

# TL 4066B

## Quad Bilateral Switch

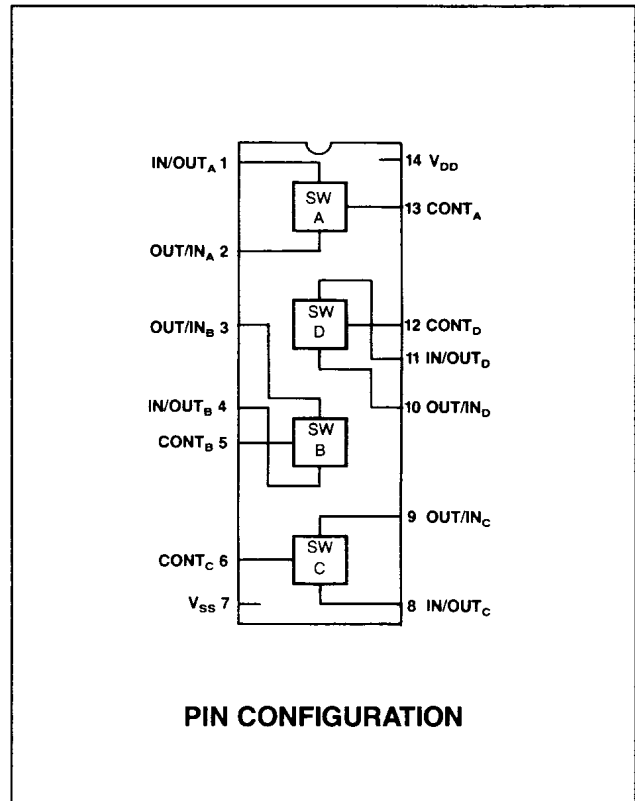


### GENERAL DESCRIPTION

The TL 4066B is a quad bilateral switch designed to transmit or multiplex analog or digital signals. It is pin-for-pin compatible with CD 4016, MC 14016, CD 4066 and MC 14066 but has much lower ON resistance than the 4016 type devices. ON resistance of the TL 4066B is relatively independent of input signal voltage variation.

Each of the four bilateral switches in the TL 4066B is controlled by its own control input pin. The p-channel and n-channel devices within a switch are either both ON or both OFF. To eliminate changes in ON resistance due to threshold variation caused by changes in input voltage, the well of the n-channel device on each switch is connected to the input pin when the switch is ON and to VSS when the switch is OFF.

The TL 4066B is available in 14-lead ceramic and plastic DIP, SOIC, and in die form.



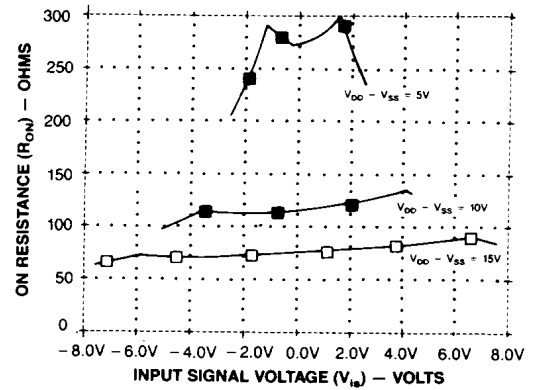
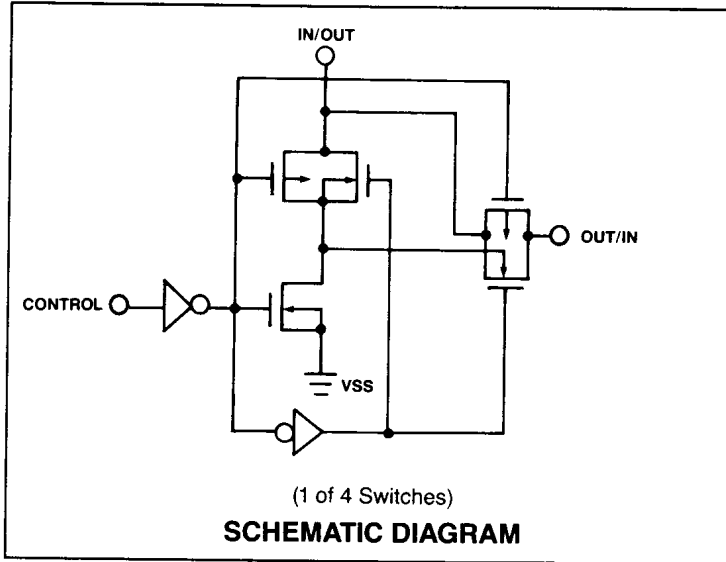
### FEATURES

- Replaces CD4066 and MC14066
- Wide supply voltage range: 3Vdc to 18Vdc
- 15V digital switching or  $\pm 7.5V$  peak-to-peak switching
- Low ON resistance ( $80\Omega$  typ @ 15V)
- Individual switch ON resistances matched to within  $5\Omega$
- Constant ON resistance independent of input signal voltage variation
- High ON/OFF output voltage ratio (80 dB typ @  $f_{is} = 10$  KHz,  $R_L = 10K\Omega$ )
- High linearity (0.1% distortion typ @  $f_{is} = 1$  KHz,  $V_{is} = 5V$  p-p)
- Extremely low leakage (switch OFF, 100 pA typ @  $V_{DD} - V_{SS} = 10V$ ,  $T_A = 25^\circ C$ )
- Extremely high control input impedance ( $10^{12}\Omega$  typ)
- Low switch-to-switch crosstalk ( $-50dB$  typ @  $f_{is} = 0.9$  MHz,  $R_L = 1K\Omega$ )
- Matched output-to-input capacitance
- 40 MHz typ frequency response (switch ON)
- Quiescent current specified over entire voltage range
- 1  $\mu A$  max control input leakage @ 15V over package-temperature range
- MIL-STD-883 screening available

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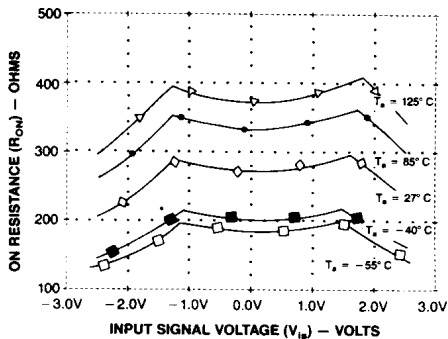
Typical ON Resistance vs. Input Signal Voltage at  $T_a = 27^\circ\text{C}$ .

## ABSOLUTE MAXIMUM RATINGS

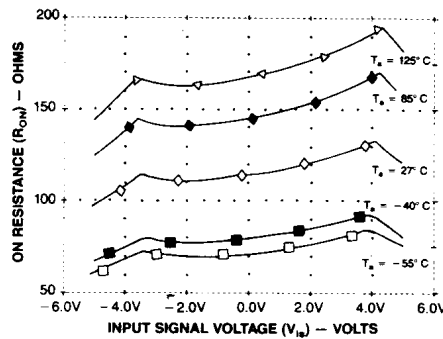
Supply Voltage Range (Referenced to VSS)	-0.5V to +18Vdc
Input Voltage	VSS - 0.5V to VDD + 0.5V
Operating Temperature (commercial)	0°C to +70°C
Operating Temperature (industrial)	-40°C to +85°C
Operating Temperature (military)	-55°C to +125°C
Storage Temperature	-65°C to +150°C
Lead Temperature (soldering, 10 sec)	265°C
Power Dissipation (ceramic package, $T_a = -55^\circ\text{C}$ to $+100^\circ\text{C}$ )	500mW
Power Dissipation (ceramic package, $T_a = +100^\circ\text{C}$ to $+125^\circ\text{C}$ )*	200mW
Power Dissipation (plastic package, $T_a = -40^\circ\text{C}$ to $+60^\circ\text{C}$ )	500mW
Power Dissipation (plastic package, $T_a = +60^\circ\text{C}$ to $+85^\circ\text{C}$ )*	200mW
Power Dissipation (each switch)	100mW

General Note: Absolute maximum ratings are those limits which, if exceeded, may cause damage to the device. Proper operation is not implied at these limits.

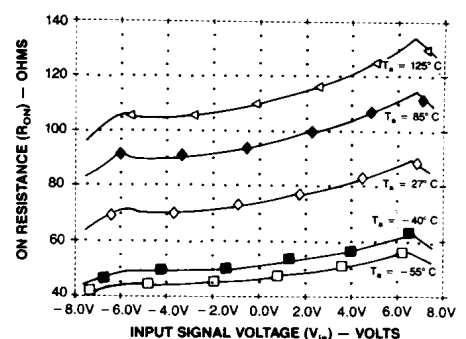
\*Derate linearly at 12 mW/°C



Typical ON Resistance vs. Input Signal Voltage for  $V_{DD} - V_{SS} = 5\text{V}$ .



Typical ON Resistance vs. Input Signal Voltage for  $V_{DD} - V_{SS} = 10\text{V}$ .



Typical ON Resistance vs. Input Signal Voltage for  $V_{DD} - V_{SS} = 15\text{V}$ .

**ELECTRICAL CHARACTERISTICS**

PARAMETER	V <sub>DD</sub> *	**				TYP	MAX	UNITS	CONDITIONS
		-55°C	-40°C	+85°C	+125°C	+25°C			
Quiescent Current, I <sub>L</sub> max (ceramic package)	5V	0.25			7.5	0.01	0.25	μA	
	10V	0.5			15	0.01	0.5		
	15V	1.0			30	0.01	1.0		
Quiescent Current, I <sub>L</sub> max (plastic package)	5V		1	15		0.25	1	μA	
	10V		2	30		0.25	2		
	15V		4	500		0.5	4		

**SIGNAL INPUTS, V<sub>is</sub> AND OUTPUTS, V<sub>os</sub>**

ON Resistance, R <sub>ON</sub> max	5V 10V 15V	800 310 200	850 330 210	1200 520 300	1300 550 320	270 120 80	1050 400 240	ohm	V <sub>C</sub> = V <sub>DD</sub> ; R <sub>L</sub> = 10K connected to 1/2 (V <sub>DD</sub> )
Δ <sub>ON</sub> Resistance Between Any 2 of 4 Switches, Δ R <sub>ON</sub>	5V 10V 15V					15 10 5		ohm	V <sub>C</sub> = V <sub>DD</sub> ; R <sub>L</sub> = 10K connected to 1/2 (V <sub>DD</sub> )
Total Harmonic Distortion, THD (Sine Wave Input)						0.1		%	V <sub>C</sub> = V <sub>DD</sub> = 5V; R <sub>L</sub> = 10K; V <sub>SS</sub> = -5V; f <sub>is</sub> = 1KHz; ***
Frequency Response, Switch ON (Sine Wave Input) (20 log <sub>10</sub> $\frac{V_{is}}{V_{os}}$ = -3dB)						40		MHz	V <sub>C</sub> = V <sub>DD</sub> = 5V; R <sub>L</sub> = 1K  V <sub>SS</sub> = -5V; ***
Feedthrough, Switch OFF (20 log <sub>10</sub> $\frac{V_{is}}{V_{os}}$ = -50dB)						1		MHz	V <sub>C</sub> = V <sub>SS</sub> = -5V; R <sub>L</sub> = 1K; ***
Leakage, Input to Output, Switch OFF (OFF Resistance) (ceramic package) (plastic package)	15V 15V					±0.1 ±0.1	±100 ±300	nA	V <sub>C</sub> = V <sub>SS</sub>
Crosstalk Frequency Between Any 2 Switches (20 log <sub>10</sub> $\frac{V_{is}}{V_{os}}$ = -50dB)						8		MHz	V <sub>C</sub> (A) = V <sub>DD</sub> = +5V; V <sub>C</sub> (B) = V <sub>SS</sub> = -5V; R <sub>L</sub> = 1K; ***

\*V<sub>DD</sub> referenced to V<sub>SS</sub>

\*\*Values specified are maximum values unless otherwise stated.

\*\*\*5V p-p sinusoidal input centered about 0V.

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## Quad Bilateral Switch

### ELECTRICAL CHARACTERISTICS (cont'd)

PARAMETER	V <sub>DD</sub> *	**				TYP	MAX	UNITS	CONDITIONS
		-55°C	-40°C	+85°C	+125°C	+25°C			
Propagation Delay, Signal Input to Output, t <sub>PD</sub>	5V					20	40	ns	V <sub>C</sub> = V <sub>DD</sub> ; C <sub>L</sub> = 50 pF; V <sub>is</sub> = Square Wave; t <sub>r</sub> = t <sub>f</sub> = 20 ns; V <sub>SS</sub> = 0V; R <sub>L</sub> = 200K
	10V					10	20		
	15V						7		
Capacitance Input, C <sub>is</sub> Output, C <sub>os</sub> Feedthrough, C <sub>ios</sub>						8		pF	V <sub>DD</sub> = +5V; V <sub>C</sub> = V <sub>SS</sub> = -5V
						8			
						0.5			

### CONTROL INPUT, V<sub>C</sub>

Input Voltage (low), max V <sub>ILC</sub>	5V	1.5	1.5	1.5	1.5	2.25	1.5	V	
	10V	3.0	3.0	3.0	3.0	4.5	3.0		
	15V	4.0	4.0	4.0	4.0	6.75	4.0		
Input Voltage (high), min V <sub>IHC</sub>	5V	3.5	3.5	3.5	3.5	2.75	3.5	V	
	10V	7.0	7.0	7.0	7.0	5.5	7.0		
	15V	11.0	11.0	11.0	11.0	8.25	11.0		
Input Leakage Current, I <sub>L</sub> max (ceramic package) (plastic package)	15V	±0.1	±0.1	±1.0	±1.0	±10E-5	±0.1	µA	
	15V	±0.3	±0.3	±1.0	±1.0	±10E-5	±0.3		
Crosstalk, Control Input to Signal Output	10V					50		mV	V <sub>C</sub> = 10V Square Wave; t <sub>r</sub> = t <sub>f</sub> = 20ns; R <sub>L</sub> = 10K; V <sub>is</sub> = V <sub>SS</sub>
Propagation Delay, Control Input to Output t <sub>PDC</sub>	10V					20	40	ns	V <sub>C</sub> = 10V Square Wave; t <sub>r</sub> = t <sub>f</sub> = 20ns; C <sub>L</sub> = 50 pF; R <sub>L</sub> = 1K
Maximum Allowable Repetition Rate, Control Input	10V					8		MHz	V <sub>C</sub> = 10V Square Wave; t <sub>r</sub> = t <sub>f</sub> = 20ns; R <sub>L</sub> = 1K; C <sub>L</sub> = 15 pF; V <sub>SS</sub> = 0V; V <sub>is</sub> = V <sub>DD</sub>
Input Capacitance, Control Input, C <sub>IN</sub>						5		pF	

\*V<sub>DD</sub> referenced to V<sub>SS</sub>

\*\*Values specified are maximum values unless otherwise stated.

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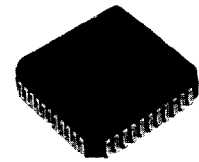
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# PACKAGES



## DUAL IN-LINE PACKAGES (DIP)

PLASTIC DIP	8 through 24 (300 mil); 24 through 48 (600 mil); 64 (900 mil)
CERAMIC DIP, SIDE BRAZED	8 through 24 (300 mil); 24 through 48 (600 mil); 64 (900 mil)
CERDIP	8 through 24 (300 mil); 24 through 48 (600 mil)

## SURFACE MOUNT PACKAGES

SOIC	8 through 16 (150 mil); 16 through 28 (300 mil)
PLCC	20 through 84
QUAD FLAT PACK	44 through 208
BUMPERED QFP	100 and up
CHIP CARRIER (LCC)	18 through 68
CERAMIC QFP	44 through 160 (EIJ); 132 through 164 (JEDEC)
CERFLAT	14 through 28
CERQUAD	20 through 68

## PIN GRID ARRAYS

PLASTIC PGA	28 through 244
PGA	28 through 244

This is a partial list; consult factory for availability of other packages.

**NOTE:** Devices are available in anti-static tubes or trays, on tape & reel, or in die form.