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NTE74HC14 **Integrated Circuit** **TTL – High Speed CMOS, Hex Schmitt Trigger Inverter**

Description:

The NTE74HC14 is a hex Schmitt Trigger inverter in a 14-Lead plastic DIP type package and is useful to “square-up” slow input rise and fall times. Due to hysteresis voltage of the Schmitt Trigger, the NTE74HC14 finds applications in noisy environments.

The NTE74HC14 is identical in pinout to the 'LS14, LS04 and the HC04 and the device inputs are compatible with Standard CMOS outputs; with pullup resistors, they are compatible with LSTTL outputs.

Features:

- Output Drive Capability: 10 LSTTL Loads
- Outputs Directly Interface to CMOS, NMOS, and TTL
- Operating Voltage range: 2V to 6V
- Low Input Current: 1.0 μ A
- High Noise Immunity Characteristics of CMOS Devices

Absolute Maximum Ratings: (Note 1, Note 2)

Supply Voltage, V_{CC}	–0.5 to +7.0V
DC Input Voltage, V_{IN}	–0.5 to $V_{CC} + 0.5V$
DC Output Voltage, V_{OUT}	–0.5 to $V_{CC} + 0.5V$
Clamp Diode Current, I_{IK}, I_{OK}	$\pm 20mA$
DC Output Current (Per Pin), I_{OUT}	$\pm 25mA$
DC V_{CC} or GND Current (Per Pin), I_{CC}	$\pm 50mA$
Power Dissipation (Note 3), P_D	600mW
Storage Temperature Range, T_{stg}	–65°C to +150°C
Lead Temperature (During Soldering, 10sec), T_L	+260°C

Note 1. Stresses exceeding the Absolute Maximum Ratings may damage the device. The device may not function or be operable above the Recommended Operating Conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the Recommended Operating Conditions may effect device reliability. The Absolute Maximum Ratings are stress ratings only.

Note 2. Unless otherwise specified, all voltages are referenced to GND.

Note 3. Power Dissipation temperature derating: 12mW/°C from +65°C to +85°C.

Recommended Operating Conditions:

Parameter	Symbol	Min	Max	Unit
Supply Voltage	V_{CC}	2.0	6.0	V
DC Input or Output Voltage	V_{IN}, V_{OUT}	0	V_{CC}	V
Operating Temperature Range	T_A	-55	+125	°C
Input Rise or Fall Times (Note 4) $V_{CC} = 2.0V$	t_r, t_f	0	No Limit	ns
$V_{CC} = 4.5V$		0	No Limit	ns
$V_{CC} = 6.0V$		0	No Limit	ns

Note 4. When $V_{IN} = 50\% V_{CC}$, $I_{CC} > 1mA$.

DC Electrical Characteristics: (Note 2)

Parameter	Symbol	Test Conditions	V_{CC} (V)	Guaranteed Limits			Unit
				-40 to +25°C	≤ 85°C	≤ 125°C	
Maximum Positive-Going Input Threshold Voltage	V_{T+max}	$V_{OUT} = 0.1V, I_{OUT} \leq 20\mu A$	2.0	1.50	1.50	1.50	V
			3.0	2.15	2.15	2.15	V
			4.5	3.15	3.15	3.15	V
			6.0	4.20	4.20	4.20	V
Minimum Positive-Going Input Threshold Voltage	V_{T+min}	$V_{OUT} = 0.1V, I_{OUT} \leq 20\mu A$	2.0	1.0	0.95	0.95	V
			3.0	1.5	1.45	1.45	V
			4.5	2.3	2.25	2.25	V
			6.0	3.0	2.95	2.95	V
Maximum Negative-Going Input Threshold Voltage	V_{T-max}	$V_{OUT} = V_{CC} - 0.1V, I_{OUT} \leq 20\mu A$	2.0	0.9	0.95	0.95	V
			3.0	1.4	1.45	1.45	V
			4.5	2.0	2.05	2.05	V
			6.0	2.6	2.65	2.65	V
Minimum Negative-Going Input Threshold Voltage	V_{T-max}	$V_{OUT} = V_{CC} - 0.1V, I_{OUT} \leq 20\mu A$	2.0	0.3	0.3	0.3	V
			3.0	0.5	0.5	0.5	V
			4.5	0.9	0.9	0.9	V
			6.0	1.2	1.2	1.2	V
Maximum Hysteresis Voltage	V_{Hmax}	$V_{OUT} = 0.1V \text{ or } V_{CC} - 0.1V, I_{OUT} \leq 20\mu A, \text{ Note 5}$	2.0	1.20	1.20	1.20	V
			3.0	1.65	1.65	1.65	V
			4.5	2.25	2.25	2.25	V
			6.0	3.00	3.00	3.00	V
Minimum Hysteresis Voltage	V_{Hmin}	$V_{OUT} = 0.1V \text{ or } V_{CC} - 0.1V, I_{OUT} \leq 20\mu A, \text{ Note 5}$	2.0	0.20	0.20	0.20	V
			3.0	0.25	0.25	0.25	V
			4.5	0.40	0.40	0.40	V
			6.0	0.50	0.50	0.50	V

Note 2. Unless otherwise specified, all voltages are referenced to GND.

Note 5. $V_{Hmin} > (V_{T+min}) - (V_{T-max})$; $V_{Hmax} = (V_{T+max}) - (V_{T-min})$.

DC Electrical Characteristics (Cont'd): (Note 2)

Parameter	Symbol	Test Conditions	V _{CC} (V)	Guaranteed Limits			Unit
				-40 to +25°C	≤ 85°C	≤ 125°C	
Minimum High Level Output Voltage	V _{OH}	V _{IN} = V _{IH} or V _{IL} , I _{OUT} ≤ 20μA	2.0	1.9	1.9	1.9	V
			4.5	4.4	4.4	4.4	V
			6.0	5.9	5.9	5.9	V
	V _{IN} = V _{IH} or V _{IL}	I _{OUT} ≤ 2.4mA	3.0	2.48	2.34	2.20	V
		I _{OUT} ≤ 4.0mA	4.5	3.98	3.84	3.70	V
		I _{OUT} ≤ 5.2mA	6.0	5.48	5.34	5.20	V
Maximum Low Level Output Voltage	V _{OL}	V _{IN} = V _{IH} or V _{IL} , I _{OUT} ≤ 20μA	2.0	0.1	0.1	0.1	V
			4.5	0.1	0.1	0.1	V
			6.0	0.1	0.1	0.1	V
	V _{IN} = V _{IH} or V _{IL}	I _{OUT} ≤ 2.4mA	2.0	0.26	0.33	0.40	V
		I _{OUT} ≤ 4.0mA	4.5	0.26	0.33	0.40	V
		I _{OUT} ≤ 5.2mA	6.0	0.26	0.33	0.40	V
Maximum Input Leakage Current	I _{IN}	V _{IN} = V _{CC} or GND	6.0	±0.1	±1.0	±1.0	μA
Maximum Quiescent Supply Current	I _{CC}	V _{IN} = V _{CC} or GND, I _{OUT} = 0μA	6.0	2.0	20	40	μA

Note 2. Unless otherwise specified, all voltages are referenced to GND.

Note 5. V_{Hmin} > (V_{T+min}) – (V_{T-max}); V_{Hmax} = (V_{T+max}) – (V_{T-min}).

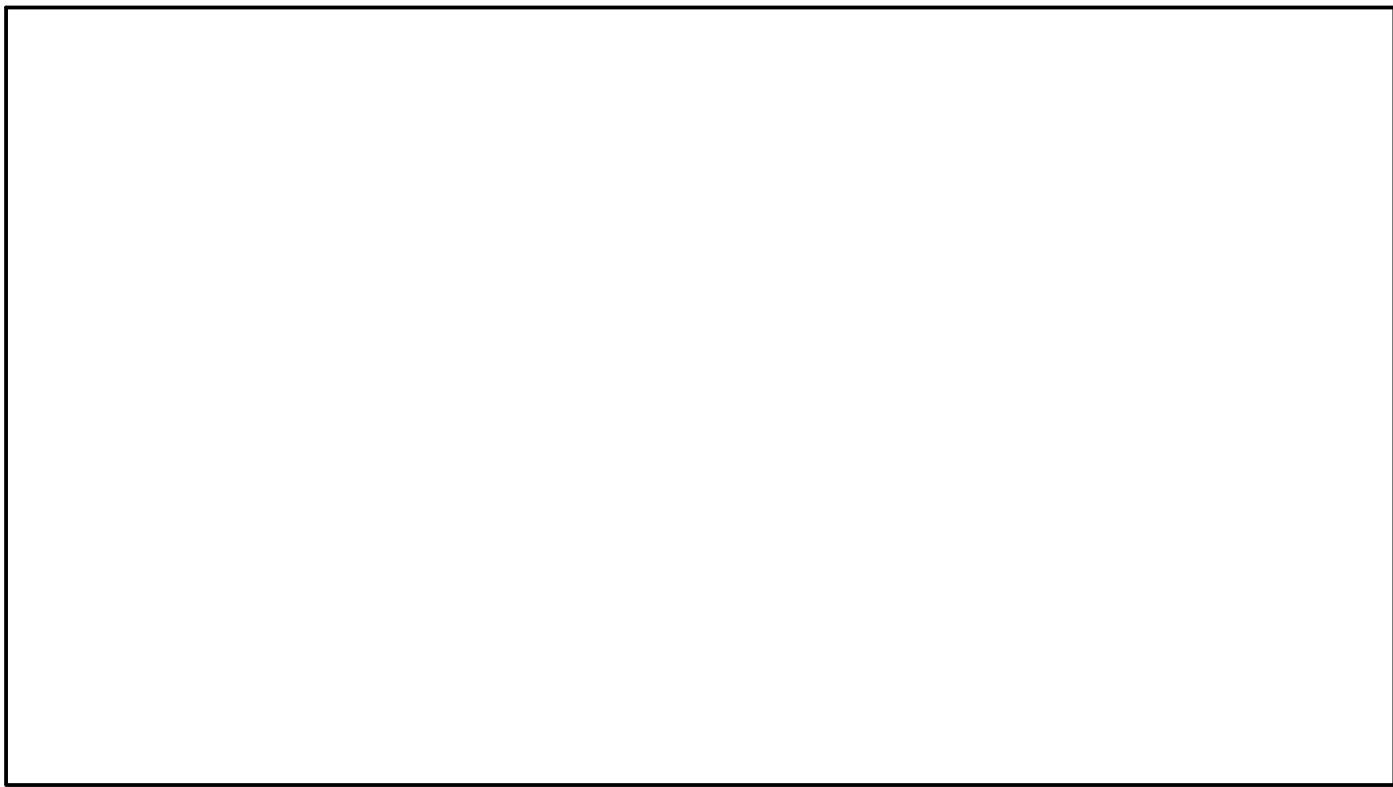
AC Electrical Characteristics: (t_r = t_f = 6ns, C_L = 50pF unless otherwise specified)

Parameter	Symbol	Test Conditions	V _{CC} (V)	Guaranteed Limits			Unit
				-55 to +25°C	≤ 85°C	≤ 125°C	
Maximum Propagation Delay, Input A or B to Output Y	t _{PLH} , t _{PHL}		2.0	75	95	110	ns
			3.0	30	40	55	ns
			4.5	15	19	22	ns
			6.0	13	16	19	ns
Maximum Output Transition Time, Any Output	t _{TLH} , t _{THL}		2.0	75	95	110	ns
			3.0	27	32	36	ns
			4.5	15	19	22	ns
			6.0	13	16	19	ns
Maximum Input Capacitance	C _{in}		–	10	10	10	pF
Parameter	Symbol	Test Conditions	Typical @ +25°C, V _{CC} = 5V, V _{EE} = 0V				Unit
Power Dissipation Capacitance (Per Inverter)	C _{PD}	Note 4	22				pF

Note 4. C_{PD} determines the no load dynamic power consumption, P_D = C_{PD} V_{CC}² f + I_{CC} V_{CC}

Function Table:

Inputs	Outputs
A	Y
L	H
H	L



Pin Connection Diagram

