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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: 1.0μA
- 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} . . . . . ±20mA
DC Output Current (Per Pin), I_{OUT} . . . . . ±25mA
DC V_{CC} or GND Current (Per Pin), I_{CC} . . . . . ±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)	t_r, t_f			
V_{CC} = 2.0V		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, $\|I_{OUT}\| \leq$ 20µA	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, $\|I_{OUT}\| \leq$ 20µA	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, $\|I_{OUT}\| \leq$ 20µA	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, $\|I_{OUT}\| \leq$ 20µA	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	$V_H$max	V_{OUT} = 0.1V or V_{CC} −0.1V, $\|I_{OUT}\| \leq$ 20µA, 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	$V_H$min	V_{OUT} = 0.1V or V_{CC} −0.1V, $\|I_{OUT}\| \leq$ 20µA, 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. $V_H$min > (V_{T+}min) − (V_{T-}max); $V_H$max = (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}, $\|I_{OUT}\| \leq 20\mu A$		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}	$\|I_{OUT}\| \leq 2.4mA$	3.0	2.48	2.34	2.20	V
			$\|I_{OUT}\| \leq 4.0mA$	4.5	3.98	3.84	3.70	V
			$\|I_{OUT}\| \leq 5.2mA$	6.0	5.48	5.34	5.20	V
Maximum Low Level Output Voltage	V_{OL}	$V_{IN} = V_{IH}$ or V_{IL}, $\|I_{OUT}\| \leq 20\mu A$		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}	$\|I_{OUT}\| \leq 2.4mA$	2.0	0.26	0.33	0.40	V
			$\|I_{OUT}\| \leq 4.0mA$	4.5	0.26	0.33	0.40	V
			$\|I_{OUT}\| \leq 5.2mA$	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, $I_{OUT} = 0\mu A$		6.0	2.0	20	40	µA

Note 2. Unless otherwise specified, all voltages are referenced to GND.
Note 5. $V_H$min > (V_{T+}min) − (V_{T-}max); $V_H$max = (V_{T+}max) − (V_{T-}min).

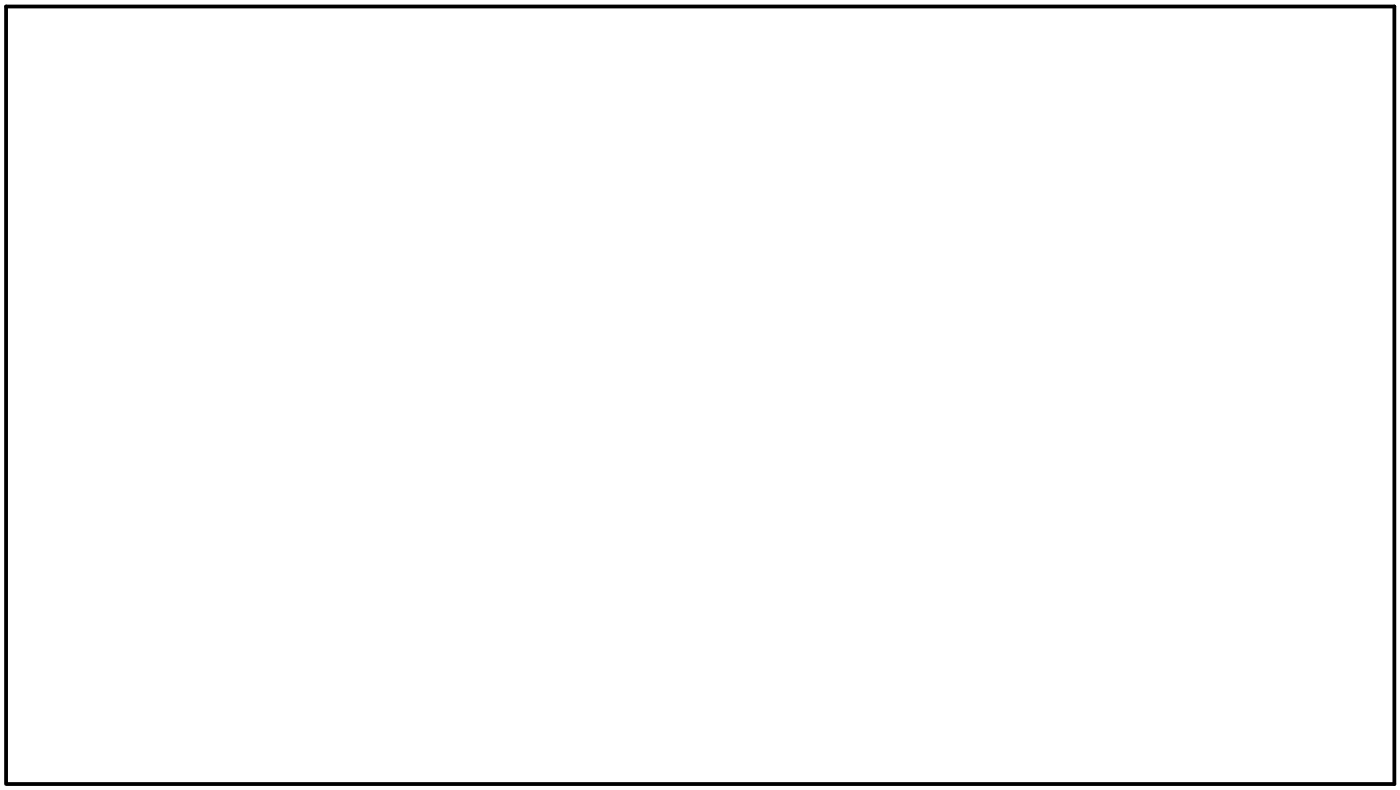
AC Electrical Characteristics: ($t_r = t_f$ = 6ns, C_L = 50pF unless otherwise specified)

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