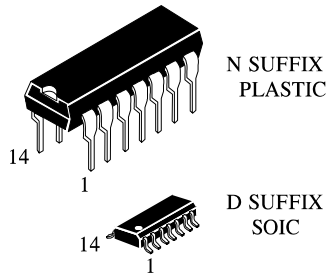
QUAD BILATERAL SWITCH

High-Voltage Silicon-Gate CMOS

The IW4066B is a quad bilateral switch intended for the transmission or multiplexing of analog or digital signals. In addition, the on-state resistance is relatively constant over the full input-signal range.

The IW4066B consists of four independent bilateral switches. A single control signal is required per switch. Both the p and the n device in a given switch are biased on or off simultaneously by the control signal.(As show in Fig.1.)The well of the n-channel device on each switch is either tied to the input when the switch is on or to GND when the switch is off. This configuration eliminates the variation of the switch-transistor threshold voltage with input signal, and thus keeps the on-state resistance low over the full operating-signal range.

The advantages over single-channel switches include peak input-signal voltage swings equal to the full supply voltage, and more constant on-state impedance over the input-signal range.



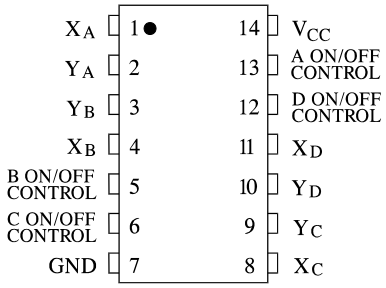
ORDERING INFORMATION

IW4066BN Plastic
IW4066BD SOIC
T_A = -55° to 125° C for all packages

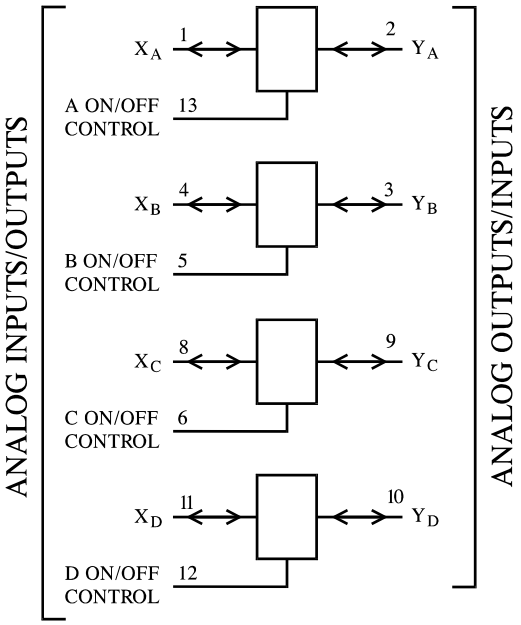
- Operating Voltage Range: 3.0 to 18 V
- Maximum input current of 1 μA at 18 V over full package-temperature range; 100 nA at 18 V and 25°C
- Noise margin (over full package temperature range):

1.0 V min @ 5.0 V supply
2.0 V min @ 10.0 V supply
2.5 V min @ 15.0 V supply

PIN ASSIGNMENT



LOGIC DIAGRAM



PIN 14 =V_{CC}
PIN 7 = GND

FUNCTION TABLE

On/Off Control Input	State of Analog Switch
L	Off
H	On

INTEGRAL

MAXIMUM RATINGS*

Symbol	Parameter	Value	Unit
V_{CC}	DC Supply Voltage (Referenced to GND)	-0.5 to +20	V
V_{IN}	DC Input Voltage (Referenced to GND)	-0.5 to V_{CC} +0.5	V
V_{OUT}	DC Output Voltage (Referenced to GND)	-0.5 to V_{CC} +0.5	V
I_{IN}	DC Input Current, per Pin	±10	mA
P_D	Power Dissipation in Still Air, Plastic DIP+ SOIC Package+	750 500	mW
P_D	Dissipation per Output Transistor	100	mW
Tstg	Storage Temperature	-65 to +150	°C
T_L	Lead Temperature, 1 mm from Case for 10 Seconds (Plastic DIP or SOIC Package)	260	°C

*Maximum Ratings are those values beyond which damage to the device may occur. Functional operation should be restricted to the Recommended Operating Conditions.
+Derating - Plastic DIP: - 10 mW/°C from 65° to 125°C
SOIC Package: : - 7 mW/°C from 65° to 125°C

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V_{CC}	DC Supply Voltage (Referenced to GND)	3.0	18	V
V_{IN}, V_{OUT}	DC Input Voltage, Output Voltage (Referenced to GND)	0	V_{CC}	V
T_A	Operating Temperature, All Package Types	-55	+125	°C

This device contains protection circuitry to guard against damage due to high static voltages or electric fields. However, precautions must be taken to avoid applications of any voltage higher than maximum rated voltages to this high-impedance circuit. For proper operation, V_{IN} and V_{OUT} should be constrained to the range GND≤(V_{IN} or V_{OUT})≤V_{CC}.

Unused inputs must always be tied to an appropriate logic voltage level (e.g., either GND or V_{CC}). Unused outputs must be left open.

DC ELECTRICAL CHARACTERISTICS(Voltages Referenced to GND)

Symbol	Parameter	Test Conditions	V_{CC} V	Guaranteed Limit			Unit
				≥-55°C	25 °C	≤125 °C	
V_{IH}	Minimum High-Level Voltage ON/Off Control Inputs	R_{ON}= Per Spec	5.0 10 15	3.5(Min) 7(Min) 11(Min)			V
V_{IL}	Minimum Low-Level Voltage ON/Off Control Inputs	R_{ON} = Per Spec	5.0 10 15	1 2 2	1 2 2	1 2 2	V
I_{IN}	Maximum Input Leakage Current, ON/OFF Control Inputs	V_{IN} = V_{CC} or GND	18	±0.1	±0.1	±1.0	μA
I_{CC}	Maximum Quiescent Supply Current (per Package)	V_{IN} = V_{CC} or GND	5.0 10 15 20	0.25 0.5 1 5	0.25 0.5 1 5	7.5 15 30 150	μA
R_{ON}	Maximum "ON" Resistance	V_C= V_{CC} R_L=10 kΩ returned to $\frac{V_{CC} - GND}{2}$ V_{IS}= GND to V_{CC}	5.0 10 15	800 310 200	1050 400 240	1300 550 320	Ω
ΔR_{ON}	Maximum Difference in "ON" Resistance Between Any Two Channels in the Same Package	V_C= V_{CC} R_L=10 kΩ	5.0 10 15	- - -	15 10 5	- - -	Ω
I_{OFF}	Maximum Off-Channel Leakage Current, Any One Channel	V_C= 0 V V_{IS}=18 V; V_{OS}= 0 V V_{IS}=0 V; V_{OS}= 18V	18	±0.1	±0.1	±1.0	μA
I_{ON}	Maximum On-Channel Leakage Current, Any One Channel	V_C= 0 V V_{IS}=18 V; V_{OS}= 0 V V_{IS}=0 V; V_{OS}= 18V	18	±0.1	±0.1	±1.0	μA

AC ELECTRICAL CHARACTERISTICS(C_L=50pF, R_L=200kΩ, Input t_r=t_f=20 ns)

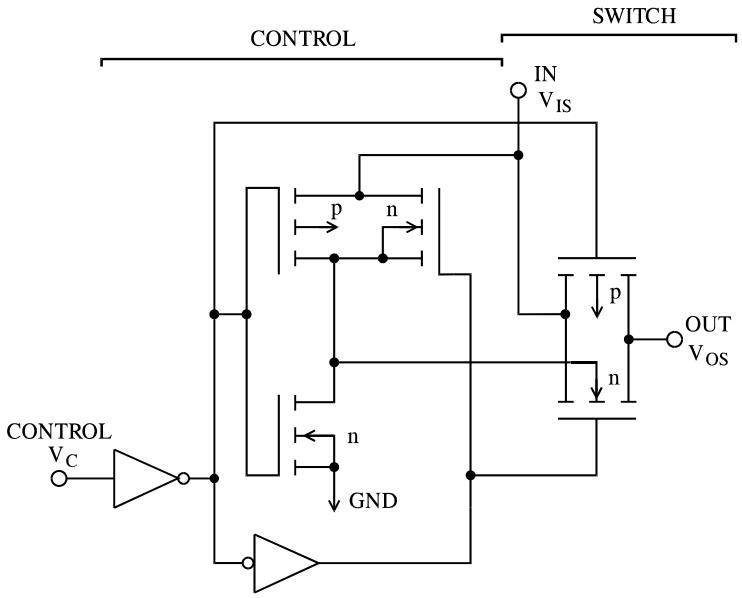
Symbol	Parameter	V_{CC} V	Guaranteed Limit			Unit
			≥-55 °C	25°C	≤125 °C	
t_{PLH}, t_{PHL}	Maximum Propagation Delay, Analog Input to Analog Output (Figure 2)	5.0 10 15	40 20 15	40 20 15	80 40 30	ns
t_{PLZ}, t_{PHZ}, t_{PZL}, t_{PZH}	Maximum Propagation Delay, ON/OFF Control to Analog Output (Figure 3)	5.0 10 15	70 40 30	70 40 30	140 80 60	ns
C	Maximum Capacitance ON/OFF Control Input Control Input = GND Analog I/O Feedthrough	-		 15 7.5 0.6		pF

ADDITIONAL APPLICATION CHARACTERISTICS(Voltages Referenced to GND Unless Noted)

Sym bol	Parameter	Test Conditions	V_{CC} V	Limit* 25°C	Unit
THD	Total Harmonic Distortion	V_C = V_{CC} , GND = -5 V R_L = 10 kΩ, f_{IS} =1 kHz sine wave	5	0.4	%
BW	Maximum On-Channel Bandwidth or Minimum Frequency Response	V_C = V_{CC} , GND = -5 V R_L = 1 kΩ	5	40	MHz
BW	Maximum On-Channel Bandwidth or Minimum Frequency Response	V_C = GND , V_{IS} = 5 V R_L = 1 kΩ	10	1	MHz
BW	Maximum On-Channel Bandwidth or Minimum Frequency Response	V_C (A) = V_{CC} = 5 V V_C (B) = GND = -5 V V_{IS} (A) = 5 V_{P-P} ,50 Ω source, R_L = 1 kΩ	5	8	MHz
-	Cross talk (Control Input to Signal Output)	V_C= 10 V t_r, t_f = 20 ns R_L = 10 kΩ	10	50	mV
-	Maximum Control Input Repetition Rate	V_{IS}= V_{CC}, R_L = 1 kΩ C_L = 50 pF V_C= 10 V (square wave centered on 5 V) t_r, t_f = 20 ns, V_{OS}= 1/2 V_{OS} @1 kHz	5 10 15	6 9 9.5	MHz

* Guaranteed limits not tested. Determined by design and verified by qualification.

V_{CC} (V)	V_{IS} (V)	Switch Input I_{IS} (mA)			Switch Output, V_{OS} (V)	
		-55 °C	+25 °C	+125 °C	Min	Max
5	0	0.64	0.51	0.36	-	0.4
5	5	-0.64	-0.51	-0.36	4.6	-
10	0	1.6	1.3	0.9	-	0.5
10	10	-1.6	-1.3	-0.9	9.5	-
15	0	4.2	3.4	2.4	-	1.5
15	15	-4.2	-3.4	-2.4	13.5	-



$GND \leq V_{IS} \leq V_{CC}$

Figure 1. Schematic diagram of 1 of 4 identical switches and its associated control circuitry.

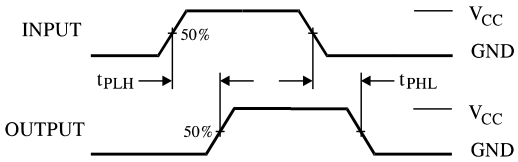


Figure 2. Switching Waveforms

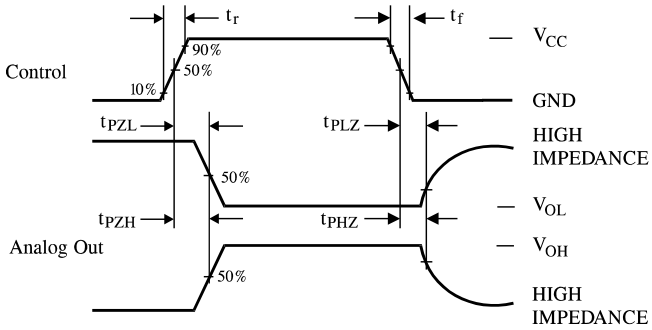
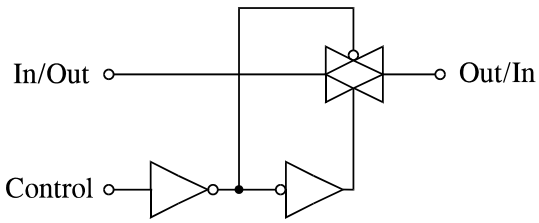


Figure 3. Switching Waveforms

EXPANDED LOGIC DIAGRAM
(1/4 of the Device)



Control	Switch
GND = L	OFF
V_{CC} = H	ON