

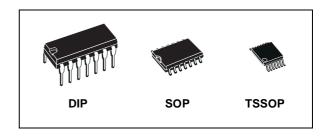
## HEX SCHMITT INVERTER

- HIGH SPEED:  $t_{PD} = 4.5$ ns (TYP.) at  $V_{CC} = 5$ V
- LOW POWER DISSIPATION:  $I_{CC} = 4\mu A(MAX.)$  at  $T_A=25^{\circ}C$
- 50Ω TRASMISSION LINE DRIVING CAPABILITY
- SYMMETRICAL OUTPUT IMPEDANCE: |I<sub>OH</sub>| = I<sub>OL</sub> = 24mA (MIN)
- BALANCED PROPAGATION DELAYS:  $t_{PLH} \cong t_{PHL}$
- OPERATING VOLTAGE RANGE:
  V<sub>CC</sub> (OPR) = 2V to 6V
- PIN AND FUNCTION COMPATIBLE WITH 74 SERIES 14
- IMPROVED LATCH-UP IMMUNITY



The 74AC14 is an advanced high-speed CMOS HEX SCHMITT TRIGGER INVERTER fabricated with sub-micron silicon gate and double-layer metal wiring C<sup>2</sup>MOS technology.

The internal circuit is composed of 3 stages including buffer output, which enables high noise immunity and stable output.



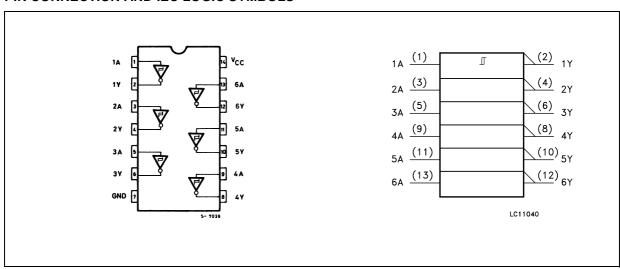
#### **ORDER CODES**

PACKAGE	TUBE	T & R
DIP	74AC14B	
SOP	74AC14M	74AC14MTR
TSSOP		74AC14TTR

This together with its schmitt trigger function allows it to be used on line receivers with slow rise/fall input signals.

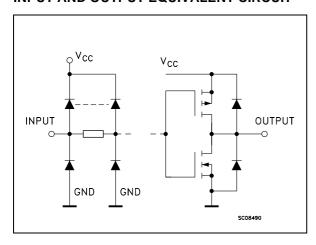
All inputs and outputs are equipped with protection circuits against static discharge, giving them 2KV ESD immunity and transient excess voltage.

### PIN CONNECTION AND IEC LOGIC SYMBOLS



July 2001 1/8

## INPUT AND OUTPUT EQUIVALENT CIRCUIT



## **PIN DESCRIPTION**

PIN No	SYMBOL	NAME AND FUNCTION
1, 3, 5, 9, 11, 13	1A to 6A	Data Inputs
2, 4, 6, 8, 10, 12	1Y to 6Y	Data Outputs
7	GND	Ground (0V)
14	V <sub>CC</sub>	Positive Supply Voltage

## **TRUTH TABLE**

A	Y
L	Н
Н	L

## **ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Value	Unit
V <sub>CC</sub>	Supply Voltage	-0.5 to +7	V
V <sub>I</sub>	DC Input Voltage	-0.5 to V <sub>CC</sub> + 0.5	V
Vo	DC Output Voltage	-0.5 to V <sub>CC</sub> + 0.5	V
I <sub>IK</sub>	DC Input Diode Current	± 20	mA
I <sub>OK</sub>	DC Output Diode Current	± 20	mA
I <sub>O</sub>	DC Output Current	± 50	mA
I <sub>CC</sub> or I <sub>GND</sub>	DC V <sub>CC</sub> or Ground Current	± 300	mA
T <sub>stg</sub>	Storage Temperature	-65 to +150	°C
T <sub>L</sub>	Lead Temperature (10 sec)	300	°C

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied.

## **RECOMMENDED OPERATING CONDITIONS**

Symbol	Parameter	Value	Unit
V <sub>CC</sub>	Supply Voltage	2 to 6	V
V <sub>I</sub>	Input Voltage	0 to V <sub>CC</sub>	V
Vo	Output Voltage	0 to V <sub>CC</sub>	V
T <sub>op</sub>	Operating Temperature	-55 to 125	°C

2/8

## **DC SPECIFICATIONS**

		-	Test Condition				Value				
Symbol	Parameter	Parameter V <sub>CC</sub>		T <sub>A</sub> = 25°C			-40 to	85°C	-55 to	125°C	Unit
		(V)		Min.	Тур.	Max.	Min.	Max.	Min.	Max.	
V <sub>t+</sub>	High Level Input	3.0		2.2			2.2		2.2		
	Voltage	4.5	T <sub>A</sub> =Worst Case	3.2			3.2		3.2		V
		5.5		3.9			3.9		3.9		
$V_{t-}$	Low Level Input	3.0				0.5		0.5		0.5	
	Voltage	4.5	T <sub>A</sub> =Worst Case			0.9		0.9		0.9	V
		5.5				1.1		1.1		1.1	
$V_h$	Hysteresis Voltage	3.0		0.3		1.2	0.3	1.2		1.2	
		4.5	T <sub>A</sub> =Worst Case	0.4		1.4	0.4	1.4		1.4	V
		5.5		0.5		1.6	0.5	1.6		1.6	
$V_{OH}$	V <sub>OH</sub> High Level Output	3.0	I <sub>O</sub> =-50 μA	2.9	2.99		2.9		2.9		
Voltage	4.5	I <sub>O</sub> =-50 μA	4.4	4.49		4.4		4.4			
		5.5	I <sub>O</sub> =-50 μA	5.4	5.49		5.4		5.4		V
		3.0	I <sub>O</sub> =-12 mA	2.56			2.46		2.46		V
		4.5	I <sub>O</sub> =-24 mA	3.86			3.76		3.76		
		5.5	I <sub>O</sub> =-24 mA	4.86			4.76		4.76		
V <sub>OL</sub>	Low Level Output	3.0	I <sub>O</sub> =50 μA		0.002	0.1		0.1		0.1	
	Voltage	4.5	I <sub>O</sub> =50 μA		0.001	0.1		0.1		0.1	
		5.5	I <sub>O</sub> =50 μA		0.001	0.1		0.1		0.1	V
		3.0	I <sub>O</sub> =12 mA			0.36		0.44		0.44	V
		4.5	I <sub>O</sub> =24 mA			0.36		0.44		0.44	
		5.5	I <sub>O</sub> =24 mA			0.36		0.44		0.44	
I <sub>I</sub>	Input Leakage Cur- rent	5.5	$V_I = V_{CC}$ or GND			± 0.1		± 1		± 1	μА
I <sub>CC</sub>	Quiescent Supply Current	5.5	$V_I = V_{CC}$ or GND			4		40		40	μΑ
I <sub>OLD</sub>	Dynamic Output	EF	V <sub>OLD</sub> = 1.65 V max					75		50	mA
I <sub>OHD</sub>	Current (note 1, 2)	5.5	V <sub>OHD</sub> = 3.85 V min					-75		-50	mA

# AC ELECTRICAL CHARACTERISTICS (C $_L$ = 50 pF, $R_L$ = 500 $\Omega,$ Input $t_r$ = $t_f$ = 3ns)

		1	Test Condition				Value				
Symbol Parameter		v <sub>cc</sub>	V <sub>CC</sub>		T <sub>A</sub> = 25°C		-40 to 85°C		-55 to 125°C		Unit
		(V)		Min.	Тур.	Max.	Min.	Max.	Min.	Max.	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay	3.3 <sup>(*)</sup>		1.5	6.0	11.0	1.0	15.0	1.0	16.0	nc
	Time	5.0 <sup>(**)</sup>		1.5	4	8.0	1.0	11.0	1.0	12.0	ns

<sup>1)</sup> Maximum test duration 2ms, one output loaded at time 2) Incident wave switching is guaranteed on transmission lines with impedances as low as  $50\Omega$ 

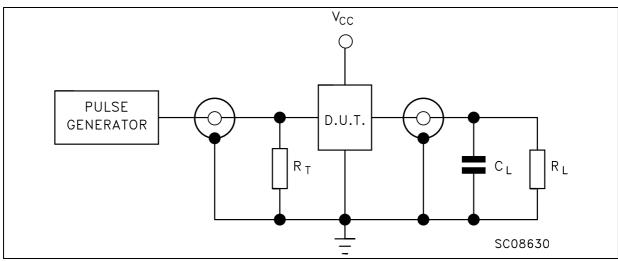
<sup>(\*)</sup> Voltage range is 3.3V ± 0.3V (\*\*) Voltage range is 5.0V ± 0.5V

## **CAPACITIVE CHARACTERISTICS**

		Test Condition		Value							
Symbol	Parameter	V <sub>CC</sub>	V <sub>CC</sub> (V)		<sub>A</sub> = 25°	С	-40 to	85°C	-55 to	125°C	Unit
		(V)			Тур.	Max.	Min.	Max.	Min.	Max.	
C <sub>IN</sub>	Input Capacitance	5.0			4						pF
C <sub>PD</sub>	Power Dissipation Capacitance (note 1)	5.0	f <sub>IN</sub> = 10MHz		35						pF

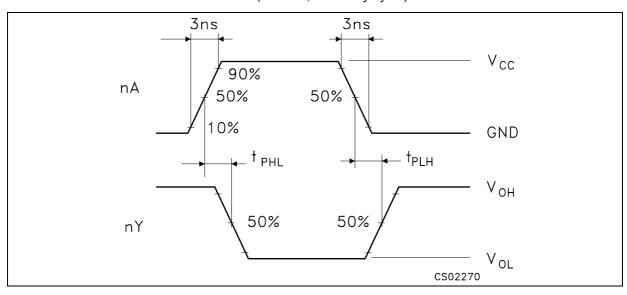
<sup>1)</sup>  $C_{PD}$  is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load. (Refer to Test Circuit). Average operating current can be obtained by the following equation.  $I_{CC(opr)} = C_{PD} \times V_{CC} \times f_{IN} + I_{CC}/6$  (per gate)

#### **TEST CIRCUIT**



 $C_L$  = 50pF or equivalent (includes jig and probe capacitance)  $R_L$  =  $R_1$  = 500 $\Omega$  or equivalent  $R_T$  =  $Z_{OUT}$  of pulse generator (typically 50 $\Omega$ )

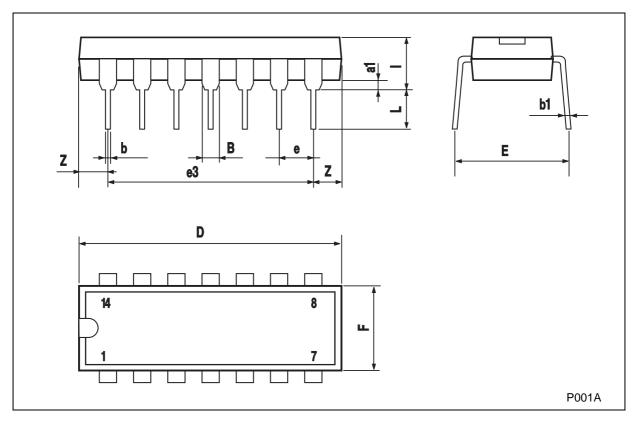
## WAVEFORM: PROPAGATION DELAYS (f=1MHz; 50% duty cycle)



4/8

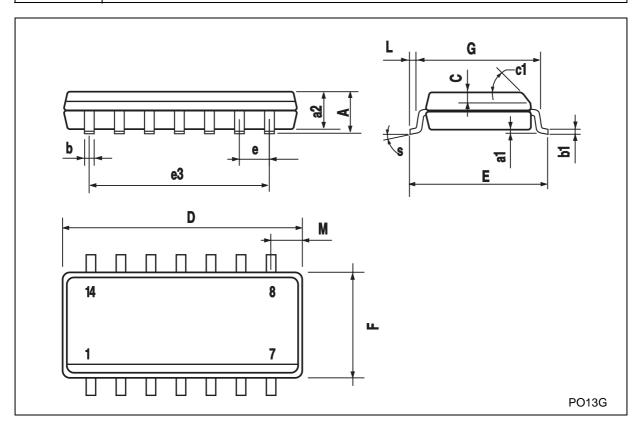
## **Plastic DIP-14 MECHANICAL DATA**

DIM		mm.			inch	
DIM.	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
a1	0.51			0.020		
В	1.39		1.65	0.055		0.065
b		0.5			0.020	
b1		0.25			0.010	
D			20			0.787
E		8.5			0.335	
е		2.54			0.100	
e3		15.24			0.600	
F			7.1			0.280
I			5.1			0.201
L		3.3			0.130	
Z	1.27		2.54	0.050		0.100



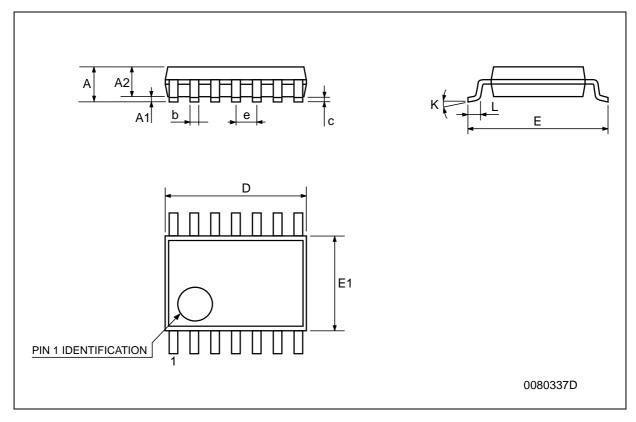
## **SO-14 MECHANICAL DATA**

DIM		mm.			inch	
DIM.	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
Α			1.75			0.068
a1	0.1		0.2	0.003		0.007
a2			1.65			0.064
b	0.35		0.46	0.013		0.018
b1	0.19		0.25	0.007		0.010
С		0.5			0.019	
c1			45°	(typ.)	•	
D	8.55		8.75	0.336		0.344
E	5.8		6.2	0.228		0.244
е		1.27			0.050	
еЗ		7.62			0.300	
F	3.8		4.0	0.149		0.157
G	4.6		5.3	0.181		0.208
L	0.5		1.27	0.019		0.050
М			0.68			0.026
S			8° (ı	max.)		



## **TSSOP14 MECHANICAL DATA**

DIM.		mm.		inch			
DIWI.	MIN.	TYP	MAX.	MIN.	TYP.	MAX.	
А			1.2			0.047	
A1	0.05		0.15	0.002	0.004	0.006	
A2	0.8	1	1.05	0.031	0.039	0.041	
b	0.19		0.30	0.007		0.012	
С	0.09		0.20	0.004		0.0089	
D	4.9	5	5.1	0.193	0.197	0.201	
E	6.2	6.4	6.6	0.244	0.252	0.260	
E1	4.3	4.4	4.48	0.169	0.173	0.176	
е		0.65 BSC			0.0256 BSC		
К	0°		8°	0°		8°	
L	0.45	0.60	0.75	0.018	0.024	0.030	



Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

© The ST logo is a registered trademark of STMicroelectronics

© 2001 STMicroelectronics - Printed in Italy - All Rights Reserved STMicroelectronics GROUP OF COMPANIES

Australia - Brazil - China - Finland - France - Germany - Hong Kong - India - Italy - Japan - Malaysia - Malta - Morocco Singapore - Spain - Sweden - Switzerland - United Kingdom © http://www.st.com

