

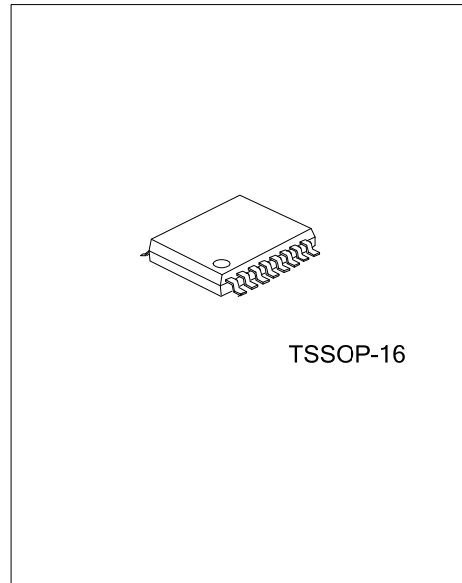


U74HC4851

Preliminary

CMOS IC

8-CHANNEL ANALOG MULTIPLEXER/DEMULTIPLEX ER WITH INJECTION-CURRENT EFFECT CONTROL



DESCRIPTION

The **U74HC4851** contains an 8-channel analog multiplexer/demultiplexer with injection-current effect control. which has excellent value in automotive applications where voltages in excess of normal supply voltages are common.

The injection-current effect control allows signals at disabled analog input channels to exceed the supply voltage without affecting the signal of the enabled analog channel. This eliminates the need for external diode/resistor networks typically used to keep the analog channel signals within the supply-voltage range.

FEATURES

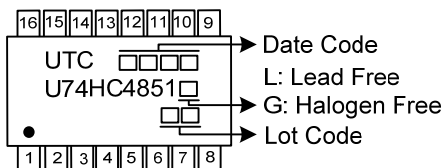
- * Injection-Current cross coupling < 1mV/mA
- * Low crosstalk between switches
- * 2V to 6V V_{CC} Operation

ORDERING INFORMATION

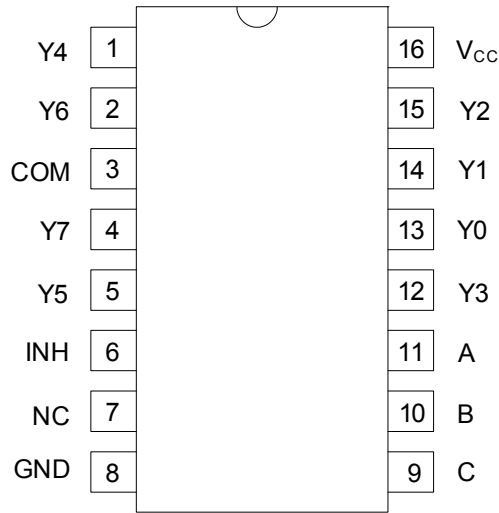
Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74HC4851L-P16-R	U74HC4851G-P16-R	TSSOP-16	Tape Reel

<p>U74HC4851G-P16-R</p>	<p>(1) R: Tape Reel (2) P16: TSSOP-16 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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MARKING



■ PIN CONFIGURATION

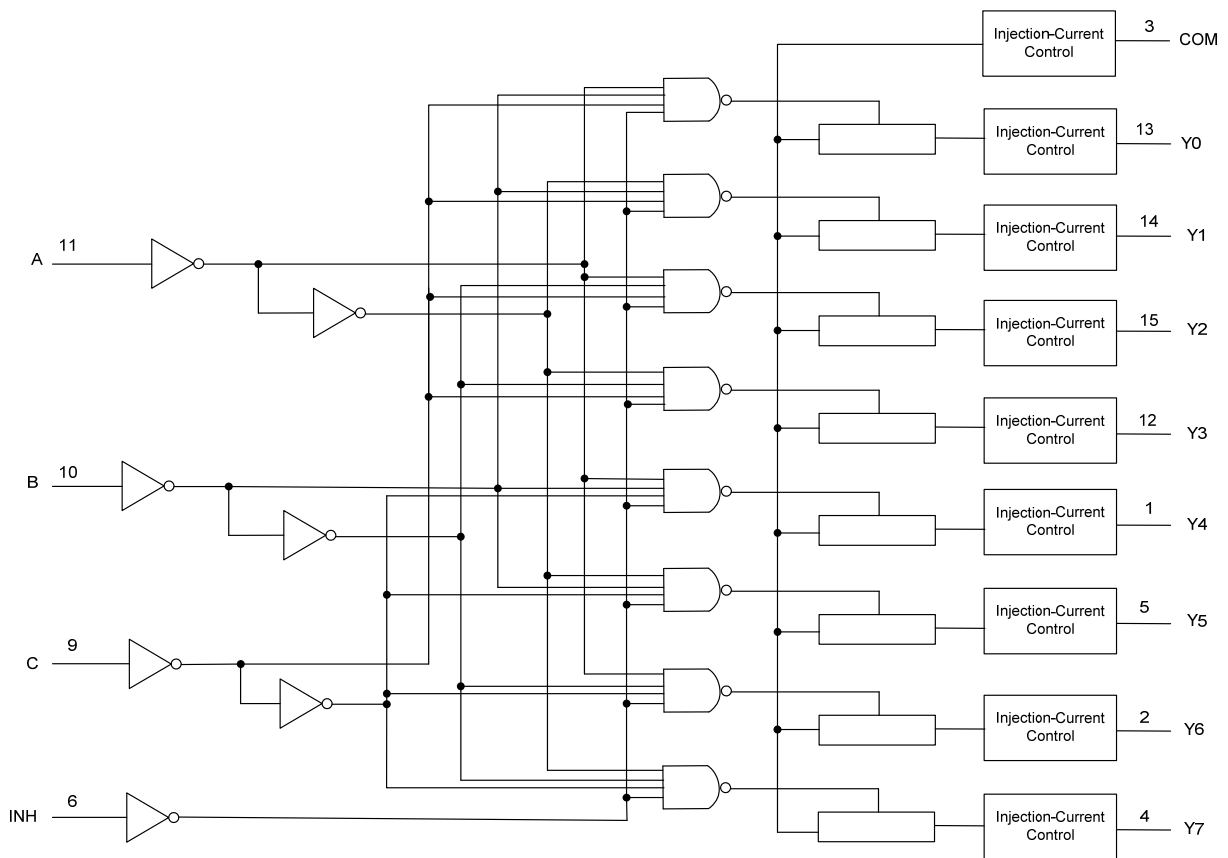


■ FUNCTION TABLE

INPUTS(INH)	INPUTS(C)	INPUTS(B)	OUTPUT(A)	ON CHANNEL
L	L	L	L	Y0
L	L	L	H	Y1
L	L	H	L	Y2
L	L	H	H	Y3
L	H	L	L	Y4
L	H	L	H	Y5
L	H	H	L	Y6
L	H	H	H	Y7
H	X	X	X	None

Note: H: HIGH Voltage Level L: LOW Voltage Level X: Don' Care

■ LOGIC DIAGRAM



■ ABSOLUTE MAXIMUM RATING ($T_A=25^{\circ}\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{CC}	-0.5 ~ 7	V
Input Voltage	V_{IN}	-0.5 ~ $V_{CC}+0.5$	V
Output Voltage	V_{OUT}	-0.5 ~ $V_{CC}+0.5$	V
Input Clamp Current ($V_{IN}<0$, or $V_{IN}>V_{DD}$)	I_{IK}	± 20	mA
Output Clamp Current	I_{OK}	± 20	mA
Continuous VCC or GND Current	I_{CC}	± 50	mA
Switch Through Current	I_T	± 25	mA
Storage Temperature	T_{STG}	-65 ~ +150	$^{\circ}\text{C}$

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

2. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	CONDITIONS	MIN	TPY	MAX	UNIT
Supply Voltage	V_{CC}		2		6	V
Input High Voltage	V_{IH}	$V_{CC}=2\text{V}$	1.5			V
		$V_{CC}=3\text{V}$	2.1			V
		$V_{CC}=3.3\text{V}$	2.3			V
		$V_{CC}=4.5\text{V}$	3.15			V
		$V_{CC}=6\text{V}$	4.2			V
Input Low Voltage	V_{IL}	$V_{CC}=2\text{V}$			0.5	V
		$V_{CC}=3\text{V}$			0.9	V
		$V_{CC}=3.3\text{V}$			1	V
		$V_{CC}=4.5\text{V}$			1.35	V
		$V_{CC}=6\text{V}$			1.8	V
Control Input Voltage	V_I		0		V_{CC}	V
Input/Output Voltage	V_{IO}		0		V_{CC}	V
Input-Pulse Rise and Fall Time	t_r / t_f	$V_{CC}=2\text{V}$			1000	ns
		$V_{CC}=3\text{V}$			800	ns
		$V_{CC}=3.3\text{V}$			700	ns
		$V_{CC}=4.5\text{V}$			500	ns
		$V_{CC}=6\text{V}$			400	ns
Operating Temperature	T_A		-40		+125	$^{\circ}\text{C}$

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	110	$^{\circ}\text{C}/\text{W}$

■ ELECTRICAL CHARACTERISTICS (T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
"ON" Resistance	R _{ON}	I _T ≤2mA, V _I =V _{CC} to GND, V _{INH} =V _{IL}	V _{CC} =2V		500	650	Ω
			V _{CC} =3V		215	280	Ω
			V _{CC} =3.3V		210	270	Ω
			V _{CC} =4.5V		160	210	Ω
			V _{CC} =6V		150	195	Ω
"ON" Resistance Between Any 2 of 4 Switches	ΔR _{ON}	I _T ≤2mA, V _I =V _{CC} /2, V _{INH} =V _{IL}	V _{CC} =2V		4	10	Ω
			V _{CC} =3V		2	8	Ω
			V _{CC} =3.3V		2	8	Ω
			V _{CC} =4.5V		2	8	Ω
			V _{CC} =6V		3	9	Ω
Supply Current	I _{CC}	V _{IN} =V _{CC} or GND	V _{CC} =6V		2	μA	
Control Input Current	I _I	V _{IN} =V _{CC} or GND	V _{CC} =6V		±0.1	μA	
Off-State Switch Leakage Current (Any One Channel)	I _{IS(OFF)}	V _I =V _{CC} to GND, V _{INH} =V _{IL}	V _{CC} =6V		±0.1	μA	
Off-State Switch Leakage Current (Common Channel)		V _I =V _{CC} to GND, V _{INH} =V _{IL}	V _{CC} =6V		±0.2	μA	
On-State Switch Leakage Current	I _{IS(ON)}	V _I =V _{CC} to GND, V _{INH} =V _{IL}	V _{CC} =6V		±0.1	μA	
Control Input Capacitance	C _{IN}	A, B, C, INH		3.5	10	pF	
Signal Input Capacitance	C _{IS}	Switch Off		22	40	pF	
Signal Output Capacitance	C _{OS}	Switch Off		6.7	15	pF	

■ SWITCHING CHARACTERISTICS (T_A=25°C, Input t_r / t_f=20ns, C_L=50pF, R_L=200kΩ)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TPY	MAX	UNIT
Propagation Delay Time, Input(COM or Yn) to Output(Yn or COM)	t _{PLH} / t _{PHL}	V _{CC} =2V		19.5	25	ns
		V _{CC} =3V		12	15.5	ns
		V _{CC} =3.3V		11	14.5	ns
		V _{CC} =4.5V		8.6	11.5	ns
		V _{CC} =6V		8	10	ns
Propagation Delay Time, Input(Channel select) to Output(COM or Yn)	t _{PLH} / t _{PHL}	V _{CC} =2V		23	30	ns
		V _{CC} =3V		13.5	17.5	ns
		V _{CC} =3.3V		12.5	16.5	ns
		V _{CC} =4.5V		10	13	ns
		V _{CC} =6V		9.5	12.5	ns
Enable Delay Time, Input(INH) to Output(COM or Yn)	t _{PZH} / t _{PZL}	V _{CC} =2V			95	ns
		V _{CC} =3V			90	ns
		V _{CC} =3.3V			85	ns
		V _{CC} =4.5V			80	ns
		V _{CC} =6V			78	ns
Disable Delay Time, Input(INH) to Output(COM or Yn)	t _{PHZ} / t _{PLZ}	V _{CC} =2V			95	ns
		V _{CC} =3V			90	ns
		V _{CC} =3.3V			85	ns
		V _{CC} =4.5V			80	ns
		V _{CC} =6V			78	ns

■ OPERATING CHARACTERISTICS (T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	C _{PD}	V _{CC} =3.3V	No Load		32	pF
		V _{CC} =5V			37	pF

■ TEST CIRCUIT AND WAVEFORMS

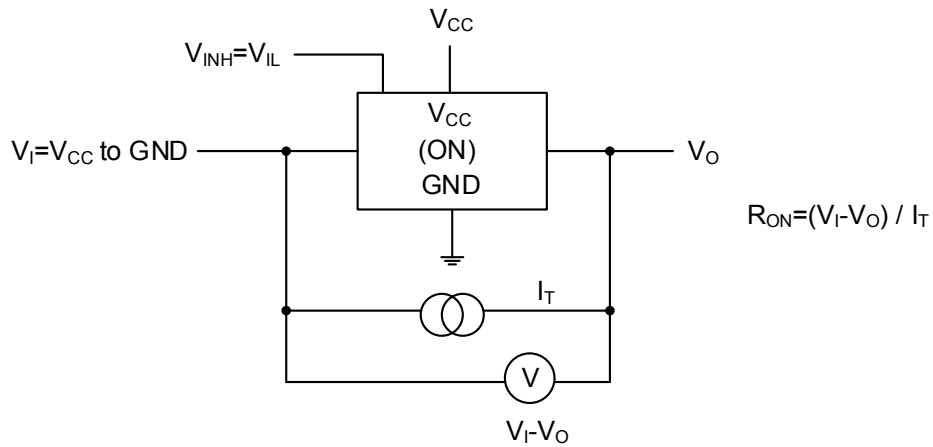


Fig. 1 On-State-Resistance Test Circuit

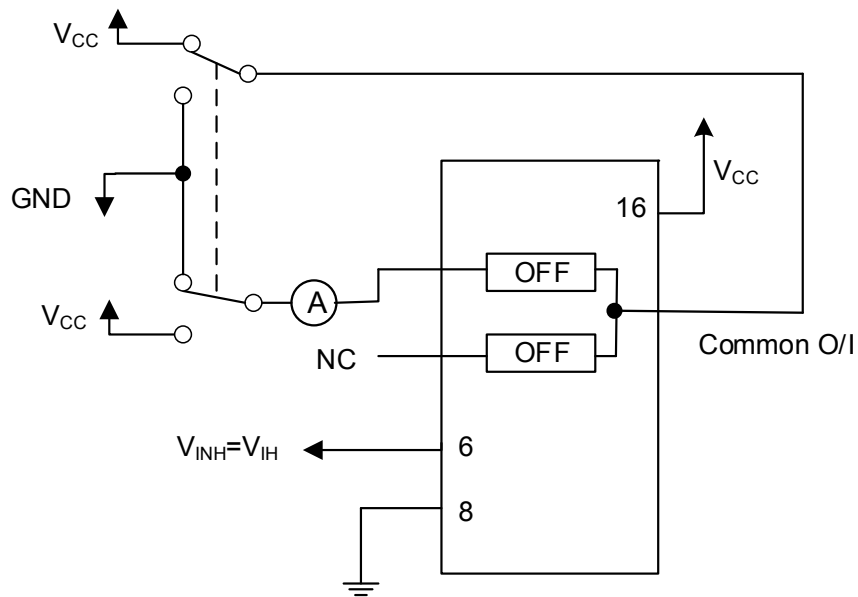


Fig. 2 Maximum Off-Channel Leakage Current, Any One Channel, Test Setup

■ TEST CIRCUIT AND WAVEFORMS (Cont.)

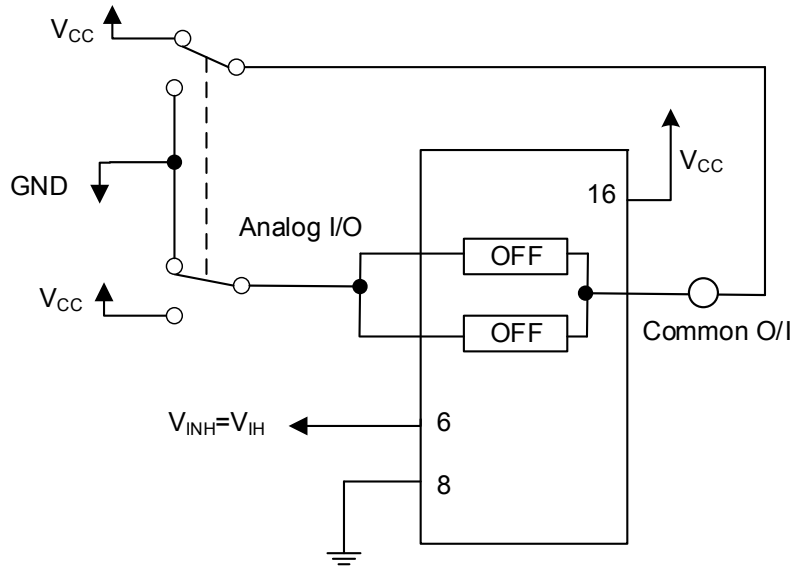


Fig. 3 Maximum Off-Channel Leakage Current, Common Channel, Test Setup

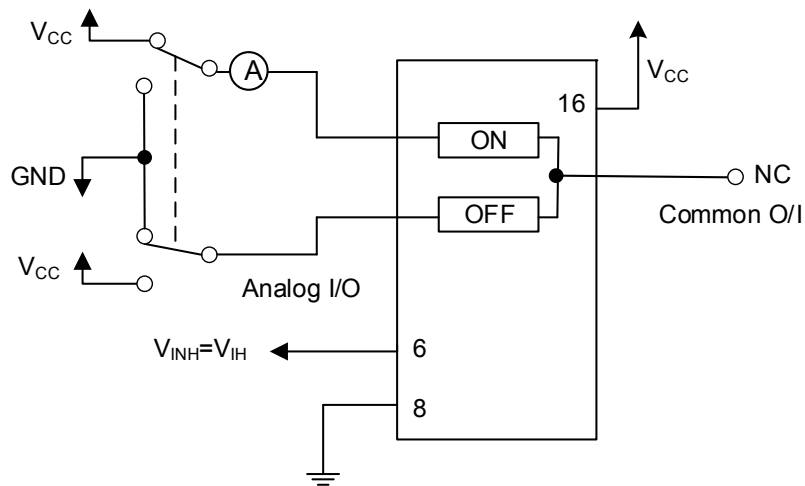


Fig. 4 Maximum On-Channel Leakage Current, Channel To Channel, Test Setup

■ TEST CIRCUIT AND WAVEFORMS (Cont.)

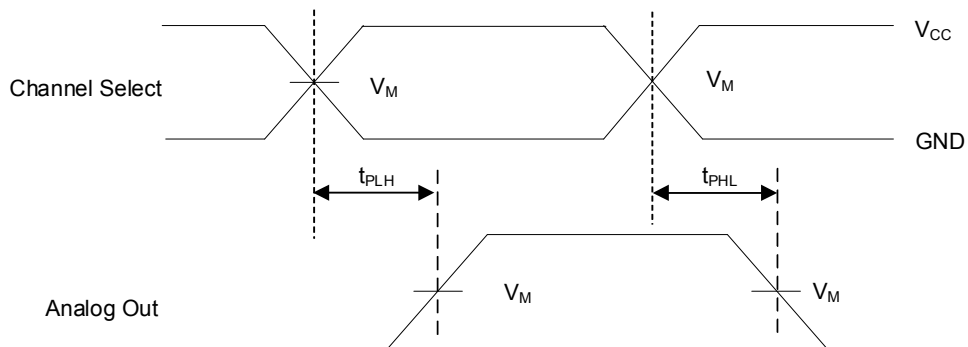


Fig. 5 Propagation Delays, Channel Select to Analog Out

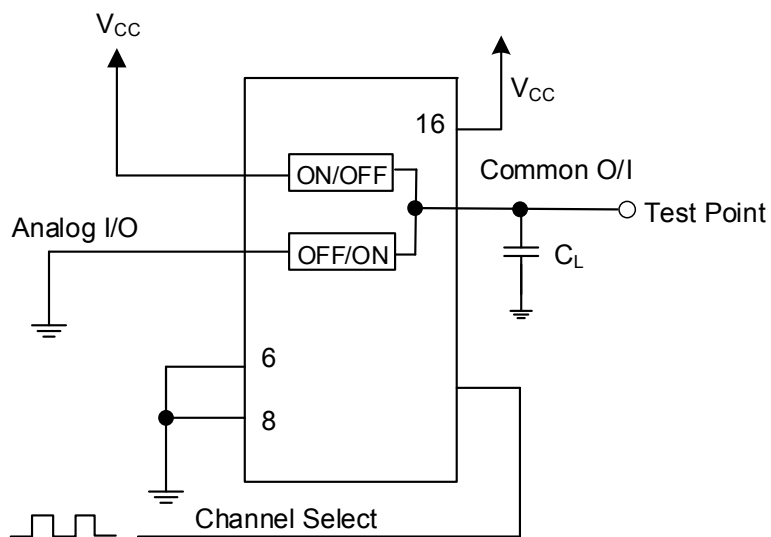
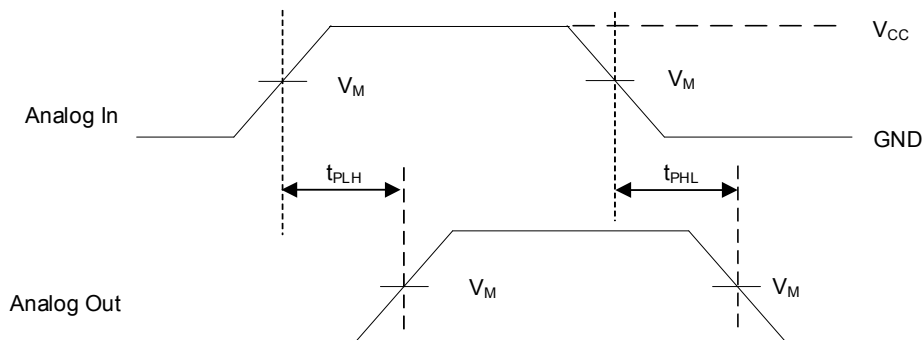


Fig. 6 Propagation-Delay Test Setup, Channel Select to Analog Out



■ TEST CIRCUIT AND WAVEFORMS (Cont.)

Fig. 7 Propagation Delays, Analog In to Analog Out

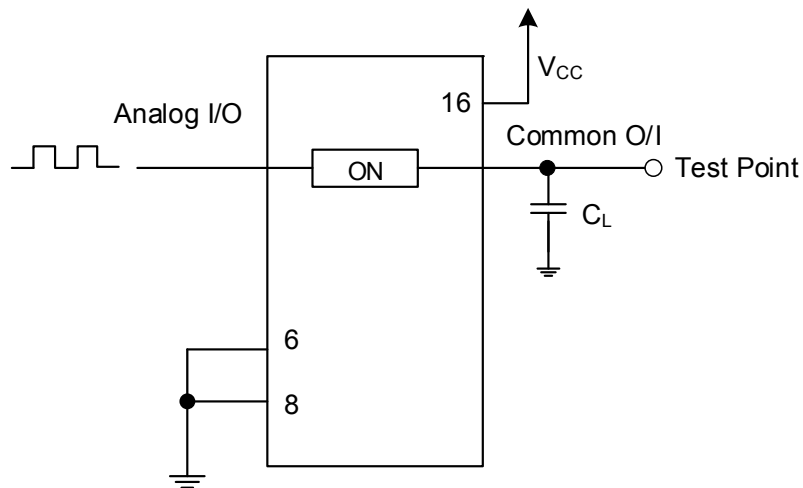


Fig. 8 Propagation-Delay Test Setup, Analog In to Analog Out

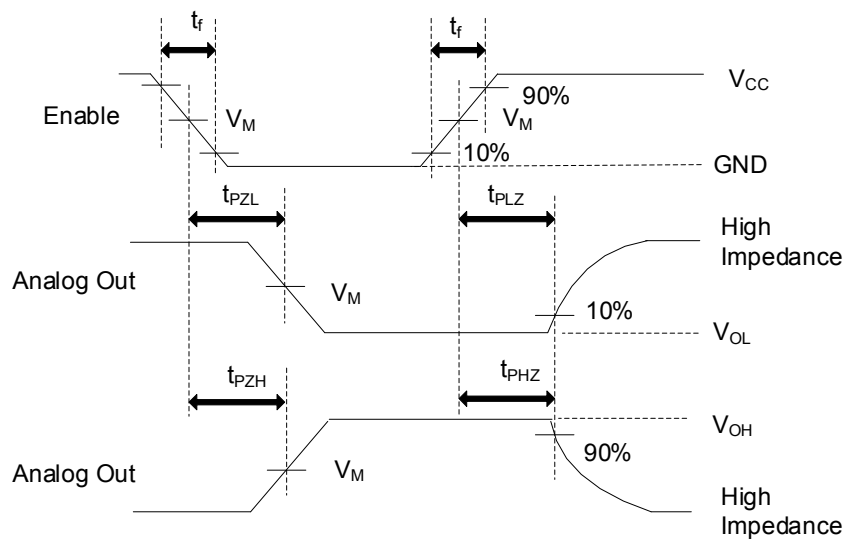


Fig. 9 Propagation Delays, Enable to Analog Out

■ TEST CIRCUIT AND WAVEFORMS (Cont.)

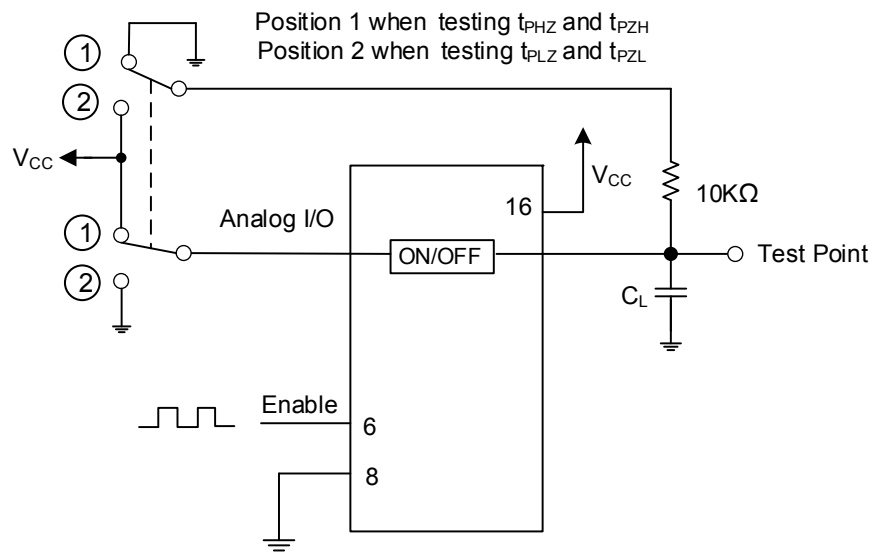


Fig. 10 Propagation-Delay Test Setup, Enable to Analog Out

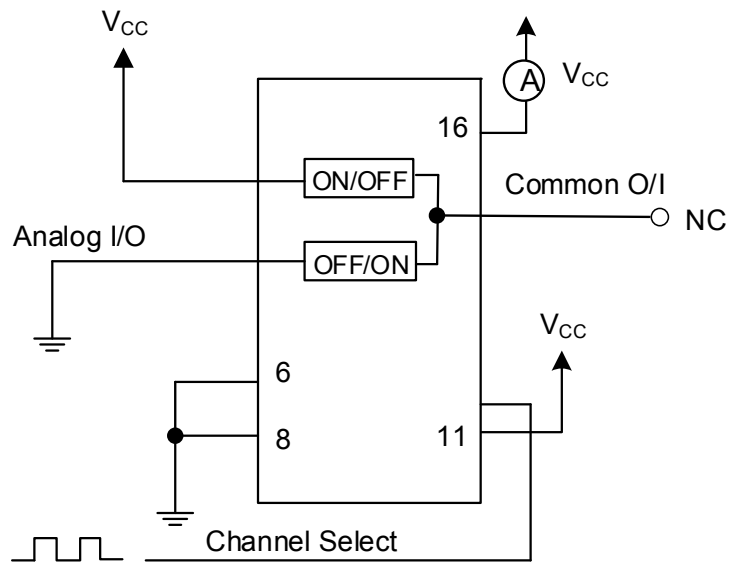


Fig. 11 Power-Dissipation Capacitance Test Setup

Notes: 1. C_L includes probe and jig capacitance.

2. All input pulses are supplied by generators having the following characteristics: PRR \leq 1MHz, $Z_o = 50\Omega$.

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