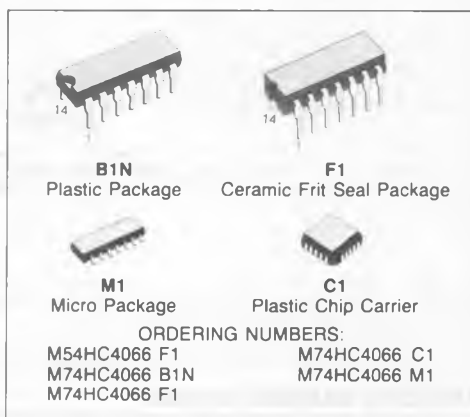


QUAD BILATERAL SWITCH

- **HIGH SPEED**
 $t_{PD} = 12 \text{ ns (TYP.) at } V_{CC} = 5V$
- **LOW POWER DISSIPATION**
 $I_{CC} = 1 \mu A \text{ (MAX.) at } T_A = 25^\circ C$
- **HIGH NOISE IMMUNITY**
 $V_{NIH} = V_{NIL} = 28\% V_{CC} \text{ (MIN.)}$
- **OUTPUT DRIVE CAPABILITY**
 10 LSTTL LOADS
- **SYMMETRICAL OUTPUT IMPEDANCE**
 $|I_{OH}| = I_{OL} = 4 \text{ mA (MIN.)}$
- **BALANCED PROPAGATION DELAYS**
 $t_{PLH} = t_{PHL}$
- **WIDE OPERATING VOLTAGE RANGE**
 $V_{CC} \text{ (OPR.)} = 2V \text{ to } 6V$
- **PIN AND FUNCTION COMPATIBLE**
 WITH 4066B

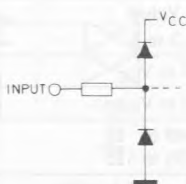


DESCRIPTION

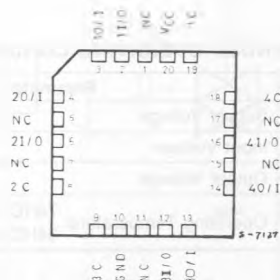
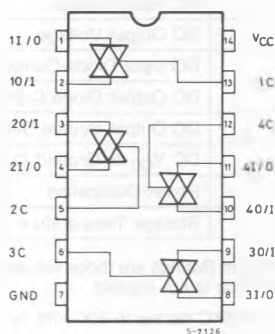
The M54/74HC4066 is a high speed CMOS QUAD BILATERAL SWITCH fabricated in silicon gate C²MOS technology. It has the same high speed performance of LSTTL combined with true CMOS low power consumption.

The C input is provided to control the switch. The switch is on when the C input is held high and off when C is held low.

CONTROL INPUT

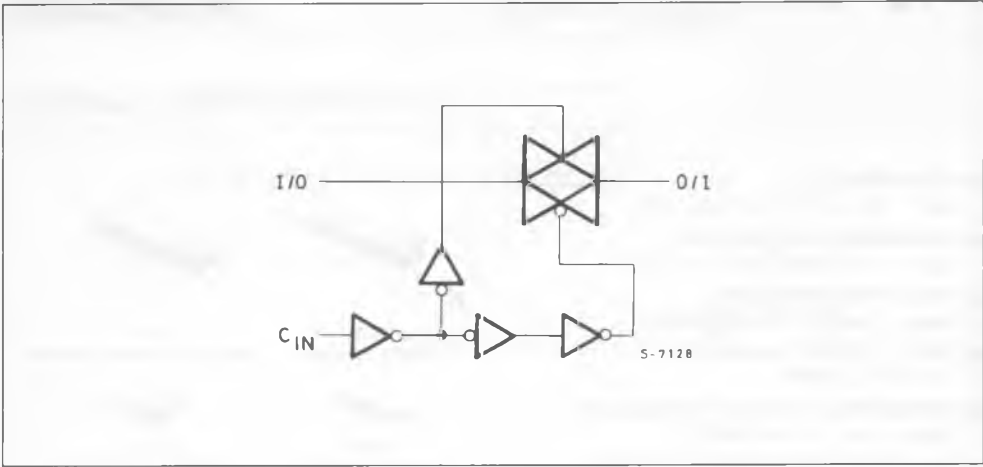


PIN CONNECTIONS (top view)



NC =
No Internal
Connection

LOGIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	- 0.5 to 7	V
V_I	DC Input Voltage	- 0.5 to $V_{CC} + 0.5$	V
V_O	DC Output Voltage	- 0.5 to $V_{CC} + 0.5$	V
I_{IK}	DC Input Diode Current	± 20	mA
I_{OK}	DC Output Diode Current	± 20	mA
I_O	DC Output Source Sink Current Per Output Pin	± 25	mA
I_{CC} or I_{GND}	DC V_{CC} or Ground Current	± 50	mA
P_D	Power Dissipation	500 (*)	mW
T_{stg}	Storage Temperature	- 65 to 150	$^{\circ}C$

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied.

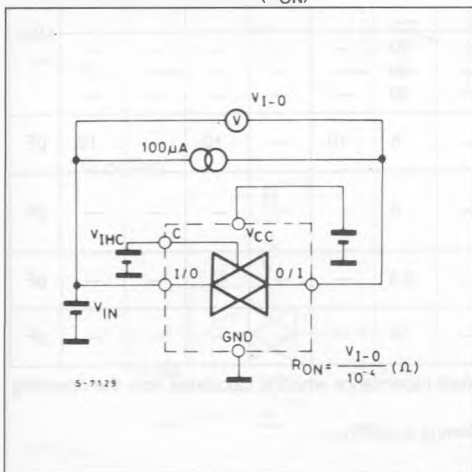
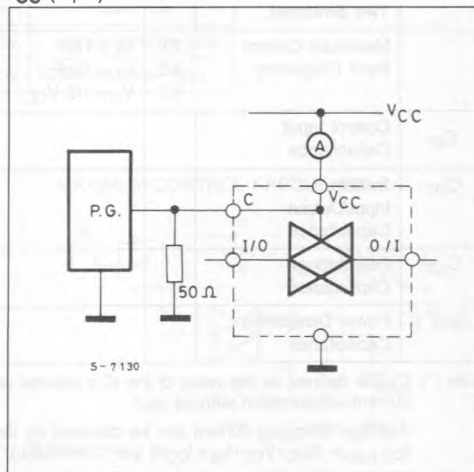
(*) 500 mW: $\cong$ 65 $^{\circ}C$ derate to 300 mW by 10 mW/ $^{\circ}C$: 65 $^{\circ}C$ to 85 $^{\circ}C$.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	2 to 6	V
V_I	Input Voltage	0 to V_{CC}	V
V_O	Output Voltage	0 to V_{CC}	V
T_A	Operating Temperature 74HC Series 54HC Series	- 40 to 85 - 55 to 125	$^{\circ}C$
t_r, t_f	Input Rise and Fall Time	$V_{CC} \begin{cases} 2 \text{ V} & 0 \text{ to } 1000 \\ 4.5 \text{ V} & 0 \text{ to } 500 \\ 6 \text{ V} & 0 \text{ to } 400 \end{cases}$	ns

DC SPECIFICATIONS

Symbol	Parameter	V _{CC}	Test Condition	T _A = 25°C 54HC and 74HC			- 40 to 85°C 74HC		- 55 to 125°C 54HC		Unit
				Min.	Typ.	Max.	Min.	Max.	Min.	Max.	
V _{IH}	High Level Control Input Voltage	2.0 4.5 6.0	Refer to R _{ON} Specification	1.5 3.15 4.2	— — —	— — —	1.5 3.15 4.2	— — —	1.5 3.15 4.2	— — —	V
V _{IL}	Low Level Control Input	2.0 4.5 6.0	I _{OFF} ≤ 1.0 μA	— — —	— — —	0.5 1.35 1.8	— — —	0.5 1.35 1.8	— — —	0.5 1.35 1.8	V
R _{ON}	ON Resistance	2.0 4.5 6.0	V _{I/O} = 0 ~ V _{CC} I _{I/O} = 100 μA	— — —	2000 100 60	— 200 170	— 250 210	— — —	— 300 250	— — —	Ω
Δ R _{ON}	Difference of ON Resistance between Any two of Four Switches	2.0 4.5 6.0	V _C = V _{IHC} I _{I/O} = 100 μA	— — —	50 3 2	— — —	— — —	— — —	— — —	— — —	Ω
I _{OFF}	Input/Output Leakage Current (Switch OFF)	6.0	V _C = V _{ILC} V _{I/O} = 6V, V _{O/I} = 0V V _{I/O} = 0V, V _{O/I} = 6V	—	—	± 0.1	—	± 0.1	—	± 0.1	μA
I _{IN}	Input Leakage Current	6.0		—	—	± 0.1	—	± 1.0	—	± 1.0	μA
I _{CC}	Quiescent Supply Current	6.0	V _{IN} = V _{CC} or GND	—	—	1	—	10	—	20	μA

CHANNEL RESISTANCE (R_{ON})I_{CC} (Opr.)

AC ELECTRICAL CHARACTERISTICS ($C_L = 50\text{pF}$, Input $t_r = t_f = 6\text{ns}$)

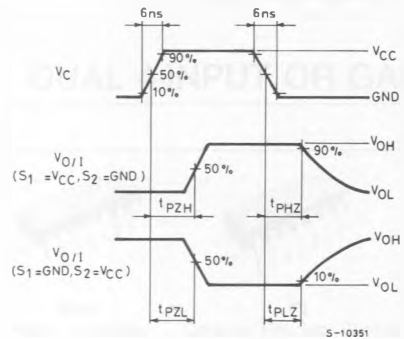
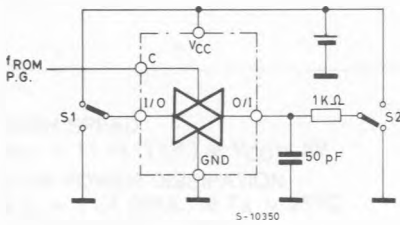
Symbol	Parameter	V_{CC}	Test Condition	$T_A = 25^\circ\text{C}$ 54HC and 74HC			-40 to 85°C 74HC		-55 to 125°C 54HC		Unit
				Min.	Typ.	Max.	Min.	Max.	Min.	Max.	
t_{PLH} t_{PHL}	Propagation Delay Time (Input to output)	2.0 4.5 6.0	$R_L = 10\text{k}\Omega$	— — —	13 5 4	50 10 8	— — —	60 12 10	— — —	75 15 13	ns
t_{PZH} t_{PZL}	Output Enable Time	2.0 4.5 6.0	$R_L 1\text{k}\Omega$	— — —	56 14 12	115 23 20	— — —	140 28 24	— — —	173 35 29	ns
t_{PLZ} t_{PHZ}	Output Disable Time	2.0 4.5 6.0	$R_L = 1\text{k}\Omega$	— — —	64 16 14	115 23 20	— — —	140 28 24	— — —	173 35 29	ns
	Sine Wave Distortion	2.5	$V_{SS} = -2.5\text{V}$ $V_{IN} = 0.88V_{RMS}$ $R_L = 10\text{k}\Omega$ $f = 1\text{kHz}$	—	0.05	—	—	—	—	—	%
	Frequency Response (Switch ON) $20 \log_{10} \frac{V_{OUT}}{V_{IN}} = -3\text{dB}$	2.5	$V_{SS} = -2.5\text{V}$ $V_{IN} 0.88V_{RMS}$ $R_L = 1\text{k}\Omega$	—	30	—	—	—	—	—	MHz
	Feedthrough Frequency (Switch OFF) $20 \log_{10} \frac{V_{OUT}}{V_{IN}} = -50\text{dB}$	2.5	$V_{SS} = -2.5\text{V}$ $V_{IN} 0.88V_{RMS}$ $R_L = 1\text{k}\Omega$	—	1.0	—	—	—	—	—	
	Crosstalk (Control Input to Signal Output)	2.0 4.5 6.0	$R_{IN} = 1\text{k}\Omega$ $R_L 10\text{k}\Omega$	— — —	25 60 75	— — —	— — —	— — —	— — —	— — —	mV
	Crosstalk (Between Any Two Switches)	2.5		—	1.5	—	—	—	—	—	MHz
	Maximum Control Input Frequency	2.0 4.5 6.0	$R_L = 1\text{k}\Omega$ $C_L = 15\text{pF}$ $V_O = 1/2 V_{CC}$	— — —	20 30 30	— — —	— — —	— — —	— — —	— — —	
C_{IN}	Control Input Capacitance			—	5	10	—	10	—	10	
$C_{I/O}$	Switch Input/Output Capacitance			—	6	—	—	—	—	—	pF
C_{I-O}	Feedthrough Capacitance			—	0.5	—	—	—	—	—	pF
$C_{PD}^{(*)}$	Power Dissipation Capacitance			—	13	—	—	—	—	—	pF

Note (*) C_{PD} is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load.

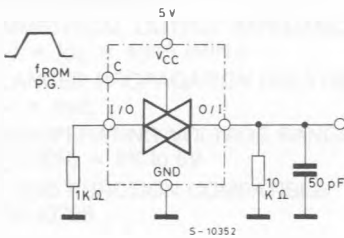
Average operating current can be obtained by the following equation.

$$I_{CC (opr)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/4 \text{ (per CHANNEL).}$$

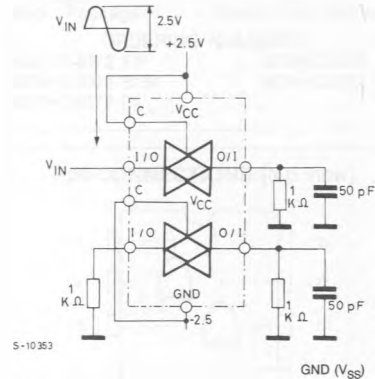
SWITCHING CHARACTERISTICS TEST CIRCUIT

 t_{PLZ} , t_{PHZ} , t_{PZL} , t_{PZH} 

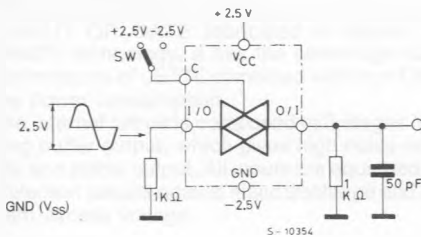
CROSSTALK (CONTROL TO OUTPUT)



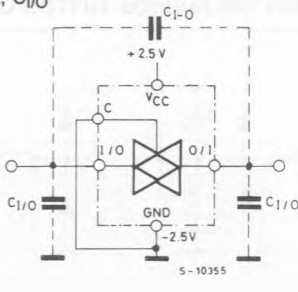
CROSSTALK BETWEEN ANY TWO SWITCHES



BANDWIDTH AND FEEDTHROUGH ATTENUATION



SW	TEST ITEM
+2.5V	-3dB BANDWIDTH TEST
-2.5V	FEEDTHROUGH TEST

 $C_{I/O}$, $C_{I/O}$ 

MAXIMUM CONTROL FREQUENCY

