



U74AHC4066

Preliminary

CMOS IC

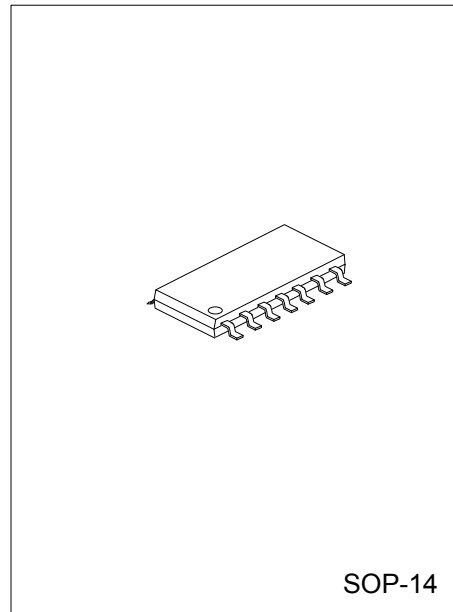
QUADRUPLE BILATERAL ANALOG SWITCH

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: $I_{CC}=20\mu A(\text{Max})$
- * Low Input Current: $I_{I(L)}=1\mu A(\text{Max})$

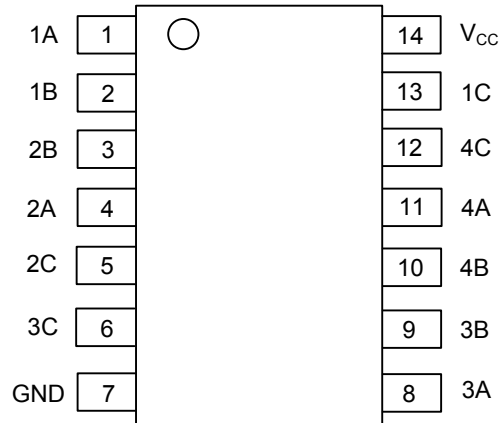


ORDERING INFORMATION

Ordering Number	Package	Packing
U74AHC4066G-S14-R	SOP-14	Tape Reel

<p>U74AHC4066G-S14-R</p> <p>(1) Packing Type (2) Package Type (3) Halogen Free</p>	<p>(1) R: Tape Reel (2) S14: SOP-14 (3) G: Halogen Free</p>
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■ PIN CONFIGURATION

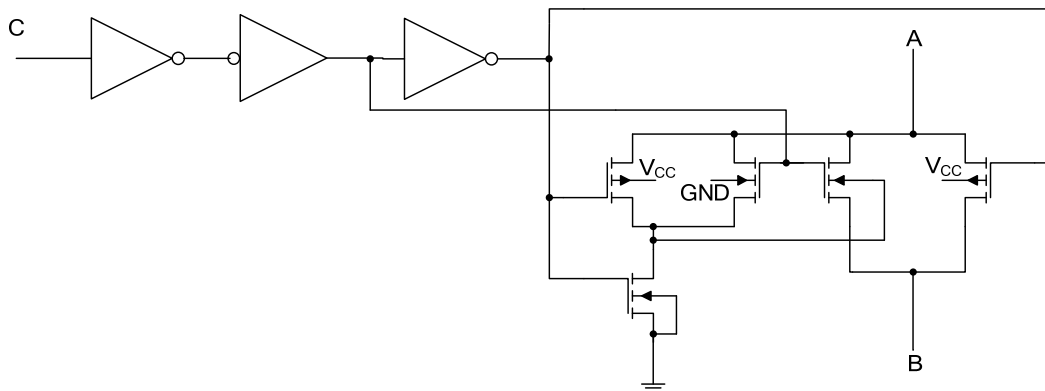


■ FUNCTION TABLE

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

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}	-40 ~ + 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	θ_{JA}	86	°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	$V_{CC} \times 0.7$			
		$V_{CC}=3V$ to 3.6V	$V_{CC} \times 0.7$			
		$V_{CC}=4.5V$ to 5.5V	$V_{CC} \times 0.7$			
Low-Level Input Voltage	V_{IL}	$V_{CC}=2V$			0.5	V
		$V_{CC}=2.3V$ to 2.7V			$V_{CC} \times 0.3$	
		$V_{CC}=3V$ to 3.6V			$V_{CC} \times 0.3$	
		$V_{CC}=4.5V$ to 5.5V			$V_{CC} \times 0.3$	
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 ($T_A=25^\circ C$, 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	

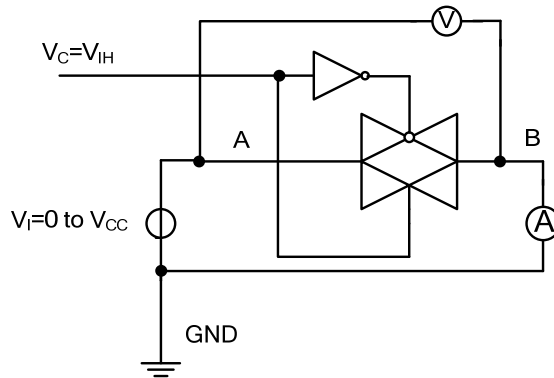
■ ANALOG SWITCHING CHARACTERISTICS (T_A=25°C)

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, 20log 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		

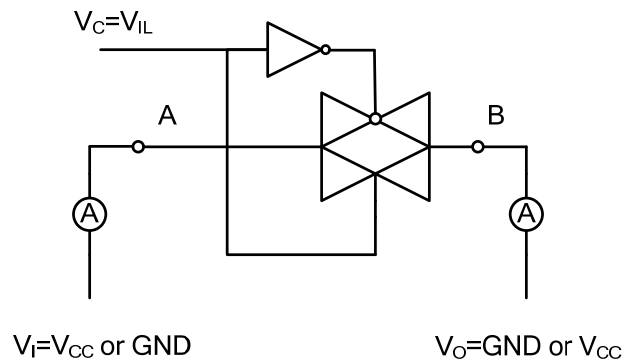
■ OPERATING CHARACTERISTICS(T_A=25°C)

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

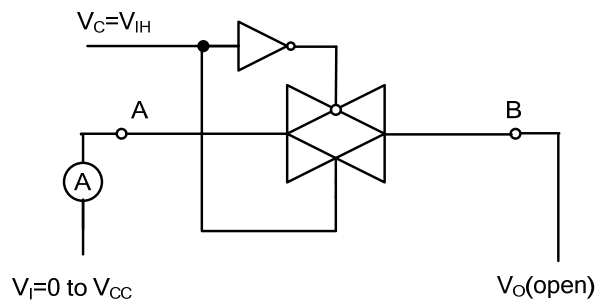
■ TEST CIRCUIT AND WAVEFORMS



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

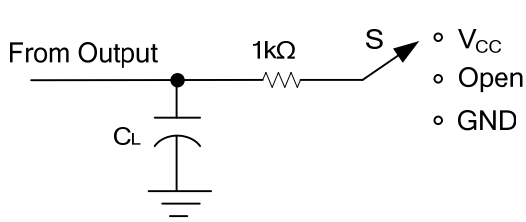


Test circuit for measuring OFF-state current



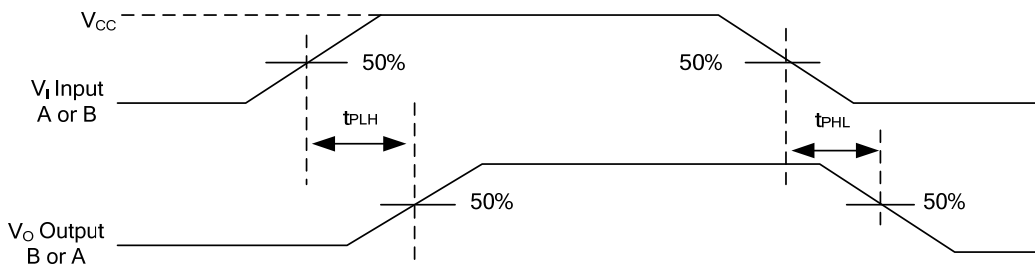
Test circuit for measuring ON-state current

■ TEST CIRCUIT AND WAVEFORMS(Cont.)

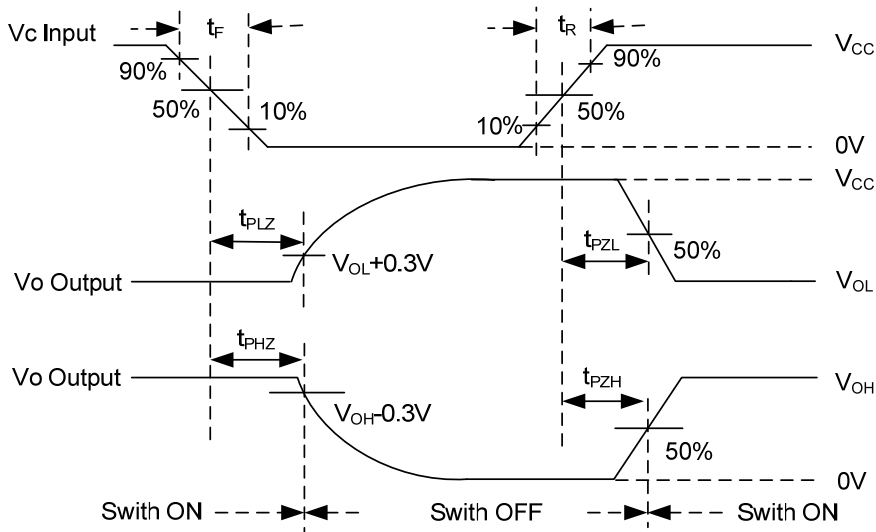


TEST	S	Vi
t_{PLH}/t_{PHL}	Open	Pulse
t_{PHZ}/t_{PZH}	GND	V_{CC}
t_{PLZ}/t_{PZL}	V_{CC}	GND

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 ≤ 1 MHz, $Z_o = 50\Omega$, $t_r \leq 3$ ns, $t_f \leq 3$ ns.

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