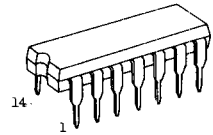
TC74HC14P HEX SCHMITT INVERTER

The TC74HC14 is a high speed CMOS HEX SCHMITT INVERTER fabricated with silicon gate C^2MOS technology.
It achieves the high speed operation similar to equivalent LSTTL while maintaining the CMOS low power dissipation.
Pin configuration and function are the same as those of the TC74HCU04 but all the inputs have 20% V_{CC} hysteresis and with its schmitt trigger function, it can be applicable to line receivers which will receive slow input signals.
All inputs are equipped with protection circuits against static discharge or transient excess voltage.

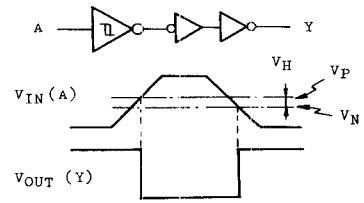
FEATURES:

- High Speed.....t_{pd}=14ns(Typ.) at V_{CC}=5V
- Low Power Dissipation.....I_{CC}=1μA(Max.) at Ta=25°C
- High Noise Immunity.....V_H=0.9V at V_{CC}=5V
- Output Drive Capability.....10 LSTTL Loads
- Symmetrical Output Impedance..$|I_{OH}|=I_{OL}$=4mA
- Balanced Propagation Delays...$t_{pLH} \fallingdotseq t_{pHL}$
- Wide Operating Voltage Range..$V_{CC(opr)}$=2V ~ 6V
- Pin and Function Compatible with 74LS14

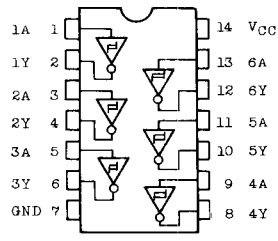


DIP (5-21F)

LOGIC DIAGRAM, WAVEFORM



PIN ASSIGNMENT



(Top View)

ABSOLUTE MAXIMUM RATINGS

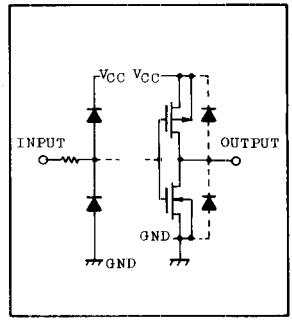
PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage Range	V_{CC}	-0.5 ~ 7	V
DC Input Voltage	V_{IN}	-0.5 ~ V_{CC}+0.5	V
DC Output Voltage	V_{OUT}	-0.5 ~ V_{CC}+0.5	V
Input Diode Current	I_{IK}	±20	mA
Output Diode Current	I_{OK}	±20	mA
DC Output Current	I_{OUT}	±25	mA
DC V_{CC}/Ground Current	I_{CC}	±50	mA
Power Dissipation	P_D	500*	mW
Storage Temperature	T_{stg}	-65 ~ 150	°C
Lead Temperature 10sec	T_L	300	°C

* 500mW in the range of Ta=-40°C ~ 65°C. and from Ta=65°C up to 85°C derating factor of -10mW/°C shall be applied until 300mW.

RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	LIMIT	UNIT
Supply Voltage	V_{CC}	2 ~ 6	V
Input Voltage	V_{IN}	0 ~ V_{CC}	V
Output Voltage	V_{OUT}	0 ~ V_{CC}	V
Operating Temperature	T_{opr}	-40 ~ 85	°C

INPUT and OUTPUT EQUIVALENT CIRCUIT



DC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITION		Ta=25°C			Ta=-40~85°C		UNIT
			V_{CC}	MIN.	TYP.	MAX.	MIN.	MAX.	
Positive Threshold Voltage	V_P		2.0	0.8	1.25	1.7	0.8	1.7	V
			4.5	1.8	2.7	3.42	1.8	3.42	
			6.0	2.4	3.6	4.56	2.4	4.56	
Negative Threshold Voltage	V_N		2.0	0.3	0.75	1.2	0.3	1.2	V
			4.5	1.08	1.9	2.7	1.08	2.7	
			6.0	1.44	2.6	3.6	1.44	3.6	
Hysteresis Voltage	V_H		2.0	0.20	0.5	1.0	0.20	1.0	V
			4.5	0.36	0.8	1.44	0.36	1.44	
			6.0	0.48	1.0	1.92	0.48	1.92	

DC ELECTRICAL CHARACTERISTICS

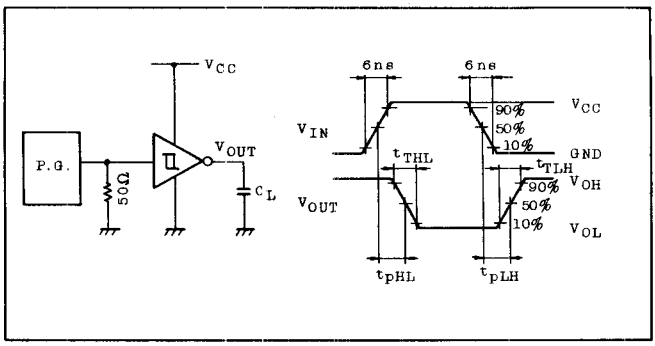
PARAMETER	SYMBOL	TEST CONDITION		V_{CC}	Ta=25°C MIN.	Ta=25°C TYP.	Ta=25°C MAX.	Ta=-40~85°C MIN.	Ta=-40~85°C MAX.	UNIT
High-Level Output Voltage	V_{OH}	V_{IN}=V_{IL}	I_{OH}=-20μA	2.0	1.9	2.0	-	1.9	-	V
				4.5	4.4	4.5	-	4.4	-	
				6.0	5.9	6.0	-	5.9	-	
			I_{OH}=-4mA	4.5	4.18	4.31	-	4.13	-	
			I_{OH}=-5.2mA	6.0	5.68	5.80	-	5.63	-	
Low-Level Output Voltage	V_{OL}	V_{IN}=V_{IH}	I_{OL}=20μA	2.0	-	0.0	0.1	-	0.1	V
				4.5	-	0.0	0.1	-	0.1	
				6.0	-	0.0	0.1	-	0.1	
			I_{OL}=4mA	4.5	-	0.17	0.32	-	0.37	
			I_{OL}=5.2mA	6.0	-	0.18	0.32	-	0.37	
Input Leakage Current	I_{IN}	V_{IN}=V_{CC} or GND		6.0	-	-	±0.1	-	±1.0	μA
Quiescent Supply Current	I_{CC}	V_{IN}=V_{CC} or GND		6.0	-	-	1.0	-	10.0	

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

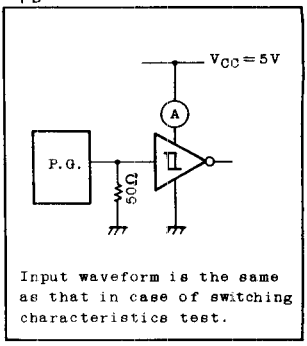
PARAMETER	SYMBOL	TEST CONDITION	V_{CC}	Ta=25°C MIN.	Ta=25°C TYP.	Ta=25°C MAX.	Ta=-40~85°C MIN.	Ta=-40~85°C MAX.	UNIT
Output Transition Time	t_{TLH} t_{THL}		2.0	-	30	75	-	90	ns
			4.5	-	8	15	-	18	
			6.0	-	7	13	-	16	
Propagation Delay Time	t_{pLH} t_{pHL}		2.0	-	62	140	-	170	ns
			4.5	-	19	28	-	34	
			6.0	-	16	24	-	29	
Input Capacitance	C_{IN}			-	5	10	-	10	pF
Power Dissipation Capacitance	C_{PD}(1)			-	31	-	-	-	

Note (1) C_{PD} is defined as the value of internal equivalent capacitance of IC which is calculated from the operating current consumption without load (refer to Test circuit).
Average operating current can be obtained by the equation hereunder.
$I_{CC(opr)}$=C_{PD}·V_{CC}·f_{IN}+I_{CC}/6 (per Gate)

SWITCHING CHARACTERISTICS TEST CIRCUIT

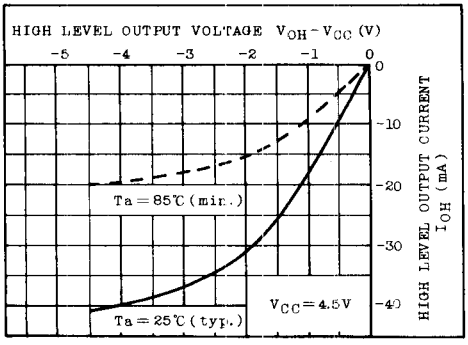


C_{PD} TEST CIRCUIT

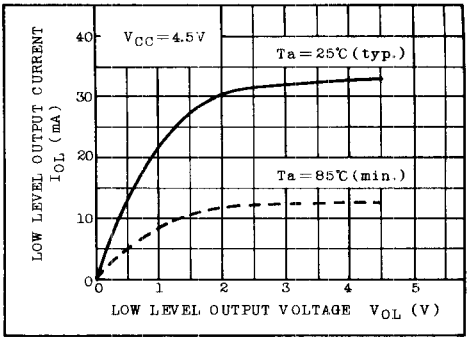


Input waveform is the same as that in case of switching characteristics test.

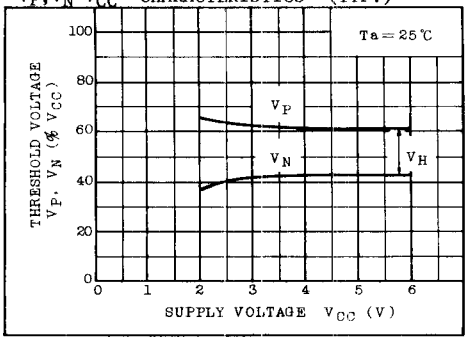
I_{OH} CHARACTERISTICS



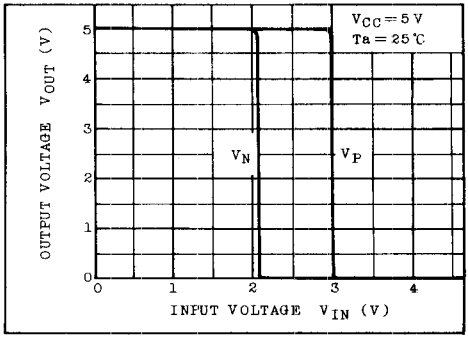
I_{OL} CHARACTERISTICS



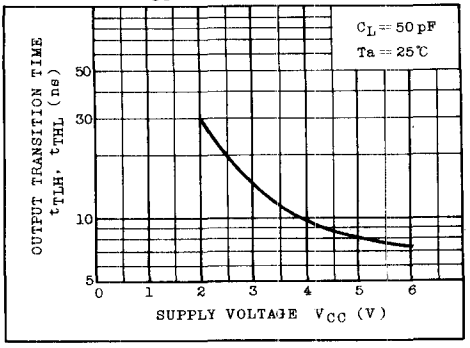
V_P, V_N-V_{CC} CHARACTERISTICS (TYP.)



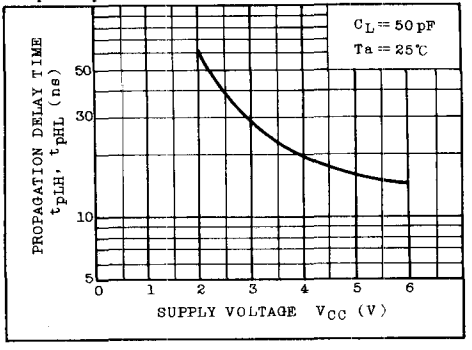
V_{IN}-V_{OUT} CHARACTERISTICS (TYP.)



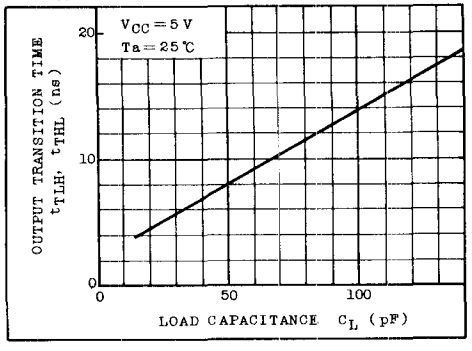
t_{TLH}, t_{THL}-V_{CC} CHARACTERISTICS (TYP.)



t_{pLH}, t_{pHL}-V_{CC} CHARACTERISTICS (TYP.)



t_{TLH}, t_{THL}-C_L CHARACTERISTICS (TYP.)



t_{pLH}, t_{pHL}-C_L CHARACTERISTICS (TYP.)