

**FEATURES**

- Voltage Operation: 1.8V to 5.5V
- On-Resistance: 4.5Ω (TYP) at 5.0V
- Fast Switching Times  
t<sub>ON</sub> 20nS  
t<sub>OFF</sub> 15nS
- High Bandwidth: 300MHz
- High Off-Isolation: -51dB at 10MHz
- Rail-to-Rail Operation
- TTL/CMOS Compatible
- Break-Before-Make Switching
- Temperature Range: -40°C to 85°C
- Lead (Pb) Free SC70-6 Package

**APPLICATIONS**

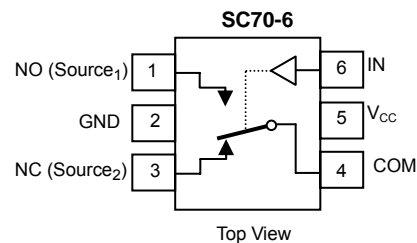
- Portable Instrumentation
- Battery-Operated Equipment
- Computer Peripherals
- Cell Phones
- PDAs
- MP3s

**DESCRIPTION**

The PA2157 is a single, bidirectional, single-pole/ double-throw (SPDT) CMOS analog switch that is designed to operate from a single +1.8V to +5.5V supply. It features high-bandwidth (300MHz) and low on-resistance (4.5Ω TYP), Targeted applications for audio switching.

The PA2157 features guaranteed on-resistance matching (0.3Ω MAX) between switches and guaranteed on-resistance flatness over the signal range (2.3Ω TYP). This ensures excellent linearity and low distortion when switching audio signals.

PA2157 is available in a SC70-6 package.

**PIN CONFIGURATION**

Truth Table		
Logic	NC	NO
0	ON	OFF
1	OFF	ON

Ordering information		
Temp. Range	Package	Part Number
-40 to 85 °C	SC70-6	PA2157-T7

**PIN DESCRIPTION**

NAME	PIN	
NO	1	Normally-open terminal
GND	2	Ground
NC	3	Normally-closed terminal
COM	4	Common terminal
V+	5	Power supply
IN	6	Digital control pin to connect the COM terminal to the NO or NC terminals

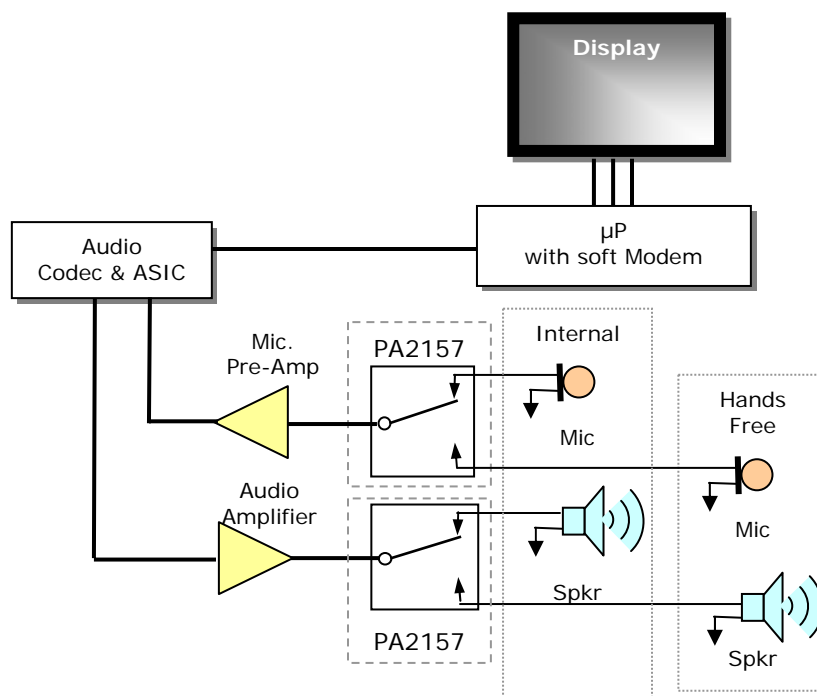
**ABSOLUTE MAXIMUM RATINGS**

V+, IN to GND.....-0.3V to 6V  
 Analog, Digital voltage range <sup>(1)</sup>.....-0.3V to (V+) + 0.3V  
 Continuous Current NO, NC, or COM.....±50mA  
 Peak Current NO, NC, or COM .....±80mA  
 Operating Temperature Range.....-40°C to +85°C

Junction Temperature.....150°C  
 Storage Temperature..... -65°C to +150°C  
 Lead Temperature (soldering, 0s).....260°C  
 ESD (HBM).....2000V

*Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.*  
 (1) Signals on NC, NO, or COM or IN exceeding V+ will be clamped by internal diodes. Limit forward diode current to maximum current ratings.

**TYPICAL APPLICATION**



**ELECTRICAL CHARACTERISTICS**
*(V<sub>+</sub> = +4.5V to +5.5V, V<sub>IH</sub> = +2.0V, V<sub>IL</sub> = +0.8V, T<sub>A</sub> = -40°C to +85°C, Typical values are at V<sub>+</sub> = 5.0V, T<sub>A</sub> = +25°C, unless otherwise noted.)*

PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
<b>ANALOG SWITCH</b>							
Analog Signal Range	V <sub>NO</sub> , V <sub>NC</sub> , V <sub>COM</sub>		-40°C to +85°C	0		V <sub>+</sub>	V
On-Resistance	R <sub>ON</sub>	V <sub>+</sub> = 4.5V, V <sub>NO</sub> or V <sub>NC</sub> = 3.5V, I <sub>COM</sub> = -10mA, Test Circuit 1	+25°C		4.5	8	Ω
			-40°C to +85°C			8.5	Ω
On-Resistance Match Between Channels	ΔR <sub>ON</sub>	V <sub>+</sub> = 4.5V, V <sub>NO</sub> or V <sub>NC</sub> = 3.5V, I <sub>COM</sub> = -10mA, Test Circuit 1	+25°C		0.15	0.3	Ω
			-40°C to +85°C			0.4	Ω
On-Resistance Flatness	R <sub>FLAT(ON)</sub>	V <sub>+</sub> = 4.5V, V <sub>NO</sub> or V <sub>NC</sub> = 1.0V, 2.0V, 3.5V, I <sub>COM</sub> = -10mA, Test Circuit 1	+25°C		2.3	3.3	Ω
			-40°C to +85°C			3.7	Ω
Source OFF Leakage Current	I <sub>NC(OFF)</sub> , I <sub>NO(OFF)</sub>	V <sub>+</sub> = 5.5V, V <sub>NO</sub> or V <sub>NC</sub> = 1.0V, 4.5V, V <sub>COM</sub> = 4.5V, 1.0V	-40°C to +85°C			1	μA
Channel ON Leakage Current	I <sub>NC(ON)</sub> , I <sub>NO(ON)</sub> , I <sub>COM(ON)</sub>	V <sub>+</sub> = 5.5V, V <sub>COM</sub> = 1.0V, 4.5V, V <sub>NO</sub> or V <sub>NC</sub> = 1.0V, 4.5V, or floating	-40°C to +85°C			1	μA
<b>DIGITAL INPUTS</b>							
Input High Voltage	V <sub>INH</sub>		-40°C to +85°C	1.5			V
Input Low Voltage	V <sub>INL</sub>		-40°C to +85°C			0.6	V
Input Leakage Current	I <sub>IN</sub>	V <sub>+</sub> = +5.5V, V <sub>IN</sub> = 0V or 5.5V	-40°C to +85°C			1	μA
<b>DYNAMIC CHARACTERISTICS</b>							
Turn-On Time	t <sub>ON</sub>	V <sub>NO</sub> or V <sub>NC</sub> = 3.0V, V <sub>IH</sub> = 1.5V, V <sub>IL</sub> = 0V, R <sub>L</sub> = 300Ω, C <sub>L</sub> = 35pF, Test Circuit 2	+25°C		20		ns
Turn-Off Time	t <sub>OFF</sub>	V <sub>NO</sub> or V <sub>NC</sub> = 3.0V, V <sub>IH</sub> = 1.5V, V <sub>IL</sub> = 0V, R <sub>L</sub> = 300Ω, C <sub>L</sub> = 35pF, Test Circuit 2	+25°C		15		ns
Break-Before-Make Time Delay	t <sub>D</sub>	V <sub>NO1</sub> or V <sub>NC1</sub> = V <sub>NO2</sub> or V <sub>NC2</sub> = 3V, R <sub>L</sub> = 300Ω, C <sub>L</sub> = 35pF, Test Circuit 3	+25°C		5		ns
Skew	t <sub>SKREW</sub>	R <sub>S</sub> = 39Ω, C <sub>L</sub> = 50pF, Test Circuit 4	+25°C		5		ns
Off Isolation	O <sub>ISO</sub>	R <sub>L</sub> = 50Ω, C <sub>L</sub> = 5pF, Signal = 0dBm, Test Circuit 5	f = 10MHz	+25°C		-51	dB
			f = 1MHz	+25°C		-72	dB
-3dB Bandwidth	BW	Signal = 0dBm, R <sub>L</sub> = 50Ω, C <sub>L</sub> = 5pF, Test Circuit 6	+25°C		300		MHz
Source OFF Capacitance	C <sub>NC(OFF)</sub> , C <sub>NO(OFF)</sub>	f = 1MHz	+25°C		5.5		pF
Channel ON Capacitance	C <sub>NC(ON)</sub> , C <sub>NO(ON)</sub> , C <sub>COM(ON)</sub>	f = 1MHz	+25°C		15.5		pF
<b>POWER REQUIREMENTS</b>							
Power Supply Range	V <sub>+</sub>		-40°C to +85°C	1.8		5.5	V
Power Supply Current	I <sub>+</sub>	V <sub>+</sub> = +5.5V, V <sub>IN</sub> = 0V or V <sub>+</sub>	-40°C to +85°C			5	μA

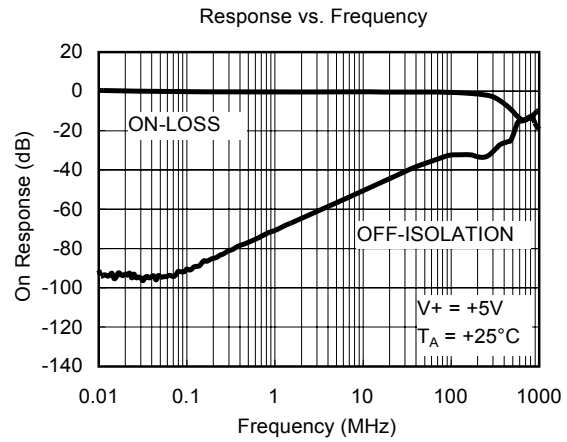
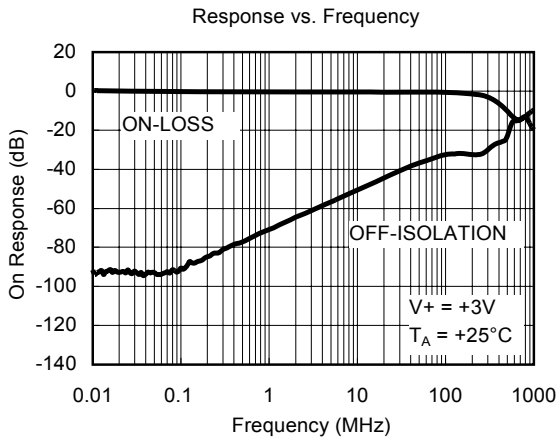
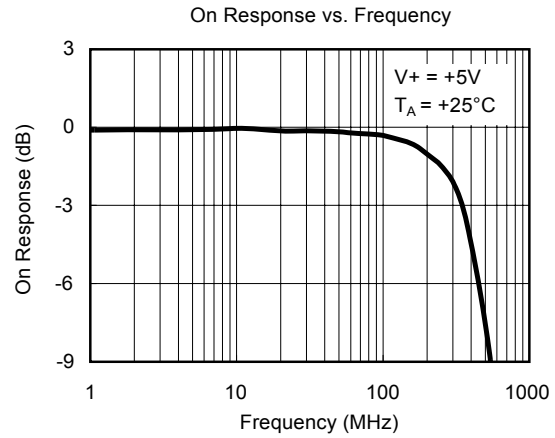
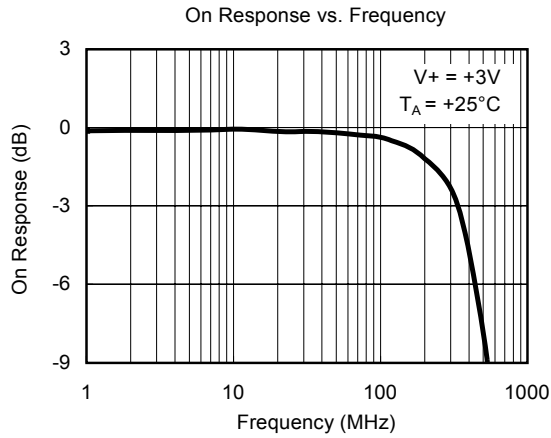
Specifications subject to change without notice.

**ELECTRICAL CHARACTERISTICS**
*(V<sub>+</sub> = +2.7V to +3.6V, V<sub>IH</sub> = +1.4V, V<sub>IL</sub> = +0.5V, T<sub>A</sub> = -40°C to +85°C, Typical values are at V<sub>+</sub> = 3.0V, T<sub>A</sub> = +25°C, unless otherwise noted.)*

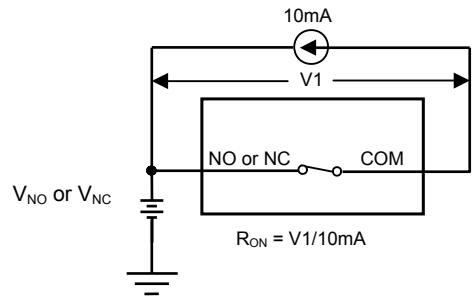
PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
<b>ANALOG SWITCH</b>							
Analog Signal Range	V <sub>NO</sub> , V <sub>NC</sub> , V <sub>COM</sub>		-40°C to +85°C	0		V <sub>+</sub>	V
On-Resistance	R <sub>ON</sub>	V <sub>+</sub> = 2.7V, V <sub>NO</sub> or V <sub>NC</sub> = 1.5V, I <sub>COM</sub> = -10mA, Test Circuit 1	+25°C		7	10	Ω
			-40°C to +85°C			10.5	Ω
On-Resistance Match Between Channels	ΔR <sub>ON</sub>	V <sub>+</sub> = 2.7V, V <sub>NO</sub> or V <sub>NC</sub> = 1.5V, I <sub>COM</sub> = -10mA, Test Circuit 1	+25°C		0.15	0.3	Ω
			-40°C to +85°C			0.4	Ω
On-Resistance Flatness	R <sub>FLAT(ON)</sub>	V <sub>+</sub> = 2.7V, V <sub>NO</sub> or V <sub>NC</sub> = 1.0V, 1.5V, 2.0V, I <sub>COM</sub> = -10mA, Test Circuit 1	+25°C		3	4	Ω
			-40°C to +85°C			4.3	Ω
Source OFF Leakage Current	I <sub>NC(OFF)</sub> , I <sub>NO(OFF)</sub>	V <sub>+</sub> = 3.6V, V <sub>NO</sub> or V <sub>NC</sub> = 0.3V, 3.3V, V <sub>COM</sub> = 3.3V, 0.3V,	-40°C to +85°C			1	μA
Channel ON Leakage Current	I <sub>NC(ON)</sub> , I <sub>NO(ON)</sub> , I <sub>COM(ON)</sub>	V <sub>+</sub> = 3.6V, V <sub>COM</sub> = 0.3V, 3.3V, V <sub>NO</sub> or V <sub>NC</sub> = 0.3V, 3.3V, or floating	-40°C to +85°C			1	μA
<b>DIGITAL INPUTS</b>							
Input High Voltage	V <sub>IH</sub>		-40°C to +85°C	1			V
Input Low Voltage	V <sub>IL</sub>		-40°C to +85°C			0.5	V
Input Leakage Current	I <sub>IN</sub>	V <sub>+</sub> = +5.5V, V <sub>IN</sub> = 0V or 3.6V	-40°C to +85°C			1	μA
<b>DYNAMIC CHARACTERISTICS</b>							
Turn-On Time	t <sub>ON</sub>	V <sub>NO</sub> or V <sub>NC</sub> = 1.5V, V <sub>IH</sub> = 1.5V, V <sub>IL</sub> = 0V, R <sub>L</sub> = 300Ω, C <sub>L</sub> = 35pF, Test Circuit 2	+25°C		30		ns
Turn-Off Time	t <sub>OFF</sub>	V <sub>NO</sub> or V <sub>NC</sub> = 1.5V, V <sub>IH</sub> = 1.5V, V <sub>IL</sub> = 0V, R <sub>L</sub> = 300Ω, C <sub>L</sub> = 35pF, Test Circuit 2	+25°C		25		ns
Break-Before-Make Time Delay	t <sub>D</sub>	V <sub>NO1</sub> or V <sub>NC1</sub> = V <sub>NO2</sub> or V <sub>NC2</sub> = 3V, R <sub>L</sub> = 300Ω, C <sub>L</sub> = 35pF, Test Circuit 3	+25°C		8		ns
Skew	t <sub>SKREW</sub>	R <sub>S</sub> = 39Ω, C <sub>L</sub> = 50pF, Test Circuit 4	+25°C		2		ns
Off Isolation	O <sub>ISO</sub>	R <sub>L</sub> = 50Ω, C <sub>L</sub> = 5pF, Signal = 0dBm, Test Circuit 5	f = 10MHz	+25°C		-51	dB
			f = 1MHz	+25°C		-72	dB
-3dB Bandwidth	BW	Signal = 0dBm, R <sub>L</sub> = 50Ω, C <sub>L</sub> = 5pF, Test Circuit 6	+25°C		300		MHz
Source OFF Capacitance	C <sub>NC(OFF)</sub> , C <sub>NO(OFF)</sub>	f = 1MHz	+25°C		5.5		pF
Channel ON Capacitance	C <sub>NC(ON)</sub> , C <sub>NO(ON)</sub> , C <sub>COM(ON)</sub>	f = 1MHz	+25°C		15.5		pF
<b>POWER REQUIREMENTS</b>							
Power Supply Range	V <sub>+</sub>		-40°C to +85°C	1.8		5.5	V
Power Supply Current	I <sub>+</sub>	V <sub>+</sub> = +5.5V, V <sub>IN</sub> = 0V or V <sub>+</sub>	-40°C to +85°C			5	μA

Specifications subject to change without notice.

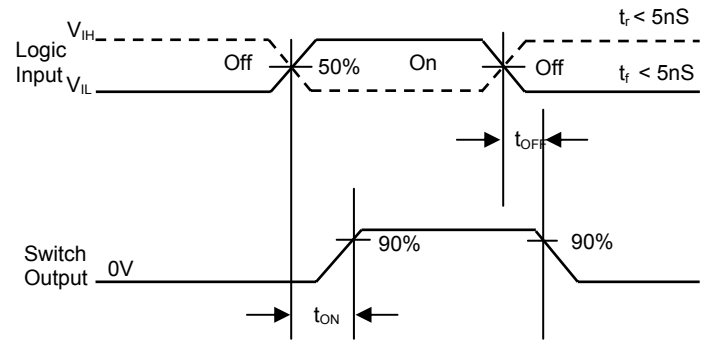
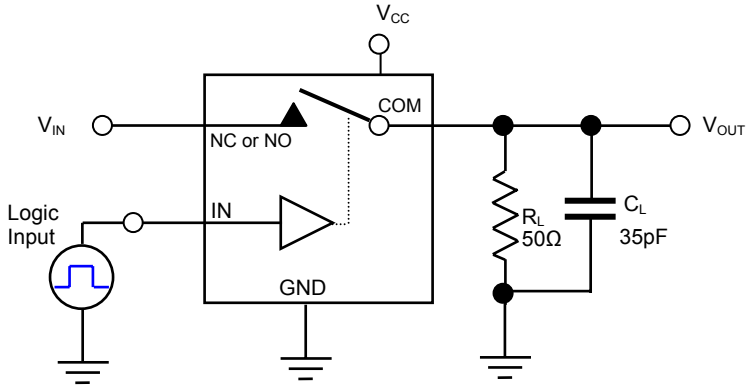
**TYPICAL PERFORMANCE CHARACTERISTICS**



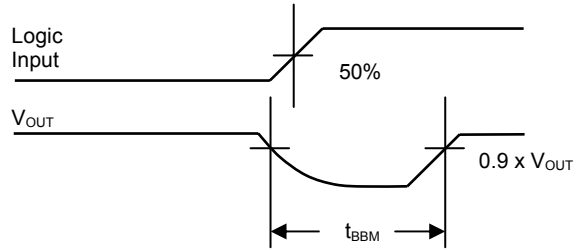
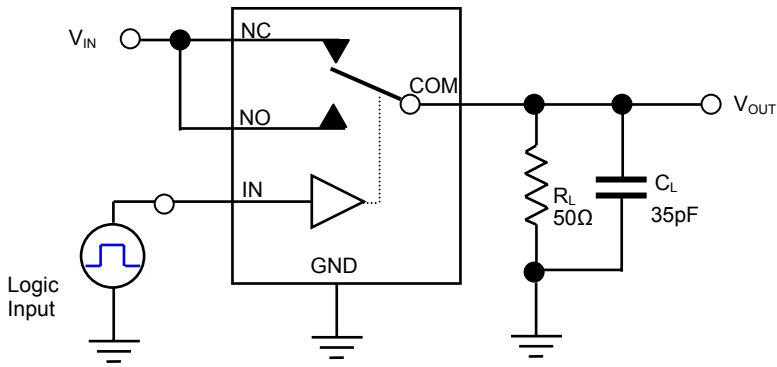
**TEST CIRCUITS.**



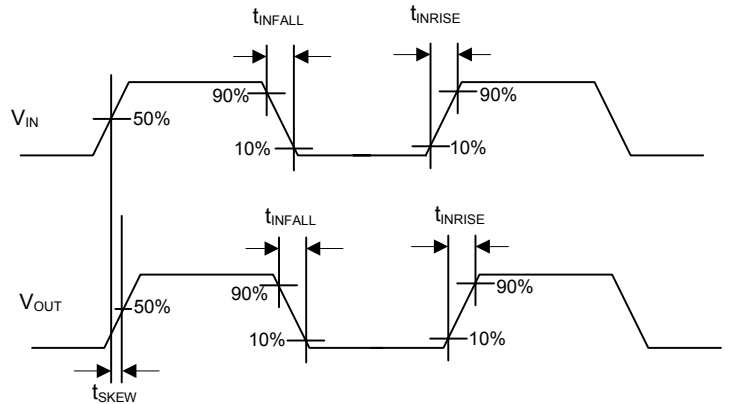
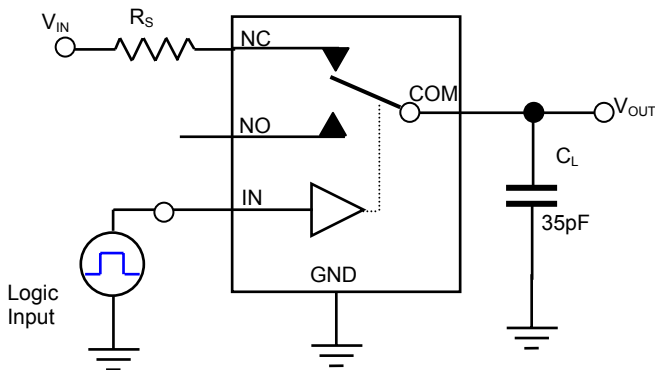
Test Circuit. 1. On Resistance



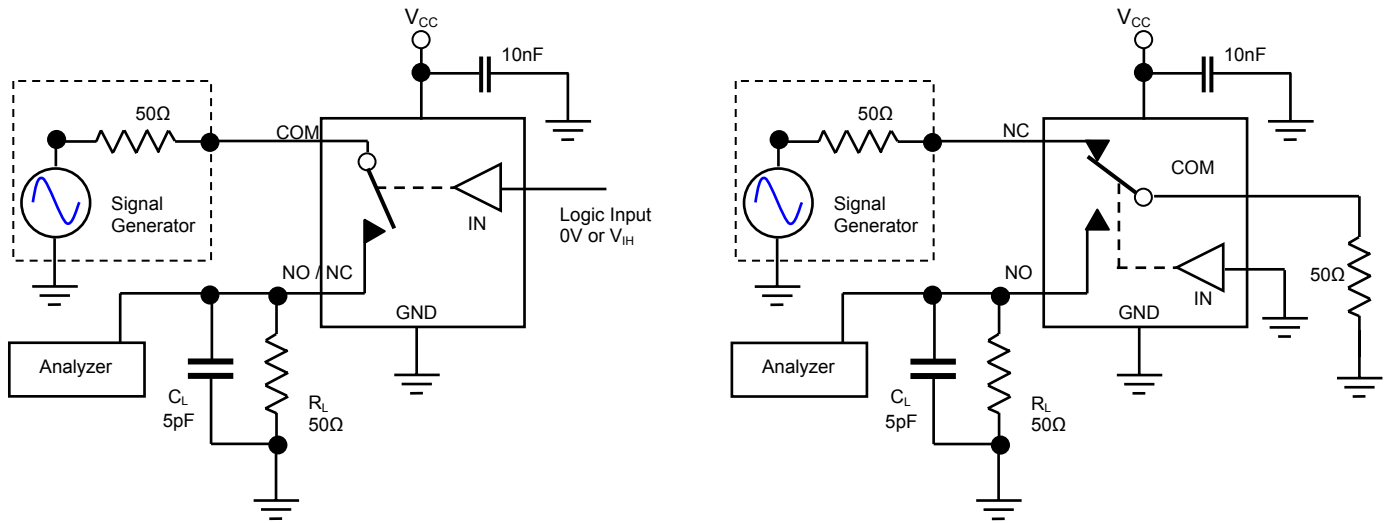
Test Circuit.2. Switching times



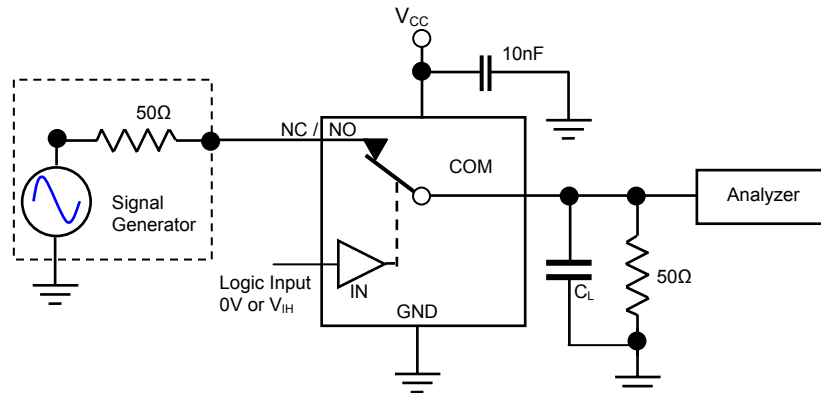
Test Circuit. 3. Break before Make Time Delay



Test Circuit. 4. Output Signal Skew

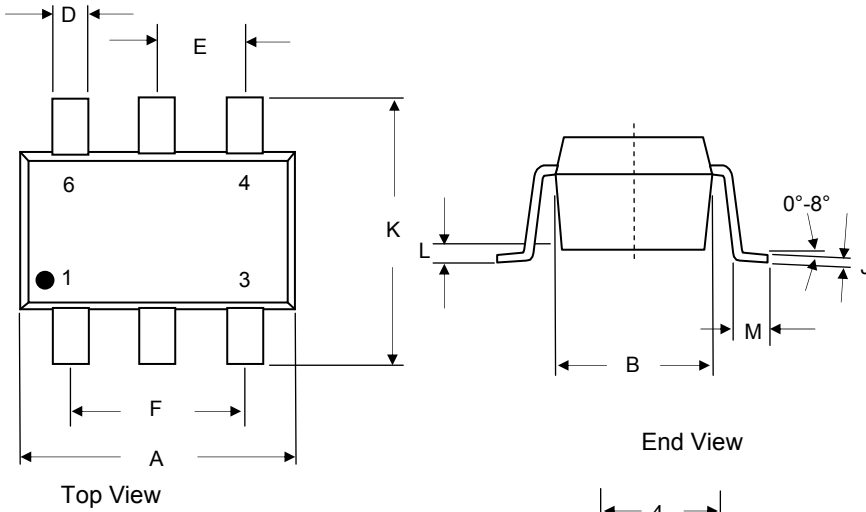


Test Circuit. 5. Off-Isolation and Crosstalk

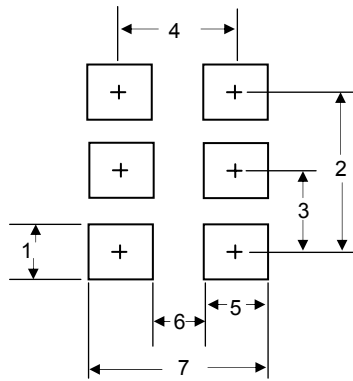
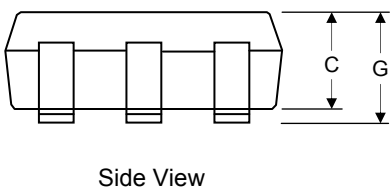


Test Circuit. 6. Bandwidth

Package Outline and Dimensions SC70-6 Lead



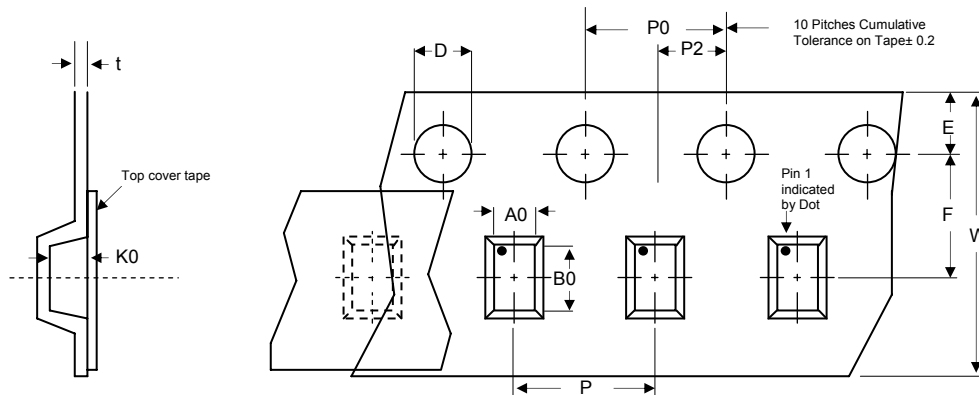
Dim	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.90	2.15	0.074	0.084
B	1.15	1.35	0.045	0.055
C	0.80	1.00	0.031	0.040
D	0.15	0.30	0.006	0.012
E	0.65 BSC		0.0255 BSC	
F	1.30 BSC		0.0512 BSC	
G	0.80	1.10	0.031	0.043
J	0.08	0.25	0.003	0.010
K	2.00	2.20	0.078	0.086
L	0	0.10	0	0.004
M	0.26	0.46	0.010	0.018



LAND PATTERN		
1	0.50	0.020
2	1.30	0.051
3	0.65	0.026
4	1.72	0.068
5	0.60	0.024
6	1.11	0.044
7	2.33	0.092

Tape and Reel Specifications (Dimensions in mm)

Reel Dia	A0	B0	K0	D	E	F	W	P0	P2	P	t-max
178 (7")	2.25±0.10	2.34±0.10	1.22±0.10	1.50±0.10	1.75±0.10	3.50±0.05	8.00±0.30	4.00±0.10	2.00±0.05	4.00±0.10	0.25



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