

Features

- Low Voltage Operation: 1.8V to 5.5V
- RON is typically 4.5Ω at 5V
- Low On-Resistance Flatness
- -3dB Bandwidth: 300MHz
- Rail-to-Rail Input and Output Operation
- Typical Power Consumption (<0.01μW)
- TTL/CMOS Compatible
- -40° to +85°C Operating Temperature Range
- Lead (Pb) Free TSSOP-16 Package

Applications

- Cell Phones
- PDAs
- MP3 players
- Portable Instrumentation
- Computer Peripherals
- Speaker Headset Switching
- Relay Replacement
- Audio and Video Signal Routing
- PCMCIA Card

Pin Designation

Pin No.	Name	Description
1	IN	Logic Control
2	NC1	Normally Closed Terminal SW1
3	NO1	Normally Open Terminal SW1
4	COM1	Common Terminal SW1
5	NC2	Normally Closed Terminal SW2
6	NO2	Normally Open Terminal SW2
7	COM2	Common Terminal SW2
8	GND	Ground
9	COM3	Common Terminal SW3
10	NO3	Normally Open Terminal SW3
11	NC3	Normally Closed Terminal SW3
12	COM4	Common Terminal SW4
13	NO4	Normally Open Terminal SW4
14	NC4	Normally Closed Terminal SW4
15	/EN	Digital Enable Input
16	VCC	Power Input

Description

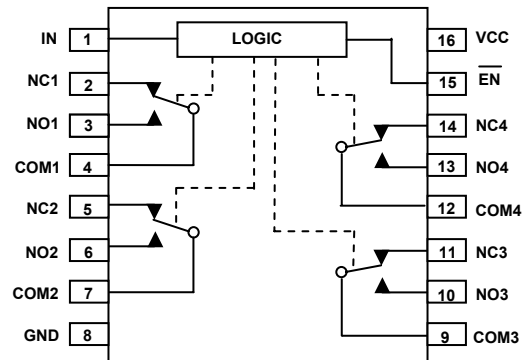
The PA2018 is a high-speed, low voltage, quad single-pole double-throw (SPDT) CMOS analog switch that is designed to operate from a single +1.8V to +5.5V power supply.

PA2018 features guaranteed on-resistance of 4.5Ω, on-resistance matching 3.6Ω between switches and guaranteed on-resistance flatness over signal range typical 3Ω. This ensures excellent linearity and low distortion when switching audio signals.

Fast switching speed, coupled with high signal bandwidth of 300MHz, also makes the parts suitable for video signal switching. CMOS process ensures ultra low power dissipation, making the parts ideally suited for portable and battery powered devices.

PA2018 is available in Pb-free TSSOP-16 package.

Functional Diagram



PA2018 – TSSOP 16

Function Table

EN	IN	NO	NC
L	L	OFF	ON
L	H	ON	OFF
H	x	All switches open	

x = Don't Care

Ordering Information

Temperature Range	Package	Part Number
-40 to 85°C	TSSOP-16	PA2018-T7

Absolute Maximum Ratings⁽¹⁾

Supply Voltage VCC	.....	-0.3V to 6V
DC Switch Voltage (VS) ⁽²⁾	-0.3V to VCC +0.3V
DC Input Voltage (VIN) ⁽²⁾	-0.5V to 4.6V
Continuous Current NO_NC_COM	.....	±100mA
Storage Temperature Range (TSTG)	.....	-65°C to +150°C
Junction Temperature under Bias (TJ)	.....	150°C
Junction Lead Temperature (TL)	.....
(Soldering, 10 seconds)	.....	260°C
Power Dissipation (PD) @ +85°C	.....	250mW

Notes:

1. "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.
2. The input and output negative voltage ratings may be exceeded if the input and output diode current ratings are observed.
3. Control input must be held HIGH or LOW; it must not float.

Electrical Characteristics

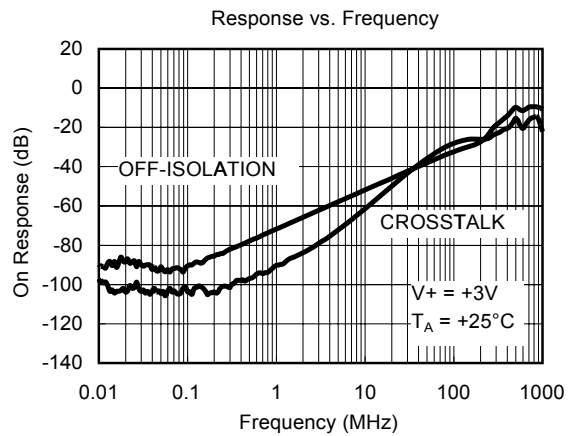
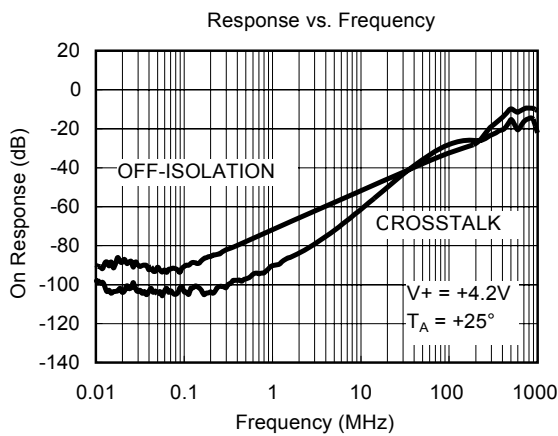
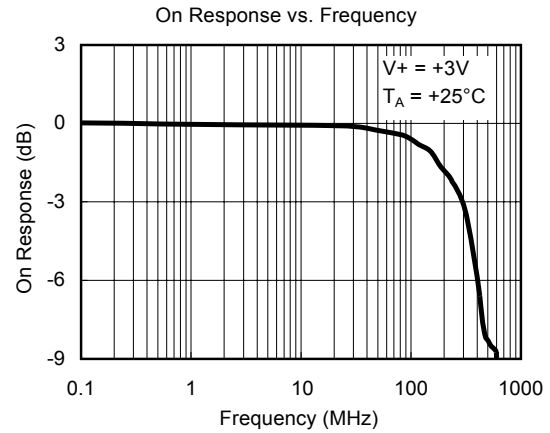
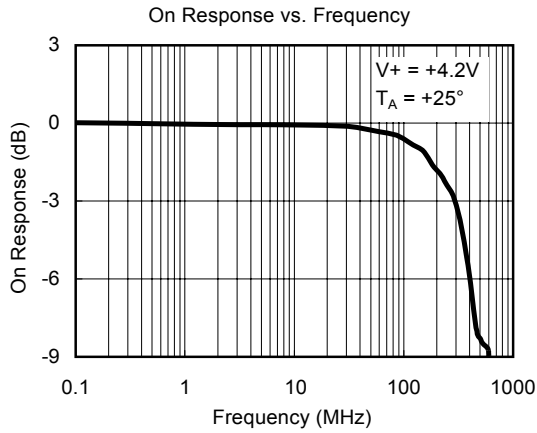
(V₊ = +2.7V to +3.6V, GND = 0V, V_{IH} = +1.6V, V_{IL} = +0.5V, T_A = -40° to +85°C. Typical values are at V₊ = +5.0V, T_A = +25°C, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
ANALOG SWITCH							
Analog Signal Range	V _{NO} , V _{NC} , V _{COM}		-40°C to +85°C	0		V ₊	V
On-Resistance	R _{ON}	V ₊ = 2.7V, V _{NO} or V _{NC} = 1.2V, I _{COM} = -100mA,	+25°C		11	15.5	Ω
			-40°C to +85°C			18.5	Ω
On-Resistance Match Between Channels	ΔR _{ON}	V ₊ = 2.7V, V _{NO} or V _{NC} = 1.2V, I _{COM} = -100mA,	+25°C		1.6	4	Ω
			-40°C to +85°C			4.6	Ω
On-Resistance Flatness	R _{FLAT(ON)}	V ₊ = 2.7V, V _{NO} or V _{NC} = 1.2V, 4.5V, I _{COM} = -100mA,	+25°C		7	9.4	Ω
			-40°C to +85°C			13	Ω
Source OFF Leakage Current	I _{NC(OFF)} , I _{NO(OFF)}	V ₊ = 3.6V, V _{NO} or V _{NC} = 3.3V / 0.3V, V _{COM} = 0.3V / 3.3V	-40°C to +85°C			1	μA
Channel ON Leakage Current	I _{NC(ON)} , I _{NO(ON)} , I _{COM(ON)}	V ₊ = 3.6V, V _{COM} = 0.3V / 3.3V, V _{NO} or V _{NC} = 0.3V / 3.3V, or floating	-40°C to +85°C			1	μA
DIGITAL INPUTS							
Input High Voltage	V _{INH}		-40°C to +85°C	1.5			V
Input Low Voltage	V _{INL}		-40°C to +85°C			0.4	V
Input Leakage Current	I _{IN}	V ₊ = 5.5V, V _{IN} = 0V or 3.6V	-40°C to +85°C			1	μA
DYNAMIC CHARACTERISTICS							
Turn-On Time	t _{ON}	V _{NO} or V _{NC} = 2V, C _L = 35pF, R _L = 300Ω, See Fig.1	+25°C		48		ns
Turn-Off Time	t _{OFF}		+25°C		45		ns
Break-Before-Make Time Delay	t _D	V _{NO} or V _{NC} = 2V, R _L = 300Ω, C _L = 35pF, See Fig.3	+25°C		20		ns
Off Isolation	O _{ISO}	R _L = 50Ω, f = 10MHz, V _{BIAS} = 350mV, Signal = 0dBm, See Fig.5	1MHz	+25°C		-70	dB
			10MHz	+25°C		-50	dB
Channel-to-Channel Crosstalk	X _{TALK}	R _L = 50Ω, f = 10MHz, V _{BIAS} = 350 mV, Signal = 0dBm, See Fig.6	1MHz	+25°C		-90	dB
			10MHz	+25°C		-60	dB
-3dB Bandwidth	BW	R _L = 50Ω, Signal = 0dBm, V _{BIAS} = 350mV, Test Circuit7	+25°C		300		MHz
Charge Injection Select Input to Common I/O	Q	V _G = GND, R _G = 0Ω, Q = C _L x V _{OUT} , C _L = 1nF, See Fig.4	+25°C		20		pC
Channel ON Capacitance	C _{ON}	See Fig.8	+25°C		42		pF

Electrical characteristics
(V₊ = +4.5V to +5.5V, GND = 0V, V_{IH} = +1.6V, V_{IL} = +0.5V, T_A = -40° to +85°C. Typical values are at V₊ = +5.0V, T_A = +25°C, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
ANALOG SWITCH							
Analog Signal Range	V _{NO} , V _{NC} , V _{COM}		-40°C to +85°C	0		V ₊	V
On-Resistance	R _{ON}	V ₊ = 4.5V, V _{NO} or V _{NC} = 1.2V, I _{COM} = -100mA,	+25°C		4.5	7	Ω
			-40°C to +85°C			8	Ω
On-Resistance Match Between Channels	ΔR _{ON}	V ₊ = 4.5V, V _{NO} or V _{NC} = 1.2V, I _{COM} = -100mA,	+25°C		0.8	3.6	Ω
			-40°C to +85°C			4.2	Ω
On-Resistance Flatness	R _{FLAT(ON)}	V ₊ = 4.5V, V _{NO} or V _{NC} = 1.2V, 4.5V, I _{COM} = -100mA,	+25°C		3	3.7	Ω
			-40°C to +85°C			4.5	Ω
Source OFF Leakage Current	I _{NC(OFF)} , I _{NO(OFF)}	V ₊ = 5.5V, V _{NO} or V _{NC} = 3.3V/ 0.3V, V _{COM} = 0.3V/ 3.3V	-40°C to +85°C			1	μA
Channel ON Leakage Current	I _{NC(ON)} , I _{NO(ON)} , I _{COM(ON)}	V ₊ = 5.5V, V _{COM} = 0.3V/ 3.3V, V _{NO} or V _{NC} = 0.3V/ 3.3V, or floating	-40°C to +85°C			1	μA
DIGITAL INPUTS							
Input High Voltage	V _{INH}		-40°C to +85°C	1.6			V
Input Low Voltage	V _{INL}		-40°C to +85°C			0.5	V
Input Leakage Current	I _{IN}	V ₊ = 5.5V, V _{IN} = 0V or 5.5V	-40°C to +85°C			1	μA
DYNAMIC CHARACTERISTICS							
Turn-On Time	t _{ON}	V _{NO} or V _{NC} = 2V, C _L = 35pF, R _L = 300Ω, See Fig. 1	+25°C		40		ns
Turn-Off Time	t _{OFF}		+25°C		30		ns
Break-Before-Make Time Delay	t _D	V _{NO} or V _{NC} = 3V, R _L = 300Ω, C _L = 35pF, See Fig. 3	+25°C		18		ns
Off Isolation	O _{ISO}	R _L = 50Ω, f = 10MHz, V _{BIAS} = 350mV, Signal = 0dBm, See Fig. 5	1MHz	+25°C		-70	dB
			10MHz	+25°C		-50	dB
Channel-to-Channel Crosstalk	X _{TALK}	R _L = 50Ω, f = 10MHz, V _{BIAS} = 350mV, Signal = 0dBm, See Fig. 6	1MHz	+25°C		-90	dB
			10MHz	+25°C		-60	dB
-3dB Bandwidth	BW	R _L = 50Ω, Signal = 0dBm, V _{BIAS} = 350mV, See Fig. 9	+25°C		300		MHz
Charge Injection Select Input to Common I/O	Q	V _G = GND, R _G = 0Ω, Q = C _L x V _{OUT} , C _L = 1nF, See Fig. 4	+25°C		20		pC
Channel ON Capacitance	C _{ON}	See Fig. 8	+25°C		42		pF
POWER REQUIREMENTS							
Power Supply Range	V ₊		-40°C to +85°C	1.8		5.5	V
Power Supply Current	I ₊	V ₊ = 5.5V, V _{IN} = 0V or V ₊	-40°C to +85°C			1	μA

Typical Performance Characteristics.



Test Circuits and Timing Diagrams

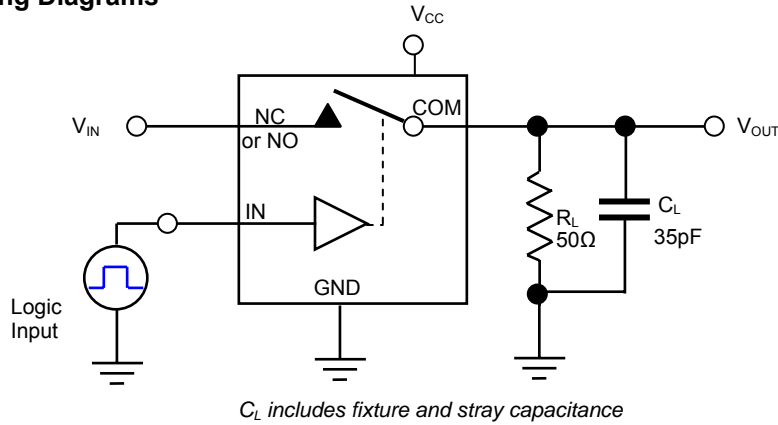
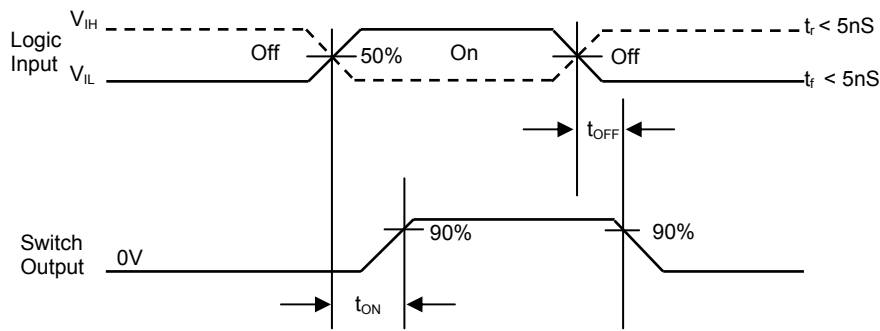


Fig. 1. AC Test Circuit

Note1. Unused Input (NO or NC) must be grounded



Logic Input Waveforms inverted for Switches that have opposite logic

Fig.2 AC Waveforms

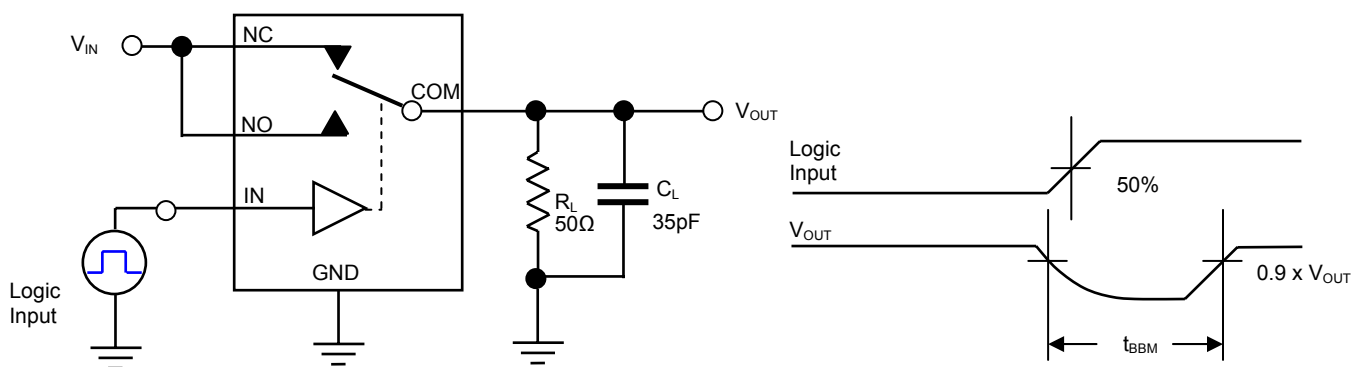


Fig. 3. Break Before Make Interval Timing

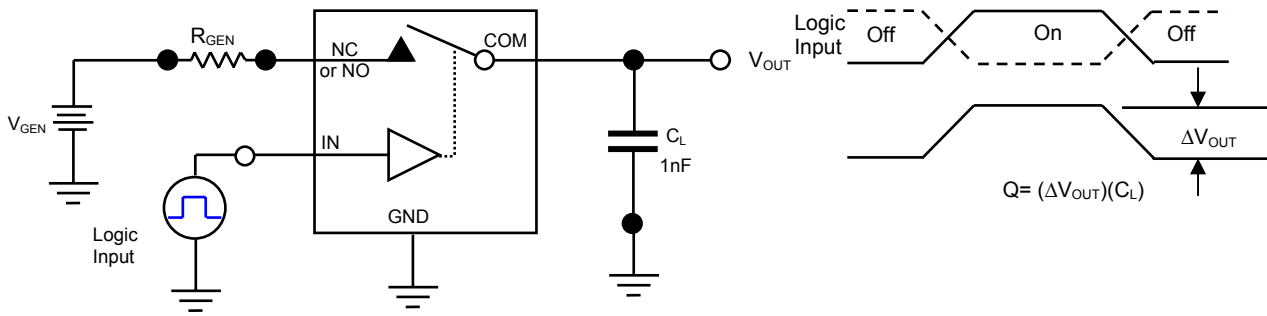


Fig. 4. Charge Injection Test

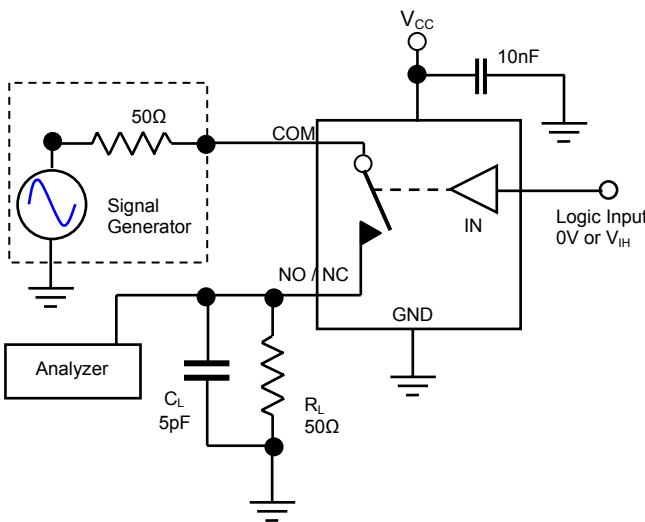


Fig.5. Off Isolation

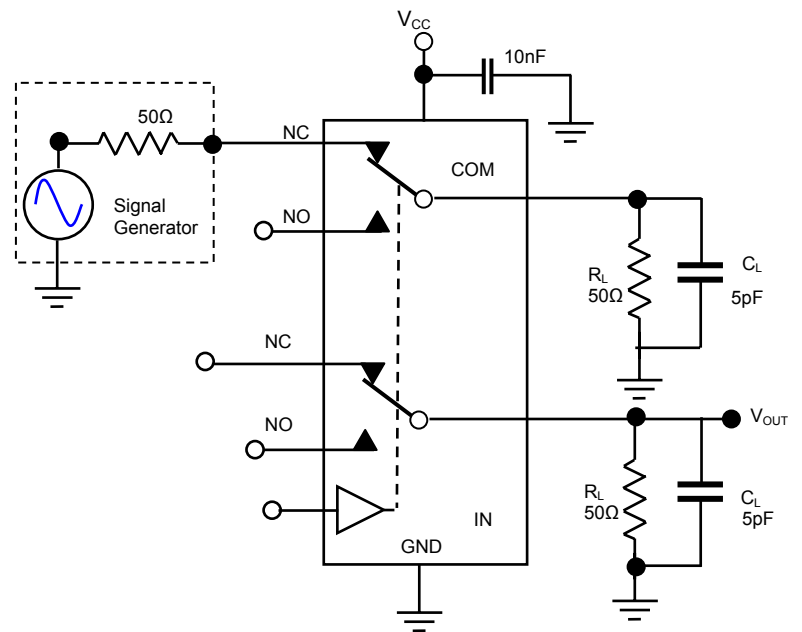


Fig. 6. Channel to Channel Crosstalk =

$$-20 \log \frac{V_{NO \text{ or } V_{NC}}}{V_{OUT}}$$

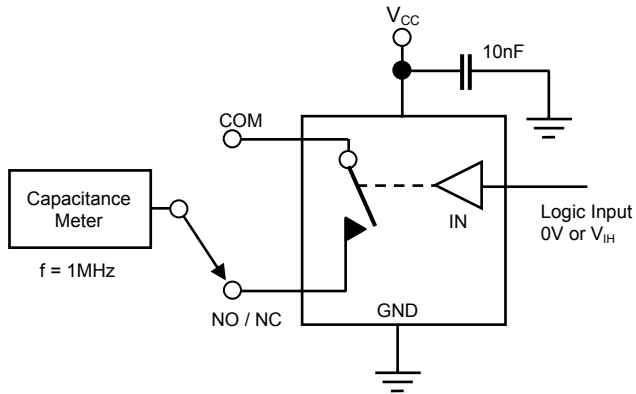


Fig. 7. Channel, Off Capacitance

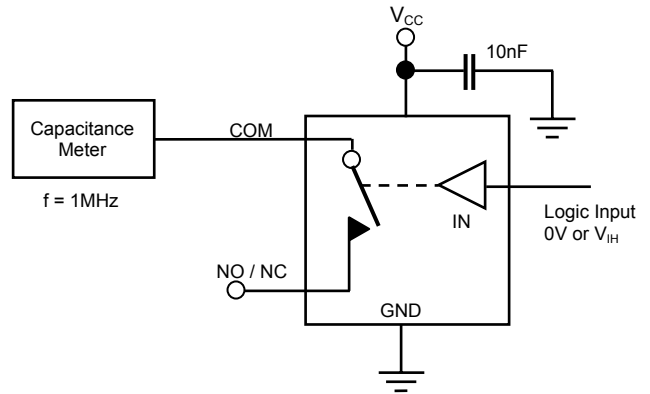


Fig. 8. Channel, On Capacitance

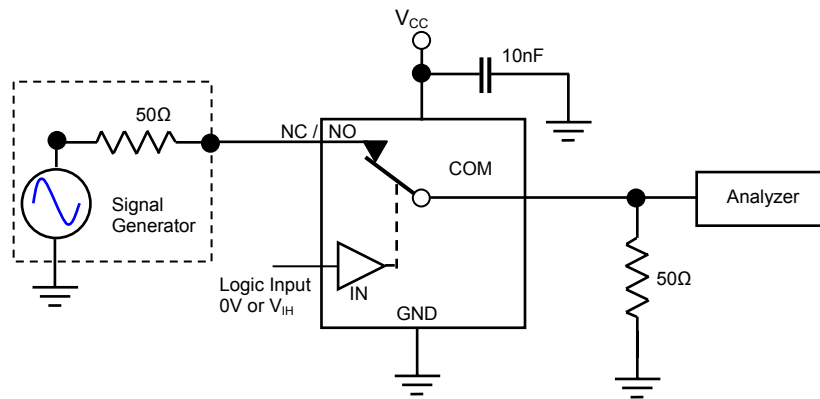
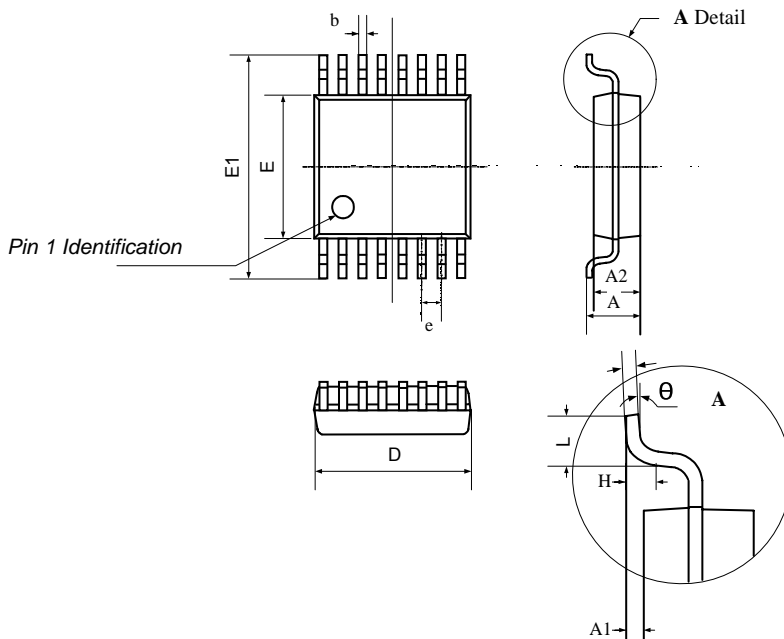


Fig. 9. Bandwidth

Package Layout and Dimensions
TSSOP-16


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
D	4.900	5.100	0.193	0.201
E	4.300	4.500	0.169	0.177
b	0.190	0.300	0.007	0.012
C	0.090	0.200	0.004	0.008
E1	6.250	6.550	0.246	0.258
A		1.100		0.043
A2	0.800	1.000	0.031	0.039
A1	0.020	0.150	0.001	0.006
e	0.65 (BSC)		0.026 (BSC)	
L	0.500	0.700	0.020	0.028
H	0.25(TYP)		0.01(TYP)	
θ	1°	7°	1°	7°

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