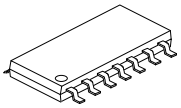
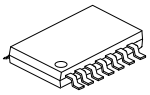
U74AHC4066

CMOS IC

QUADRUPLE BILATERAL ANALOG SWITCH



SOP-14



TSSOP-14

■ DESCRIPTION

The **U74AHC4066** is a quadruple bilateral analog switch which has 4 channels.

■ FEATURES

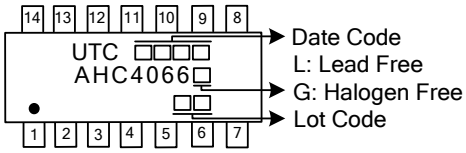
* Operate From 2V to 5.5V
* Max t_{PD} of 7ns at 5 V
* Low Power Dissipation: I_{CC}=20μA(Max)
* Low Input Current: $I_{I(L)}$=1μA(Max)

■ ORDERING INFORMATION

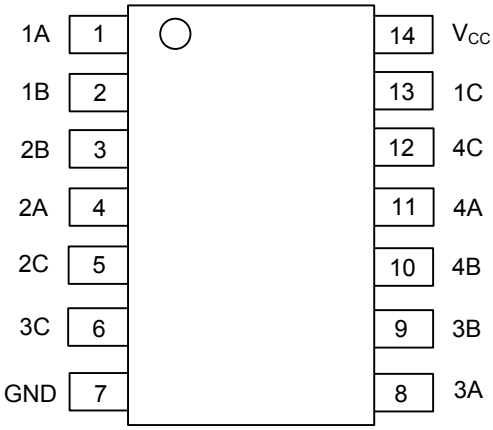
Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74AHC4066L-S14-R	U74AHC4066G-S14-R	SOP-14	Tape Reel
U74AHC4066L-P14-R	U74AHC4066G-P14-R	TSSOP-14	Tape Reel

U74AHC4066G-S14-R (1) Packing Type (2) Package Type (3) Green Package	(1) R: Tape Reel (2) S14: SOP-14, P14: TSSOP-14 (3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



■ PIN CONFIGURATION

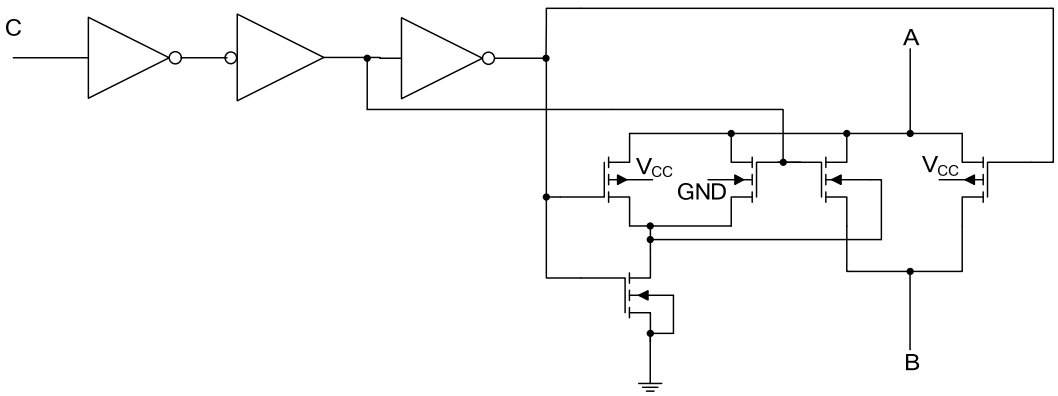


■ FUNCTION TABLE

INPUTS CONTROL (C)	SWITCH
H	ON
L	OFF

Note: H: HIGH voltage level;
L: LOW voltage level.

■ LOGIC DIAGRAM



One Of Four Switches

■ ABSOLUTE MAXIMUM RATING (T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{CC}	-0.5 ~ +7	V
Input Voltage	V_{IN}	-0.5 ~ +7	V
Switch I/O Voltage	V_{IO}	-0.5 ~ V_{CC} +0.5	V
V_{CC} or GND Current	I_{CC}	±50	mA
Output Clamp Current	I_{OK}	±50	mA
Input Clamp Current	I_{IK}	-20	mA
On-State Switch Current	I_T	±25	mA
Operating Temperature	T_{OPR}	-40 ~ + 85	°C
Storage Temperature	T_{STG}	-65 ~ + 150	°C

Note: 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.

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	SOP-14	θ_{JA}	86	°C/W
	TSSOP-14		113	°C/W

Note: The package thermal impedance is calculated in accordance with JESD 51-7.

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V_{CC}		2		5.5	V
High-Level Input Voltage	V_{IH}	V_{CC}=2V	1.5			V
		V_{CC}=2.3V to 2.7V	V_{CC} x 0.7			
		V_{CC}=3V to 3.6V	V_{CC} x 0.7			
		V_{CC}=4.5V to 5.5V	V_{CC} x 0.7			
Low-Level Input Voltage	V_{IL}	V_{CC}=2V			0.5	V
		V_{CC}=2.3V to 2.7V			V_{CC} x 0.3	
		V_{CC}=3V to 3.6V			V_{CC} x 0.3	
		V_{CC}=4.5V to 5.5V			V_{CC} x 0.3	
Input Voltage	V_{IN}		0		5.5	V
Output Voltage	V_{OUT}		0		V_{CC}	V
Input Transition Rise or Fall Rate	t_R / t_F	V_{CC}=2.3V to 2.7V			200	ns/V
		V_{CC}=3V to 3.6V			100	
		V_{CC}=4.5V to 5.5V			20	

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

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
On-state Switch Resistance	R_{ON}	I_T=-1mA, V_{IN}=GND or V_{CC}, V_C= V_{IH}	V_{CC}=2.3V		38	180	Ω
			V_{CC}=3V		29	150	
			V_{CC}=4.5V		21	75	
Peak On-state Resistance	$R_{ON(P)}$	I_T=-1mA, V_{IN}=GND to V_{CC}, V_C= V_{IH}	V_{CC}=2.3V		143	500	Ω
			V_{CC}=3V		57	180	
			V_{CC}=4.5V		31	100	
Difference In On-state Resistance Between Switches	ΔR_{ON}	I_T=-1mA, V_{IN}=GND to V_{CC}, V_C= V_{IH}	V_{CC}=2.3V		6	30	Ω
			V_{CC}=3V		3	20	
			V_{CC}=4.5V		2	15	
Control Input Current	$I_{I(CTL)}$	V_{CC}=0 to 5.5V, V_C= 5.5V or GND				±0.1	μA
On-state Switch Leakage Current	$I_{S(ON)}$	V_{CC}=5.5V, V_{IN}= V_{CC} or GND, V_C= V_{IH}				±0.1	μA
Off-state Switch Leakage Current	$I_{S(OFF)}$	V_{CC}=5.5V, V_{IN}= V_{CC} and V_O=GND, or V_{IN}=GND and V_O= V_{CC}, V_C= V_{IL}				±0.1	μA
Quiescent Supply Current	I_Q	V_{CC}=5.5V, V_C=V_{CC} or GND				2	μA
Control Input Capacitance	C_{IC}				1.5		pF
Feed-through Capacitance	C_F				0.5		pF
Switch Input/Output Capacitance	C_{IO}				5.5		pF

■ SWITCHING CHARACTERISTICS (T_A=25°C, see test circuit and waveforms)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Propagation Delay Time, From A to B Or B to A	t_{PLH}/t_{PHL}	C_L =15pF	V_{CC}=2.5V±0.2V		1.2	10	ns
			V_{CC}=3.3V±0.3V		0.8	6	
			V_{CC}=5V±0.5V		0.3	4	
Propagation Delay Time, From A to B Or B to A	t_{PLH}/t_{PHL}	C_L =50pF	V_{CC}=2.5V±0.2V		2.6	12	ns
			V_{CC}=3.3V±0.3V		1.5	9	
			V_{CC}=5V±0.5V		0.6	6	
Switch Turn-on Time, From C to A or B	t_{PZL}/t_{PZH}	C_L =15pF	V_{CC}=2.5V±0.2V		3.3	15	ns
			V_{CC}=3.3V±0.3V		2.3	11	
			V_{CC}=5V±0.5V		1.6	7	
Switch Turn-on Time, From C to A or B	t_{PZL}/t_{PZH}	C_L =50pF	V_{CC}=2.5V±0.2V		4.2	25	ns
			V_{CC}=3.3V±0.3V		3	18	
			V_{CC}=5V±0.5V		2.1	12	
Switch Turn-off Time, From C to A or B	t_{PLZ}/t_{PHZ}	C_L =15pF	V_{CC}=2.5V±0.2V		6	15	ns
			V_{CC}=3.3V±0.3V		4.5	11	
			V_{CC}=5V±0.5V		3.2	7	
Switch Turn-off Time, From C to A or B	t_{PLZ}/t_{PHZ}	C_L =50pF	V_{CC}=2.5V±0.2V		9.6	25	ns
			V_{CC}=3.3V±0.3V		7.2	18	
			V_{CC}=5V±0.5V		5.1	12	

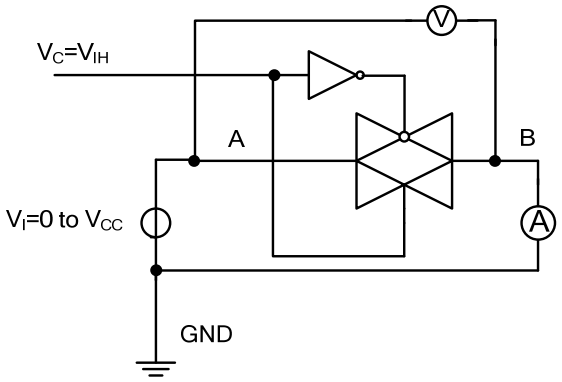
■ ANALOG SWITCHING CHARACTERISTICS (T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Frequency Response (Switch On), From A to B Or B to A		C_L= 50pF, R_L=600Ω, f_{IN}=1MHz, $20\log_{10}(V_O/V_I)$=-3dB	V_{CC}=2.3V		30		MHZ
			V_{CC}=3V		35		
			V_{CC}=4.5V		50		
Crosstalk (Between Any Switches), From A to B Or B to A		C_L= 50pF, R_L=600Ω, f_{IN}=1MHz	V_{CC}=2.3V		-45		dB
			V_{CC}=3V		-45		
			V_{CC}=4.5V		-45		
Crosstalk (Control Input To Signal Output), From C to A or B		C_L= 50pF, R_L=600Ω, f_{IN}=1MHz	V_{CC}=2.3V		15		mV
			V_{CC}=3V		20		
			V_{CC}=4.5V		50		
Feed-through Attenuation (Switch Off), From A to B Or B to A		C_L= 50pF, R_L=600Ω, f_{IN}=1MHz	V_{CC}=2.3V		-40		dB
			V_{CC}=3V		-40		
			V_{CC}=4.5V		-40		
Sine-wave Distortion		C_L= 50pF, R_L=10KΩ, f_{IN}=1KHz	V_{CC}=2.3V, V_I=2 V_{P-P}		0.1		%
			V_{CC}=3V, V_I=2.5 V_{P-P}		0.1		
			V_{CC}=4.5V, V_I=4 V_{P-P}		0.1		

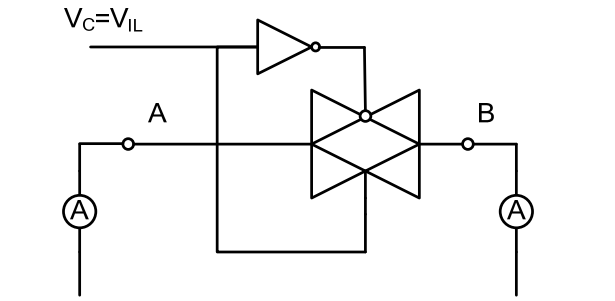
■ OPERATING CHARACTERISTICS (T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	C_{PD}	C_L =50pF,f=1MHz		4.5		pF

■ TEST CIRCUIT AND WAVEFORMS

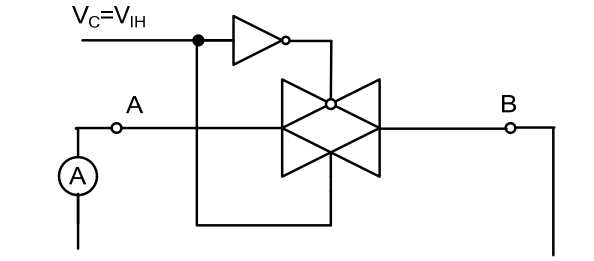


Test circuit for measuring ON-state resistance R_{ON}



V_I=V_{CC} or GND V_O=GND or V_{CC}

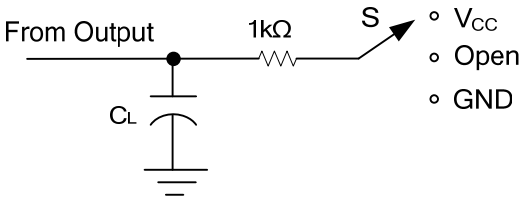
Test circuit for measuring OFF-state current



V_I=0 to V_{CC} V_O(open)

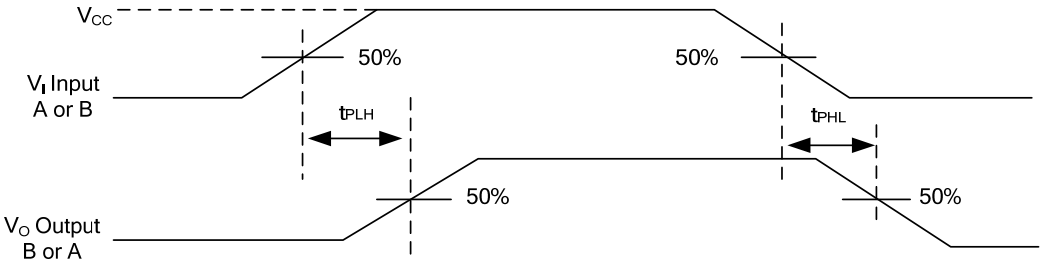
Test circuit for measuring ON-state current

■ TEST CIRCUIT AND WAVEFORMS(Cont.)

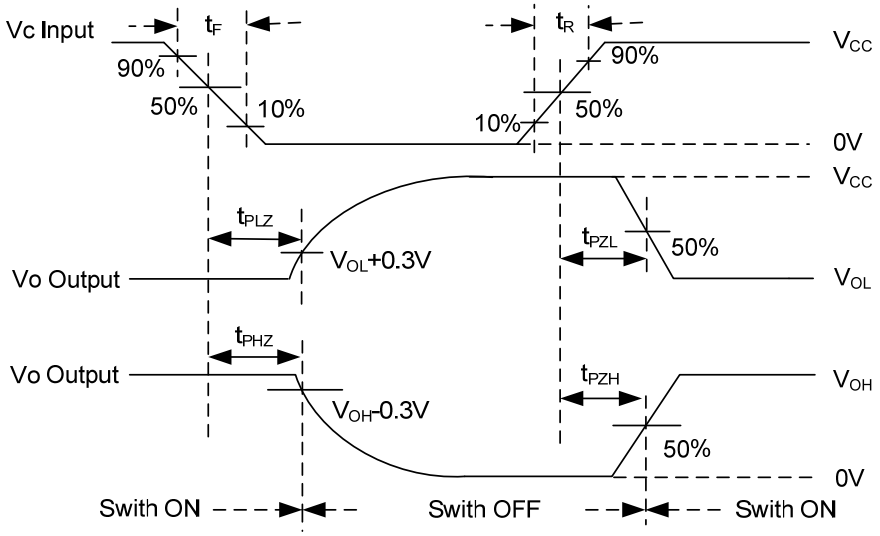


TEST	S	V_I
t_{PLH}/t_{PHL}	Open	Pulse
t_{PHZ}/t_{PZH}	GND	V_{CC}
t_{PLZ}/t_{PZL}	V_{CC}	GND

Test circuit for measuring propagation delay time, switching time



Waveforms showing the Input(V_I) to Output(V_O) propagation delays



Waveforms showing the turn-on and turn-off times

Note: C_L includes probe and jig capacitance.
All input pulses are supplied by generators having the following characteristics: PRR ≤1MHz, Zo = 50Ω, tr ⩽3ns, tf ⩽3ns.