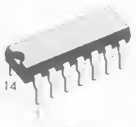
SGS-THOMSON MICROELECTRONICS

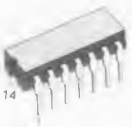
M54HC4066
M74HC4066

QUAD BILATERAL SWITCH

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



B1N
Plastic Package



F1
Ceramic Frit Seal Package

M1
Micro Package

C1
Plastic Chip Carrier

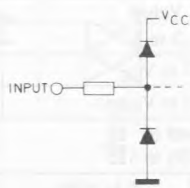
ORDERING NUMBERS:

M54HC4066 F1
M74HC4066 B1N
M74HC4066 F1
M74HC4066 C1
M74HC4066 M1

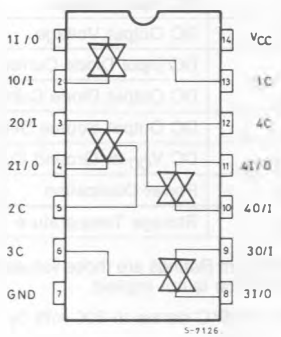
DESCRIPTION

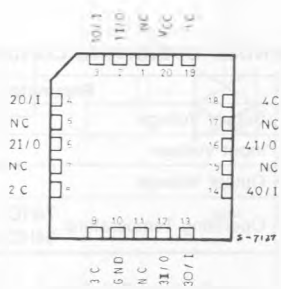
The M54/74HC4066 is a high speed CMOS QUAD BILATERAL SWITCH fabricated in silicon gate C²MOS technology. It has the same high speed performance of LSTTL combined with true CMOS low power consumption.
The C input is provided to control the switch. The switch in on when the C input is held high and off when C is held low.

CONTROL INPUT



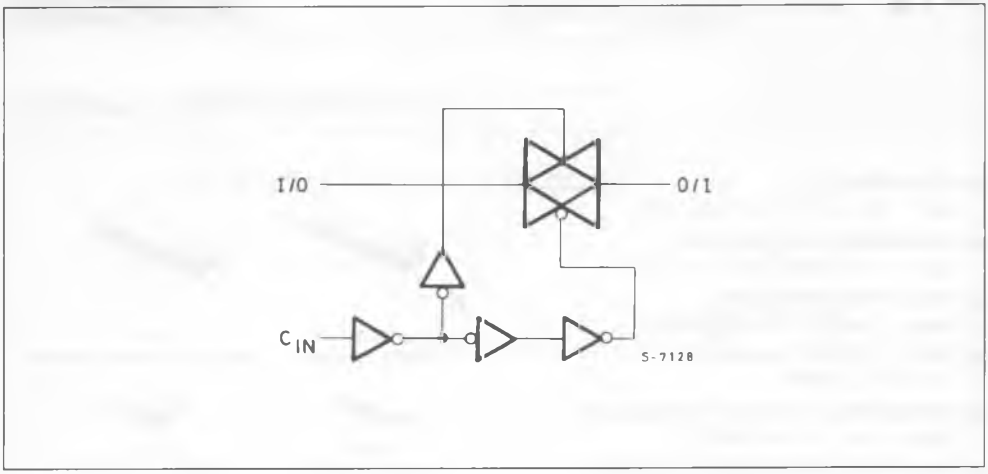
PIN CONNECTIONS (top view)





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	°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: ≅ 65°C derate to 300 mW by 10 mW/°C: 65°C to 85°C.

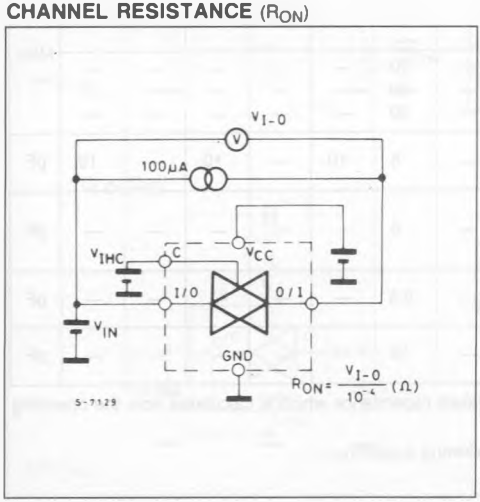
RECOMMENDED OPERATING CONDITIONS

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		°C
t_r, t_f	Input Rise and Fall Time	V_{CC} = 2 V	0 to 1000	ns
		V_{CC} = 4.5 V	0 to 500	
		V_{CC} = 6 V	0 to 400	

DC SPECIFICATIONS

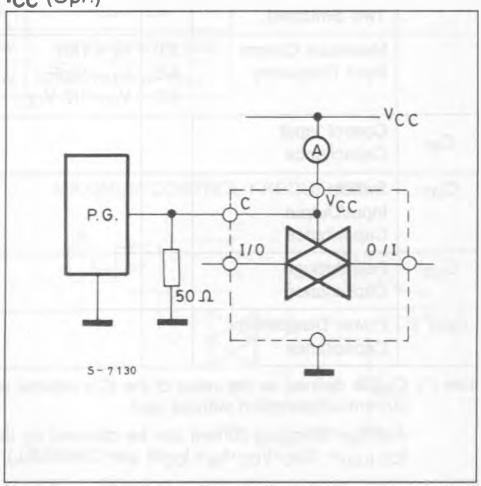
Symbol	Parameter	V_{CC}	Test Condition	$T_A = 25°C$ 54HC and 74HC			−40 to 85°C 74HC		−55 to 125°C 54HC		Unit
				Min.	Typ.	Max.	Min.	Max.	Min.	Max.	
V_{IH}	High Level Control Input Voltage	2.0 4.5 6.0	Refer to R_{ON} Specification	1.5 3.15 4.2	— — —	— — —	1.5 3.15 4.2	— — —	1.5 3.15 4.2	— — —	V
V_{IL}	Low Level Control Input	2.0 4.5 6.0	$\|I_{OFF}\| \leq 1.0\mu A$	— — —	— — —	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	$V_{I/O} = 0 \sim V_{CC}$ $I_{I/O} = 100\mu A$	— — —	2000 100 60	— 200 170	— — —	— 250 210	— — —	— 300 250	Ω
ΔR_{ON}	Difference of ON Resistance between Any two of Four Switches	2.0 4.5 6.0	$V_C = V_{IHC}$ $I_{I/O} = 100\mu A$	— — —	50 3 2	— — —	— — —	— — —	— — —	— — —	Ω
I_{OFF}	Input/Output Leakage Current (Switch OFF)	6.0	$V_C = V_{ILC}$ $V_{I/O} = 6V$, $V_{O/I} = OV$ $V_{I/O} = OV$, $V_{O/I} = 6V$	—	—	±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})



$$R_{ON} = \frac{V_{I-O}}{10^{-4}} (\Omega)$$

I_{CC} (Opr.)



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

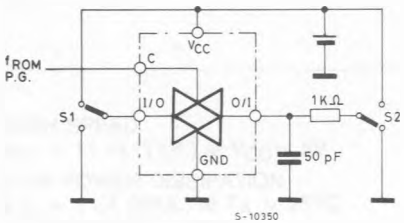
Symbol	Parameter	V_{CC}	Test Condition	T_A = 25°C 54HC and 74HC			−40 to 85°C 74HC		−55 to 125°C 54HC		Unit
				Min.	Typ.	Max.	Min.	Max.	Min.	Max.	
t_{PLH} t_{PHL}	Propagation Delay Time (Input to output)	2.0	$R_L = 10k\Omega$	—	13	50	—	60		75	ns
		4.5		—	5	10	—	12		15	
		6.0		—	4	8	—	10	—	13	
t_{PZH}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

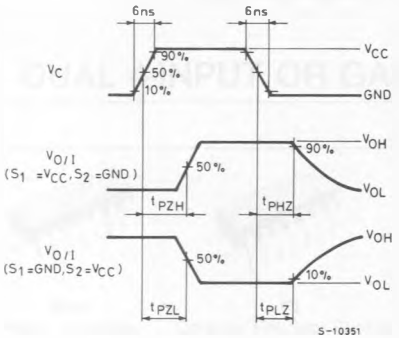
Note (*) C_{PD} is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load.

Average operating current can be obtained by the following equation.
$I_{CC\ (opr)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/4$ (per CHANNEL).

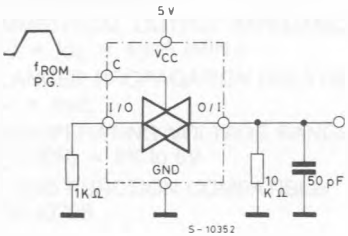
SWITCHING CHARACTERISTICS TEST CIRCUIT

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

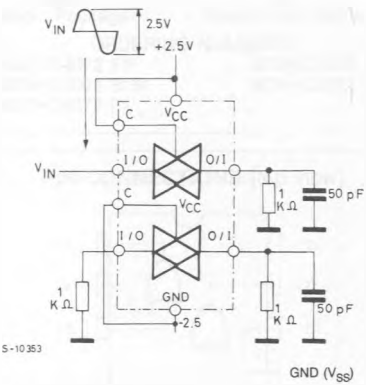




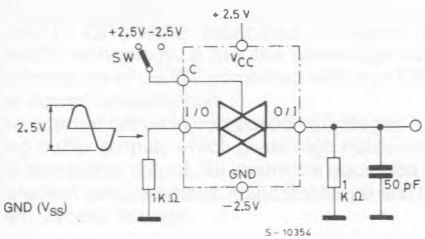
CROSSTALK (CONTROL TO OUTPUT)



CROSSTALK BETWEEN ANY TWO SWITCHES

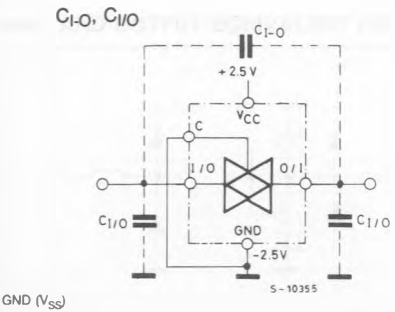


BANDWIDTH AND FEEDTHROUGH ATTENUATION



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

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



MAXIMUM CONTROL FREQUENCY