

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 μ 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

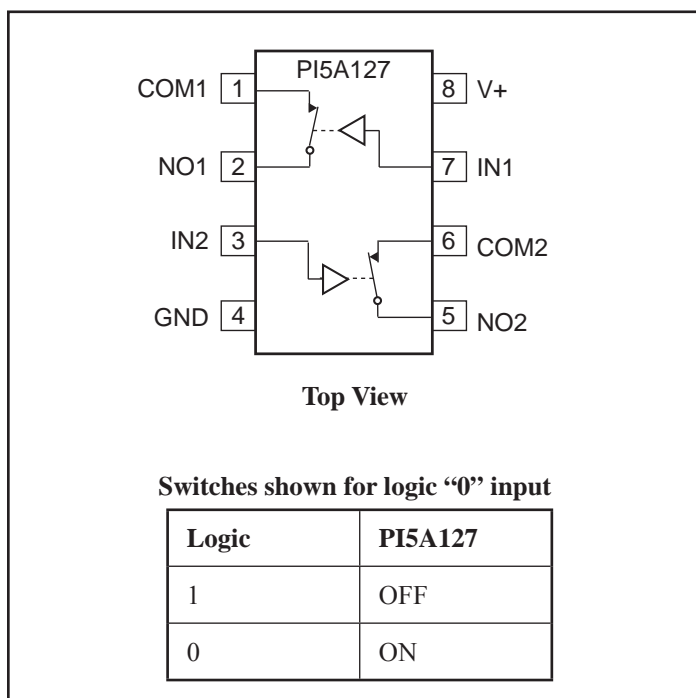
The PI5A127 is a dual SPST (single-pole single-throw) analog switches designed for single supply operation. These high-precision devices are ideal for low-distortion audio, video, signal switching and routing.

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°C to +85°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. ⁽²⁾	Typ. ⁽¹⁾	Max. ⁽²⁾	Units	
Analog Switch								
Analog Signal Range ⁽³⁾	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 ⁽⁴⁾	DR_{ON}		25		0.20	2		
			Full			4		
On-Resistance Flatness ⁽⁵⁾	$R_{FLAT(ON)}$	$V_+ = 5V,$ $I_{COM} = -30mA,$ $V_{NO} \text{ or } V_{NC} = 1V, 2.5V, 4V$	25		2.72	3.5		
			Full			4		
NO or NC Off Leakage Current ⁽⁶⁾	$I_{NO(OFF)}$ or $I_{NC(OFF)}$		$V_+ = 5.5V, V_{COM} = 0V,$ $V_{NO} \text{ or } V_{NC} = 4.5V$	25		0.18		nA
				Full	-200		200	
COM Off Leakage Current ⁽⁶⁾	$I_{COM(OFF)}$	$V_+ = 5.5V,$ $V_{COM} = +4.5V, V_{NO}$ $\text{ or } V_{NC} = \pm 0V$		25		0.20		
				Full	-200		200	
COM On Leakage Current ⁽⁶⁾	$I_{COM(ON)}$		$V_+ = 5.5V, V_{COM} = +4.5V$ $V_{NO} \text{ or } V_{NC} = +4.5V$	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. ⁽¹⁾	Typ. ⁽²⁾	Max. ⁽¹⁾	Units
Logic Input							
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	
Dynamic							
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 ⁽³⁾	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. ⁽¹⁾	Typ. ⁽²⁾	Max. ⁽¹⁾	Units
Supply							
Power-Supply Range	V+		Full	2		6	V
Positive Supply Current	I+	V+ = 5.5V, V _{IN} = 0V or V _{CC} , 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. ⁽¹⁾	Typ. ⁽²⁾	Max. ⁽¹⁾	Units
Analog Switch							
Analog Signal Range ⁽³⁾	V_{ANALOG}			0		V_+	V
On-Resistance	R_{ON}	$V_+ = 3V, I_{COM} = -30mA,$ V_{NO} or $V_{NC} = 1.5V$	25		12	18	Ω
			Full			22	
On-Resistance Match Between Channels ⁽⁴⁾	ΔR_{ON}	$V_+ = 3.3V, I_{COM} = -30mA,$ V_{NO} or $V_{NC} = 0.8V, 2.5V$	25		1	1	
			Full			2	
On-Resistance Flatness ^(3,5)	$R_{FLAT(ON)}$		25		3.5	4	
			Full			5	
Dynamic							
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 ⁽³⁾	Q	$C_L = 1nF, V_{GEN} = 0V,$ $R_{GEN} = 0V$, Figure 2	25		1.3	10	pC
Supply							
Supply Current	I_+	$V_+ = 3.6V, V_{IN} = 0V$ or V_+ All Channels on or off	Full			1	μA

Notes:

1. The algebraic convention, where the most negative value is a minimum and the 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. $\Delta R_{ON} = R_{ON\ max} - R_{ON\ min}$.
5. Flatness is defined as the difference between the maximum and minimum value of ON-resistance measured.

Test Circuits/Timing Diagrams

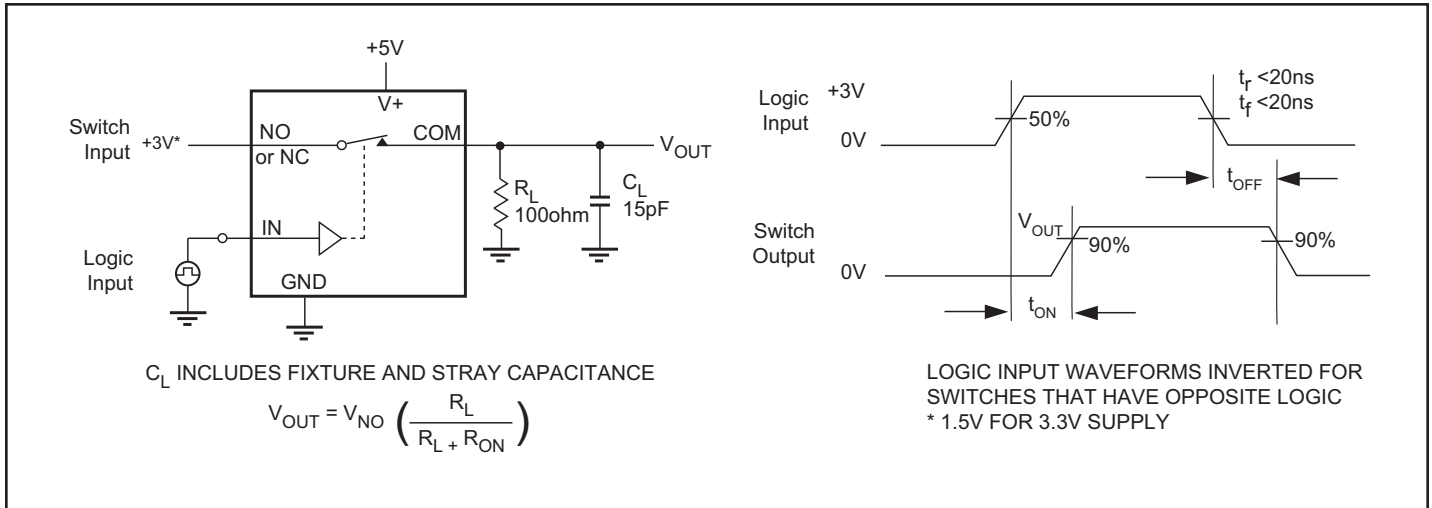


Figure 1. Switching Time

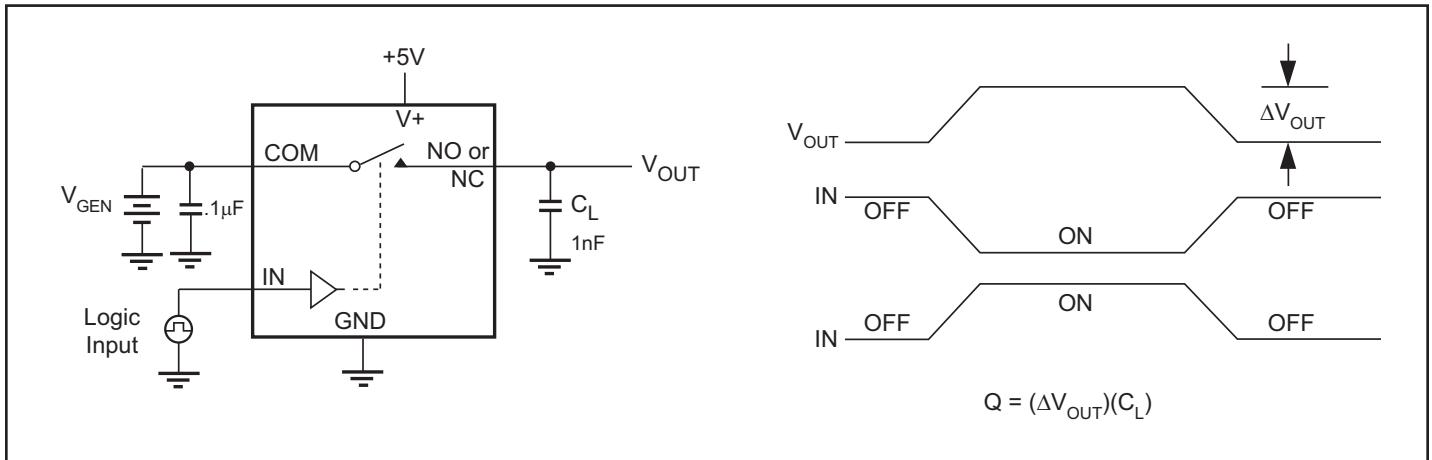


Figure 2. Charge Injection

Test Circuits/Timing Diagrams (continued)

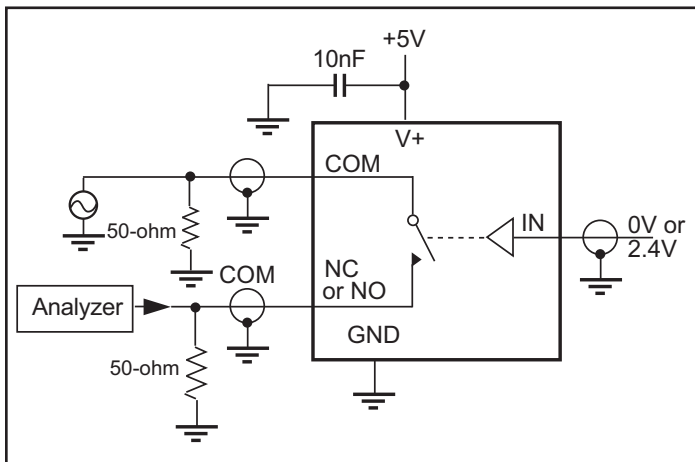


Figure 3. Off Isolation

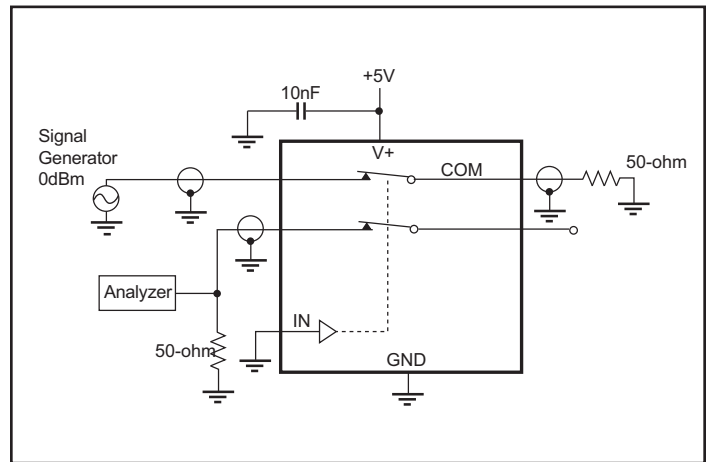


Figure 4. Crosstalk

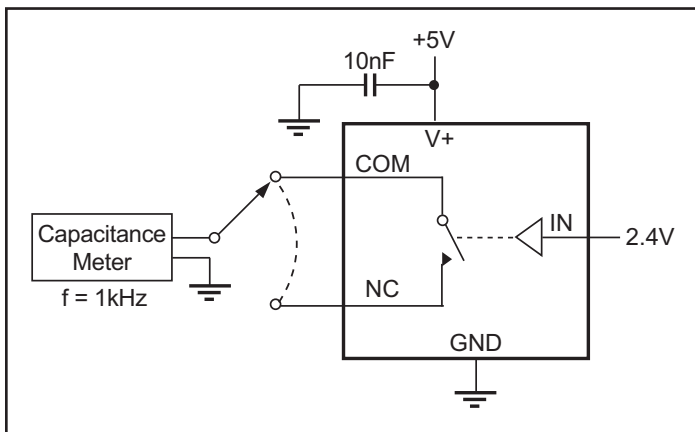


Figure 5. Channel-Off Capacitance

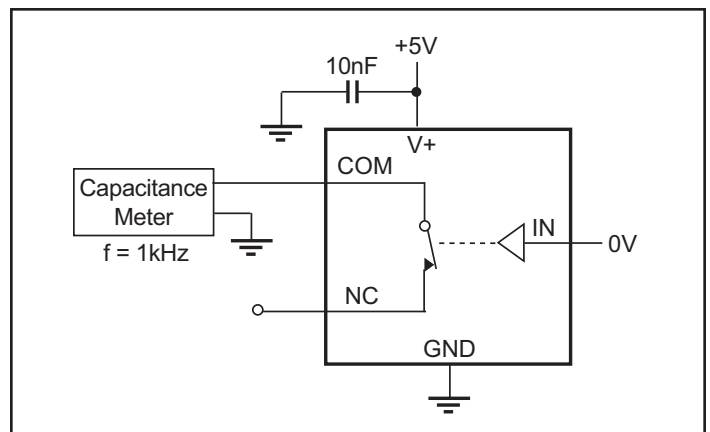


Figure 6. Channel-On Capacitance

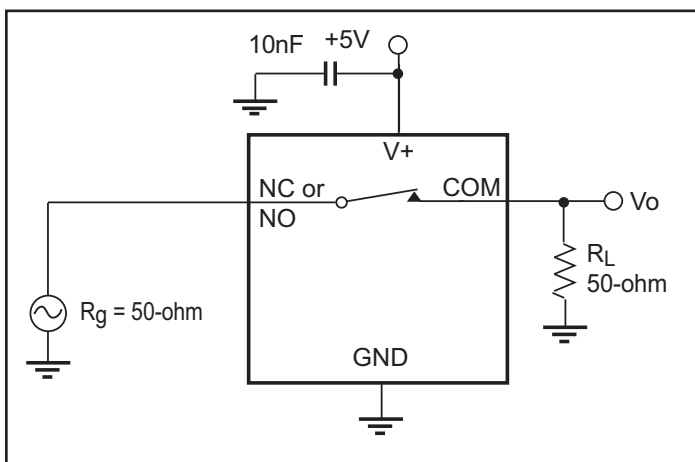
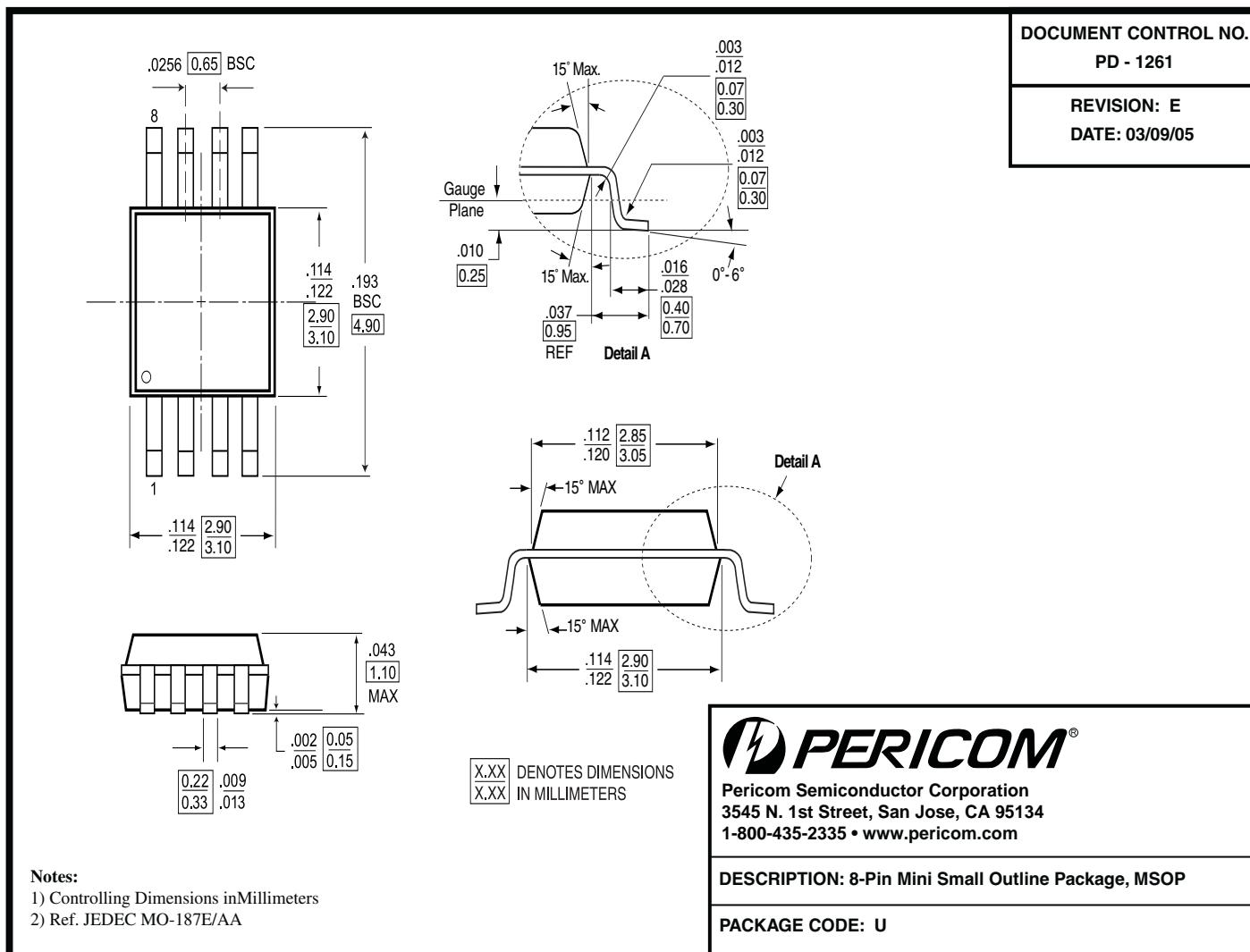


Figure 7. Bandwidth



Pericom Semiconductor Corporation
3545 N. 1st Street, San Jose, CA 95134
1-800-435-2335 • www.pericom.com

DESCRIPTION: 8-Pin Mini Small Outline Package, MSOP

PACKAGE CODE: U

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/
 - E = Pb-free and Green
 - Adding an X Suffix = Tape/Reel