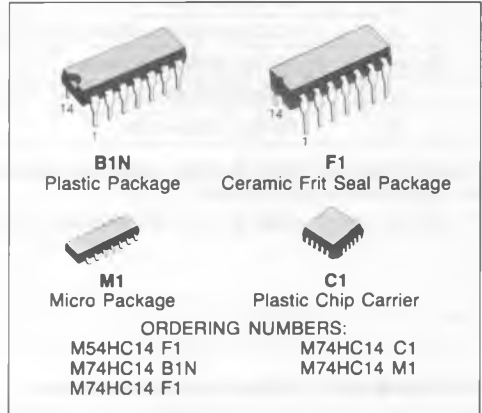


HEX SCHMITT INVERTER

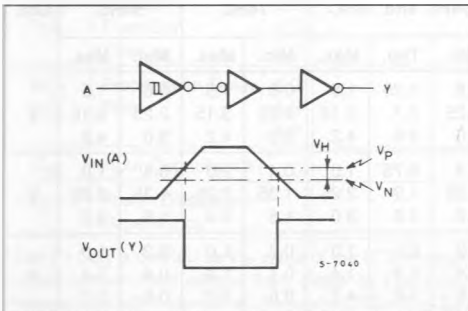
- HIGH SPEED
 $t_{PD} = 14 \text{ ns (TYP.) at } V_{CC} = 5V$
- LOW POWER DISSIPATION
 $I_{CC} = 1 \mu\text{A (MAX.) at } T_A = 25^\circ\text{C}$
- HIGH NOISE IMMUNITY
 $V_{NIH} = V_{NIL} = 28\% V_{CC} \text{ (MIN.)}$
- OUTPUT DRIVE CAPABILITY
 10 LSTTL LOADS
- SYMMETRICAL OUTPUT IMPEDANCE
 $|I_{OH}| = I_{OL} = 4 \text{ mA (MIN.)}$
- BALANCED PROPAGATION DELAYS
 $t_{PLH} = t_{PHL}$
- WIDE OPERATING VOLTAGE RANGE
 $V_{CC} \text{ (OPR)} = 2V \text{ to } 6V$
- PIN AND FUNCTION COMPATIBLE
 WITH 54/74LS14



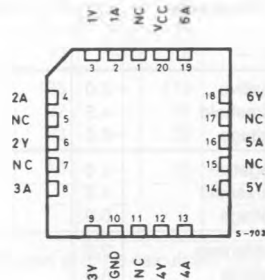
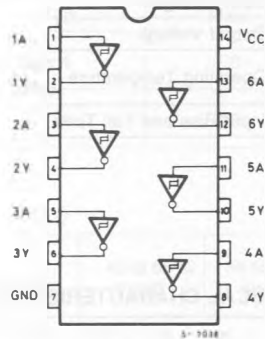
DESCRIPTION

The M54/74HC14 is a high speed CMOS HEX SCHMITT INVERTER fabricated in silicon gate C²MOS technology. It has the same high speed performance of LSTTL combined with true CMOS low power consumption. Pin configuration and function are the same as those of the HC04 but all inputs have 20% V_{CC} hysteresis level. This together with its schmitt trigger function allows it to be used on line receivers with slow rise/fall input signals. All inputs are equipped with protection circuits against static discharge and transient excess voltage.

LOGIC DIAGRAM/WAVEFORM



PIN CONNECTIONS (top view)



NC =
 No Internal
 Connection

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 conditions 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	no limits	

DC 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.	
V _P	Positive Threshold Voltage	2.0		0.8	1.25	1.5	0.8	1.5	0.8	1.5	V
		4.5		2.25	2.7	3.15	2.25	3.15	2.25	3.15	
		6.0		3.0	3.6	4.2	3.0	4.2	3.0	4.2	
V _N	Negative Threshold Voltage	2.0		0.4	0.75	1.0	0.4	1.0	0.4	1.0	V
		4.5		1.35	1.9	2.25	1.35	2.25	1.35	2.25	
		6.0		1.8	2.6	3.0	1.8	3.0	1.8	3.0	
V _H	Hysteresis Voltage	2.0		0.2	0.5	1.0	0.2	1.0	0.2	1.0	V
		4.5		0.4	0.8	1.4	0.4	1.4	0.4	1.4	
		6.0		0.6	1.0	1.7	0.6	1.7	0.6	1.7	

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 _{OH}	High Level Output Voltage	2.0 4.5 6.0	V _I	I _O	1.9	2.0	—	1.9	—	1.9	—	V
					V _{IH} or V _{IL}	- 20 μA	4.4 5.9	4.5 6.0	— —	4.4 5.9	— —	
			4.5 6.0	- 4.0 mA - 5.2 mA	4.18 5.68	4.31 5.8	— —	4.13 5.63	— —	4.10 5.60	— —	
V _{OL}	Low Level Output Voltage	2.0 4.5 6.0	V _{IH} or V _{IL}	20 μA	—	0	0.1	—	0.1	—	0.1	V
					—	0	0.1	—	0.1	—	0.1	
			4.5 6.0	4.0 mA 5.2 mA	—	0.17 0.18	0.26 0.26	— —	0.33 0.33	— —	0.40 0.40	
I _I	Input Leakage Current	6.0	V _I = V _{CC} or GND		—	—	± 0.1	—	± 1	—	± 1	μA
I _{CC}	Quiescent Supply Current	6.0	V _I = V _{CC} or GND		—	—	1	—	10	—	20	μA

AC ELECTRICAL CHARACTERISTICS (V_{CC} = 5V, T_A = 25°C, C_L = 15pF, Input t_r = t_f = 6ns)

Symbol	Parameter	54HC and 74HC			Unit
		Min.	Typ.	Max.	
t _{TLH} t _{THL}	Output Transition Time		4	8	ns
t _{PLH} t _{PHL}	Propagation Delay Time		14	22	ns

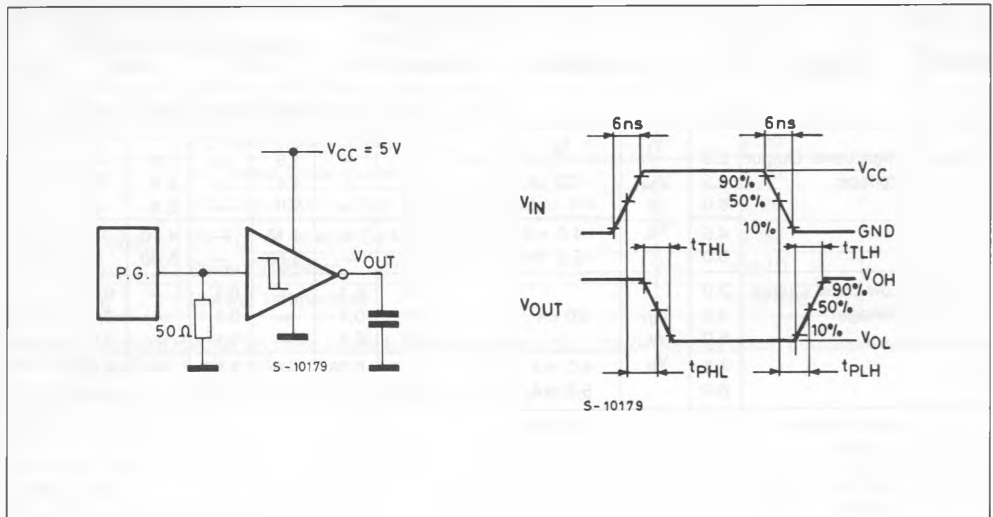
AC ELECTRICAL CHARACTERISTICS (C_L = 50pF, Input t_r = t_f = 6ns)

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 _{TLH} t _{THL}	Output Transition Time	2.0			—	30	75	—	95	—	110	ns
4.5 6.0		—	8	15	—	19	—	22				
		—	7	13	—	16	—	19				
t _{PLH} t _{PHL}	Propagation Delay Time	2.0			—	68	135	—	170	—	205	ns
4.5 6.0		—	17	27	—	34	—	41				
		—	14	23	—	29	—	35				
C _{IN}	Input Capacitance				—	5	10	—	10	—	10	pF
C _{PD} (*)	Power Dissipation Capacitance				—	31	—	—	—	—	—	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. (Refer to Test Circuit)

Average operating current is: I_{CC(opr)} = C_{PD} · V_{CC} · f_{IN} + I_{CC}

SWITCHING CHARACTERISTICS TEST CIRCUIT



TEST CIRCUIT I_{CC} (Opr.)

