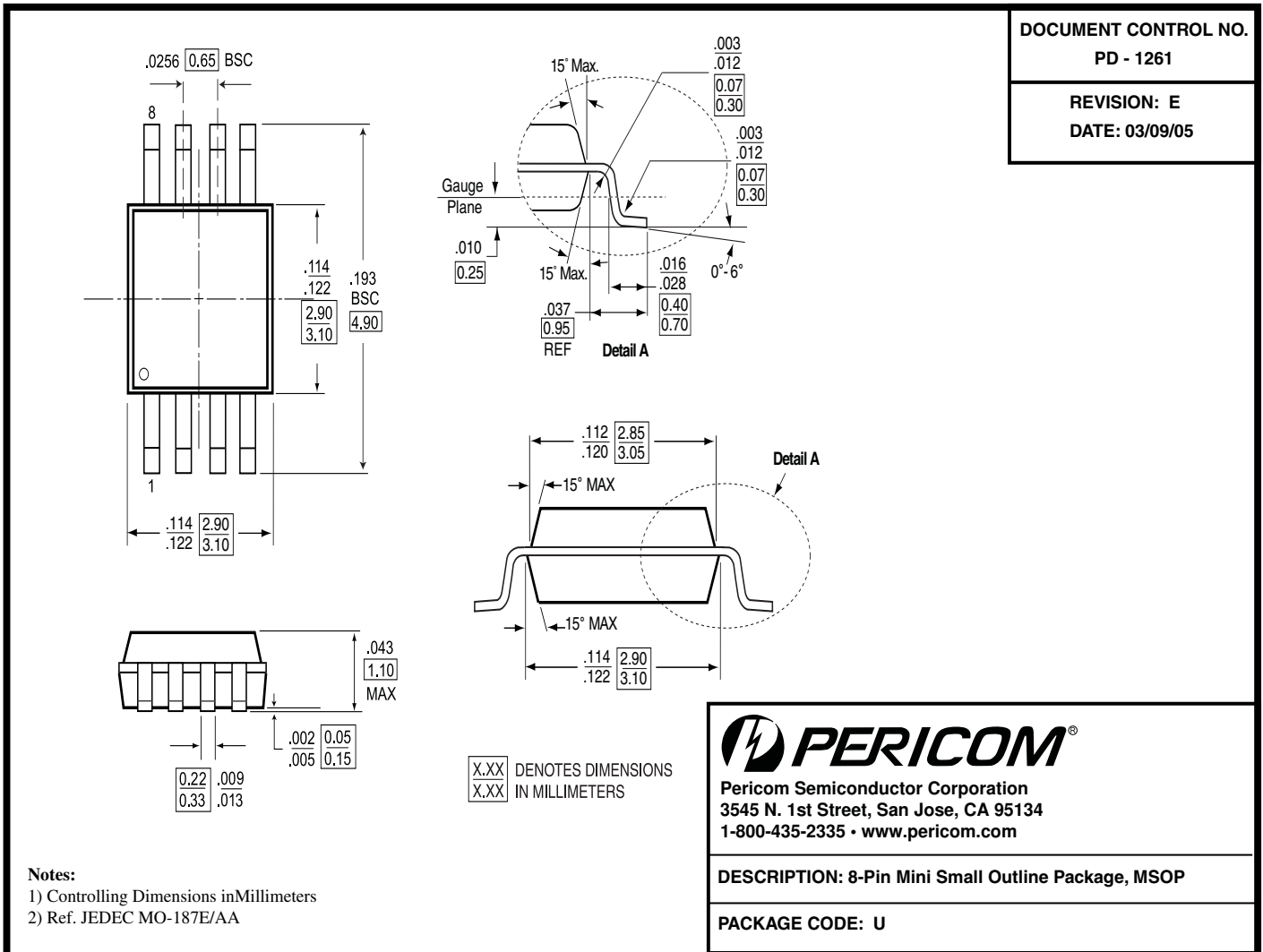
**Figure 5. Channel-Off Capacitance**



**Figure 6. Channel-On Capacitance**



**Figure 7. Bandwidth**



**Note:**

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

**Ordering Information**

Ordering Code	Package Code	Package Description
PI5A127UX	U	8-pin MSOP
PI5A127UEX	U	Pb-free & Green, 8-pin MSOP (Tape/Reel)

**Notes:**

- Thermal characteristics can be found on the company web site at [www.pericom.com/packaging/](http://www.pericom.com/packaging/)
- E = Pb-free and Green
- Adding an X Suffix = Tape/Reel