



## U74AHC4066

CMOS IC

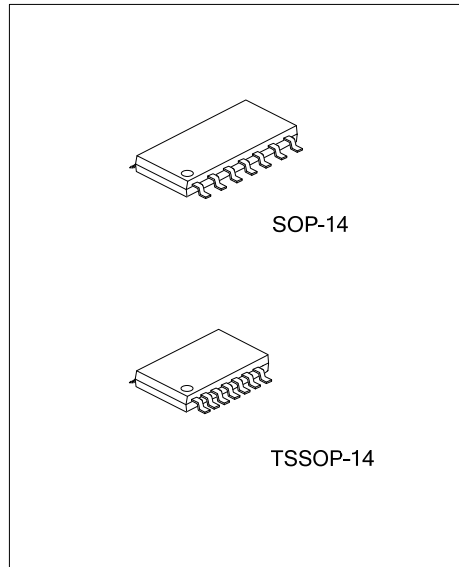
### QUADRUPLE BILATERAL ANALOG SWITCH

#### 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:  $I_{I(L)}=1\mu A(\text{Max})$

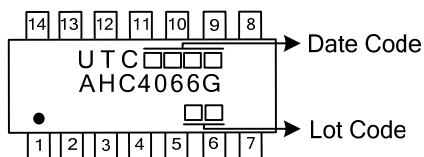


#### ORDERING INFORMATION

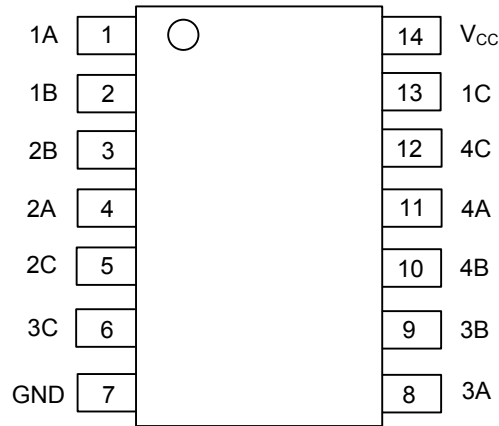
Ordering Number	Package	Packing
U74AHC4066G-S14-R	SOP-14	Tape Reel
U74AHC4066G-P14-R	TSSOP-14	Tape Reel

<p>U74AHC4066G-S14-R</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Green Package</p>	<p>(1) R: Tape Reel</p> <p>(2) S14: SOP-14, P14: TSSOP-14</p> <p>(3) G: Halogen Free and Lead Free</p>
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#### MARKING



■ PIN CONFIGURATION

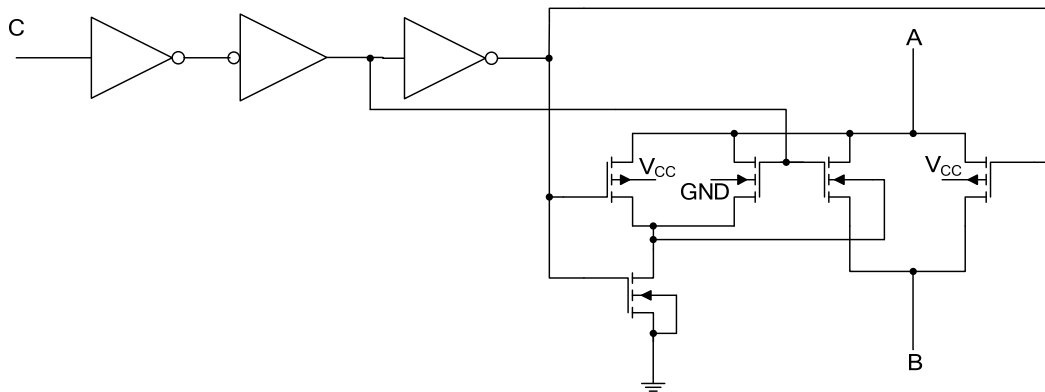


■ FUNCTION TABLE

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<sub>A</sub>=25°C, unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V <sub>CC</sub>	-0.5 ~ +7	V
Input Voltage	V <sub>IN</sub>	-0.5 ~ +7	V
Switch I/O Voltage	V <sub>IO</sub>	-0.5 ~ V <sub>CC</sub> +0.5	V
V <sub>CC</sub> or GND Current	I <sub>CC</sub>	±50	mA
Output Clamp Current	I <sub>OK</sub>	±50	mA
Input Clamp Current	I <sub>IK</sub>	-20	mA
On-State Switch Current	I <sub>T</sub>	±25	mA
Operating Temperature	T <sub>OPR</sub>	-40 ~ + 85	°C
Storage Temperature	T <sub>STG</sub>	-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	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 <sub>CC</sub>		2		5.5	V
High-Level Input Voltage	V <sub>IH</sub>	V <sub>CC</sub> =2V	1.5			V
		V <sub>CC</sub> =2.3V to 2.7V	V <sub>CC</sub> x 0.7			
		V <sub>CC</sub> =3V to 3.6V	V <sub>CC</sub> x 0.7			
		V <sub>CC</sub> =4.5V to 5.5V	V <sub>CC</sub> x 0.7			
Low-Level Input Voltage	V <sub>IL</sub>	V <sub>CC</sub> =2V			0.5	V
		V <sub>CC</sub> =2.3V to 2.7V			V <sub>CC</sub> x 0.3	
		V <sub>CC</sub> =3V to 3.6V			V <sub>CC</sub> x 0.3	
		V <sub>CC</sub> =4.5V to 5.5V			V <sub>CC</sub> x 0.3	
Input Voltage	V <sub>IN</sub>		0		5.5	V
Output Voltage	V <sub>OUT</sub>		0		V <sub>CC</sub>	V
Input Transition Rise or Fall Rate	t <sub>R</sub> / t <sub>F</sub>	V <sub>CC</sub> =2.3V to 2.7V			200	ns/V
		V <sub>CC</sub> =3V to 3.6V			100	
		V <sub>CC</sub> =4.5V to 5.5V			20	

■ ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
On-state Switch Resistance	R <sub>ON</sub>	I <sub>T</sub> =-1mA, V <sub>IN</sub> =GND or V <sub>CC</sub> , V <sub>C</sub> =V <sub>IH</sub>	V <sub>CC</sub> =2.3V	38	180	Ω
			V <sub>CC</sub> =3V	29	150	
			V <sub>CC</sub> =4.5V	21	75	
Peak On-state Resistance	R <sub>ON(P)</sub>	I <sub>T</sub> =-1mA, V <sub>IN</sub> =GND to V <sub>CC</sub> , V <sub>C</sub> =V <sub>IH</sub>	V <sub>CC</sub> =2.3V	143	500	Ω
			V <sub>CC</sub> =3V	57	180	
			V <sub>CC</sub> =4.5V	31	100	
Difference In On-state Resistance Between Switches	ΔR <sub>ON</sub>	I <sub>T</sub> =-1mA, V <sub>IN</sub> =GND to V <sub>CC</sub> , V <sub>C</sub> =V <sub>IH</sub>	V <sub>CC</sub> =2.3V	6	30	Ω
			V <sub>CC</sub> =3V	3	20	
			V <sub>CC</sub> =4.5V	2	15	
Control Input Current	I <sub>I(CTL)</sub>	V <sub>CC</sub> =0 to 5.5V, V <sub>C</sub> =5.5V or GND			±0.1	μA
On-state Switch Leakage Current	I <sub>S(ON)</sub>	V <sub>CC</sub> =5.5V, V <sub>IN</sub> =V <sub>CC</sub> or GND, V <sub>C</sub> =V <sub>IH</sub>			±0.1	μA
Off-state Switch Leakage Current	I <sub>S(OFF)</sub>	V <sub>CC</sub> =5.5V, V <sub>IN</sub> =V <sub>CC</sub> and V <sub>O</sub> =GND, or V <sub>IN</sub> =GND and V <sub>O</sub> =V <sub>CC</sub> , V <sub>C</sub> =V <sub>IL</sub>			±0.1	μA
Quiescent Supply Current	I <sub>Q</sub>	V <sub>CC</sub> =5.5V, V <sub>C</sub> =V <sub>CC</sub> or GND			2	μA
Control Input Capacitance	C <sub>IC</sub>			1.5		pF
Feed-through Capacitance	C <sub>F</sub>			0.5		pF
Switch Input/Output Capacitance	C <sub>IO</sub>			5.5		pF

■ SWITCHING CHARACTERISTICS (T<sub>A</sub>=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 <sub>PLH</sub> /t <sub>PHL</sub>	C <sub>L</sub> =15pF	V <sub>CC</sub> =2.5V±0.2V	1.2	10	ns
			V <sub>CC</sub> =3.3V±0.3V	0.8	6	
			V <sub>CC</sub> =5V±0.5V	0.3	4	
Propagation Delay Time, From A to B Or B to A	t <sub>PLH</sub> /t <sub>PHL</sub>	C <sub>L</sub> =50pF	V <sub>CC</sub> =2.5V±0.2V	2.6	12	ns
			V <sub>CC</sub> =3.3V±0.3V	1.5	9	
			V <sub>CC</sub> =5V±0.5V	0.6	6	
Switch Turn-on Time, From C to A or B	t <sub>PZL</sub> /t <sub>PZH</sub>	C <sub>L</sub> =15pF	V <sub>CC</sub> =2.5V±0.2V	3.3	15	ns
			V <sub>CC</sub> =3.3V±0.3V	2.3	11	
			V <sub>CC</sub> =5V±0.5V	1.6	7	
Switch Turn-on Time, From C to A or B	t <sub>PZL</sub> /t <sub>PZH</sub>	C <sub>L</sub> =50pF	V <sub>CC</sub> =2.5V±0.2V	4.2	25	ns
			V <sub>CC</sub> =3.3V±0.3V	3	18	
			V <sub>CC</sub> =5V±0.5V	2.1	12	
Switch Turn-off Time, From C to A or B	t <sub>PLZ</sub> /t <sub>PHZ</sub>	C <sub>L</sub> =15pF	V <sub>CC</sub> =2.5V±0.2V	6	15	ns
			V <sub>CC</sub> =3.3V±0.3V	4.5	11	
			V <sub>CC</sub> =5V±0.5V	3.2	7	
Switch Turn-off Time, From C to A or B	t <sub>PLZ</sub> /t <sub>PHZ</sub>	C <sub>L</sub> =50pF	V <sub>CC</sub> =2.5V±0.2V	9.6	25	ns
			V <sub>CC</sub> =3.3V±0.3V	7.2	18	
			V <sub>CC</sub> =5V±0.5V	5.1	12	

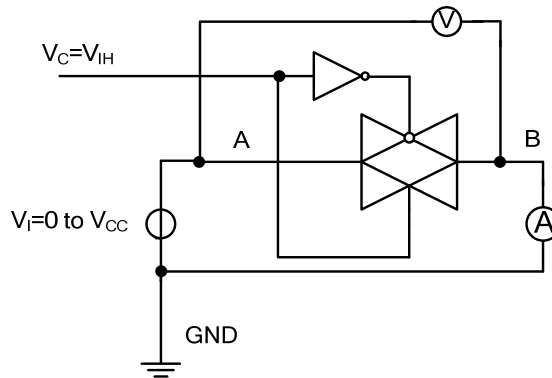
■ ANALOG SWITCHING CHARACTERISTICS (T<sub>A</sub>=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Frequency Response (Switch On), From A to B Or B to A		C <sub>L</sub> = 50pF, R <sub>L</sub> = 600Ω, f <sub>IN</sub> = 1MHz, 20log <sub>10</sub> (V <sub>O</sub> /V <sub>I</sub> ) = -3dB	V <sub>CC</sub> = 2.3V	30		MHZ
			V <sub>CC</sub> = 3V	35		
			V <sub>CC</sub> = 4.5V	50		
Crosstalk (Between Any Switches), From A to B Or B to A		C <sub>L</sub> = 50pF, R <sub>L</sub> = 600Ω, f <sub>IN</sub> = 1MHz	V <sub>CC</sub> = 2.3V	-45		dB
			V <sub>CC</sub> = 3V	-45		
			V <sub>CC</sub> = 4.5V	-45		
Crosstalk (Control Input To Signal Output), From C to A or B		C <sub>L</sub> = 50pF, R <sub>L</sub> = 600Ω, f <sub>IN</sub> = 1MHz	V <sub>CC</sub> = 2.3V	15		mV
			V <sub>CC</sub> = 3V	20		
			V <sub>CC</sub> = 4.5V	50		
Feed-through Attenuation (Switch Off), From A to B Or B to A		C <sub>L</sub> = 50pF, R <sub>L</sub> = 600Ω, f <sub>IN</sub> = 1MHz	V <sub>CC</sub> = 2.3V	-40		dB
			V <sub>CC</sub> = 3V	-40		
			V <sub>CC</sub> = 4.5V	-40		
Sine-wave Distortion		C <sub>L</sub> = 50pF, R <sub>L</sub> = 10KΩ, f <sub>IN</sub> = 1KHz	V <sub>CC</sub> = 2.3V, V <sub>I</sub> = 2 V <sub>P-P</sub>	0.1		%
			V <sub>CC</sub> = 3V, V <sub>I</sub> = 2.5 V <sub>P-P</sub>	0.1		
			V <sub>CC</sub> = 4.5V, V <sub>I</sub> = 4 V <sub>P-P</sub>	0.1		

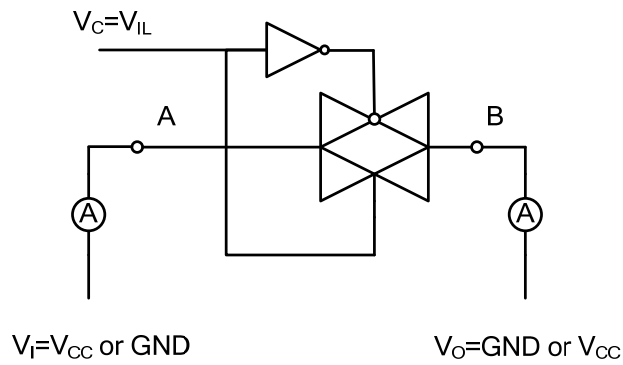
■ OPERATING CHARACTERISTICS (T<sub>A</sub>=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	C <sub>PD</sub>	C <sub>L</sub> = 50pF, f = 1MHz		4.5		pF

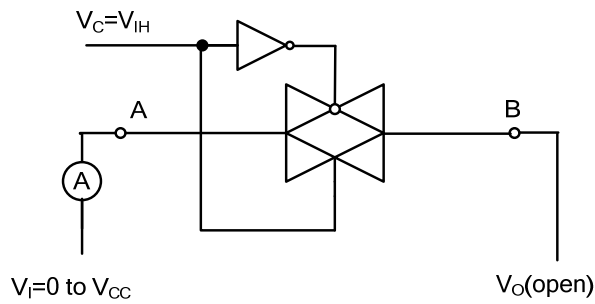
■ TEST CIRCUIT AND WAVEFORMS



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

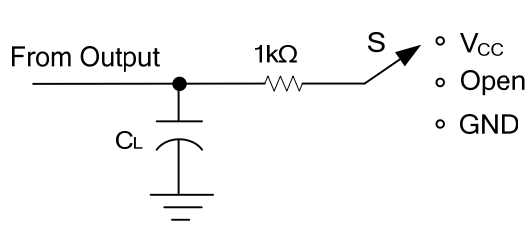


Test circuit for measuring OFF-state current



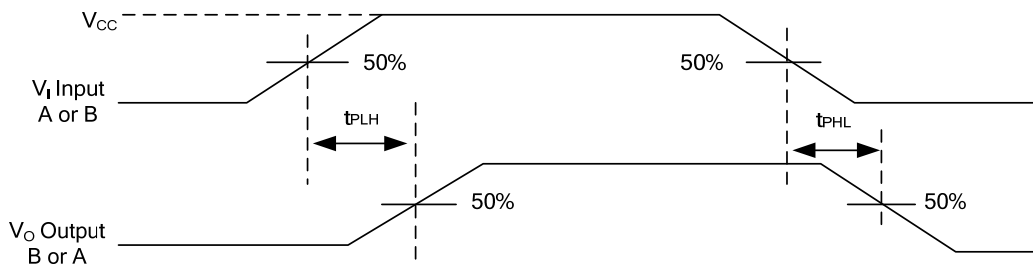
Test circuit for measuring ON-state current

## ■ TEST CIRCUIT AND WAVEFORMS(Cont.)

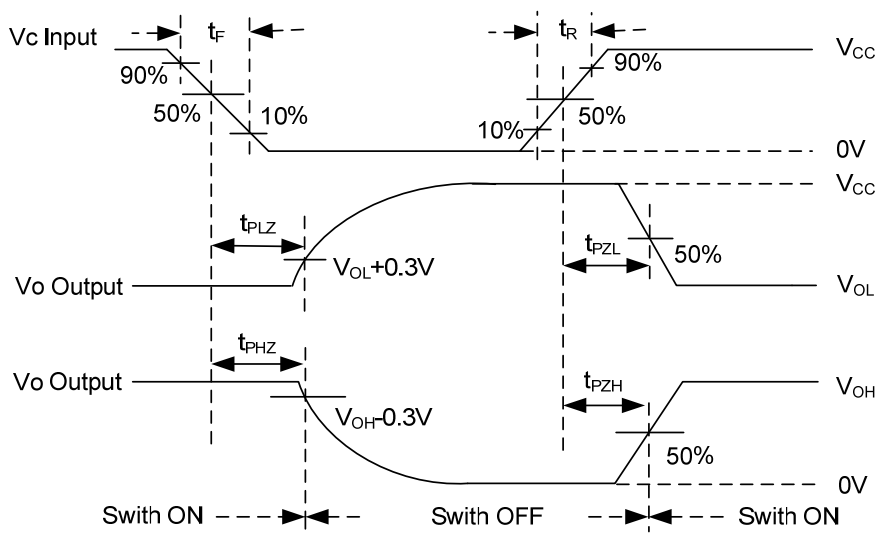


TEST	S	V <sub>I</sub>
t <sub>PLH</sub> /t <sub>PHL</sub>	Open	Pulse
t <sub>PHZ</sub> /t <sub>PZH</sub>	GND	V <sub>CC</sub>
t <sub>PLZ</sub> /t <sub>PZL</sub>	V <sub>CC</sub>	GND

Test circuit for measuring propagation delay time, switching time



Waveforms showing the Input(V<sub>i</sub>) to Output(V<sub>o</sub>) propagation delays



Waveforms showing the turn-on and turn-off times

Note: C<sub>L</sub> includes probe and jig capacitance.

All input pulses are supplied by generators having the following characteristics: PRR ≤ 1MHz, Z<sub>o</sub> = 50Ω, tr ≤ 3ns, tf ≤ 3ns.

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