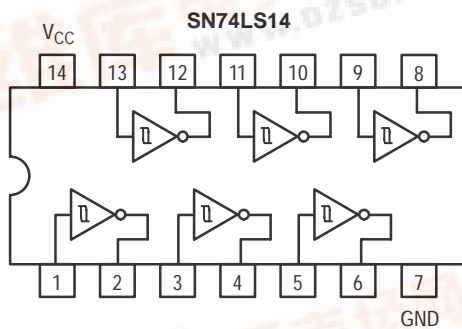# SN74LS14

Schmitt Triggers Dual Gate/Hex Inverter

The SN74LS14 contains logic gates/inverters which accept standard TTL input signals and provide standard TTL output levels. They are capable of transforming slowly changing input signals into sharply defined, jitter-free output signals. Additionally, they have greater noise margin than conventional inverters.

Each circuit contains a Schmitt trigger followed by a Darlington level shifter and a phase splitter driving a TTL totem pole output. The Schmitt trigger uses positive feedback to effectively speed-up slow input transitions, and provide different input threshold voltages for positive and negative-going transitions. This hysteresis between the positive-going and negative-going input thresholds (typically 800 mV) is determined internally by resistor ratios and is essentially insensitive to temperature and supply voltage variations.

ON Semiconductor
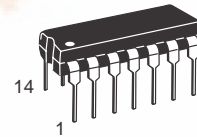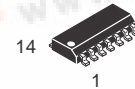Formerly a Division of Motorola
http://onsemi.com

**LOW
POWER
SCHOTTKY**

**PLASTIC
N SUFFIX
CASE 646**

**SOIC
D SUFFIX
CASE 751A**

LOGIC AND CONNECTION DIAGRAMS

SN74LS14

GUARANTEED OPERATING RANGES

Symbol	Parameter	Min	Typ	Max	Unit
V_{CC}	Supply Voltage	4.75	5.0	5.25	V
T_A	Operating Ambient Temperature Range	0	25	70	°C
I_{OH}	Output Current – High			− 0.4	mA
I_{OL}	Output Current – Low			8.0	mA

ORDERING INFORMATION

Device	Package	Shipping
SN74LS14N	14 Pin DIP	2000 Units/Box
SN74LS14D	14 Pin	2500/Tape & Reel

SN74LS14

DC CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE (unless otherwise specified)

Symbol	Parameter	Limits			Unit	Test Conditions
		Min	Typ	Max		
V_{T+}	Positive-Going Threshold Voltage	1.5		2.0	V	$V_{CC} = 5.0$ V
V_{T-}	Negative-Going Threshold Voltage	0.6		1.1	V	$V_{CC} = 5.0$ V
$V_{T+} - V_{T-}$	Hysteresis	0.4	0.8		V	$V_{CC} = 5.0$ V
V_{IK}	Input Clamp Diode Voltage		−0.65	−1.5	V	$V_{CC} = $ MIN, $I_{IN} = -18$ mA
V_{OH}	Output HIGH Voltage	2.7	3.4		V	$V_{CC} = $ MIN, $I_{OH} = -400$ μA, $V_{IN} = V_{IL}$
V_{OL}	Output LOW Voltage		0.25	0.4	V	$V_{CC} = $ MIN, $I_{OL} = 4.0$ mA, $V_{IN} = 2.0$ V
			0.35	0.5	V	$V_{CC} = $ MIN, $I_{OL} = 8.0$ mA, $V_{IN} = 2.0$ V
I_{T+}	Input Current at Positive-Going Threshold		−0.14		mA	$V_{CC} = 5.0$ V, $V_{IN} = V_{T+}$
I_{T-}	Input Current at Negative-Going Threshold		−0.18		mA	$V_{CC} = 5.0$ V, $V_{IN} = V_{T-}$
I_{IH}	Input HIGH Current		1.0	20	μA	$V_{CC} = $ MAX, $V_{IN} = 2.7$ V
				0.1	mA	$V_{CC} = $ MAX, $V_{IN} = 7.0$ V
I_{IL}	Input LOW Current			−0.4	mA	$V_{CC} = $ MAX, $V_{IN} = 0.4$ V
I_{OS}	Short Circuit Current (Note 1)	−20		−100	mA	$V_{CC} = $ MAX, $V_{OUT} = 0$ V
I_{CC}	Power Supply Current Total, Output HIGH		8.6	16	mA	$V_{CC} = $ MAX
	Total, Output LOW		12	21		

Note 1: Not more than one output should be shorted at a time, nor for more than 1 second.

AC CHARACTERISTICS ($T_A = 25°C$)

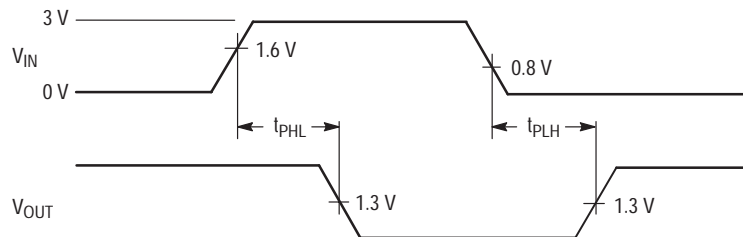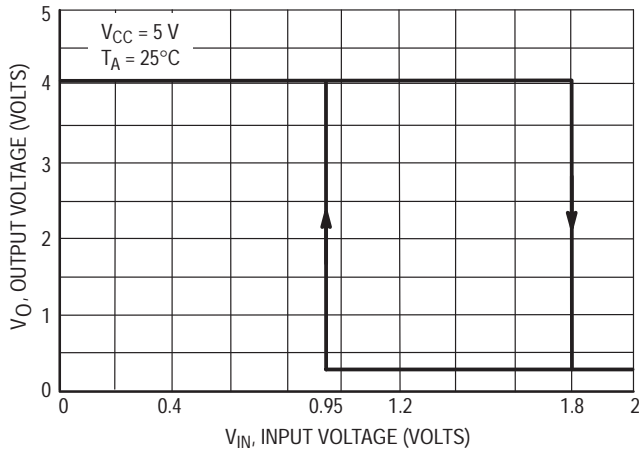| Symbol	Parameter	Max	Unit	Test Conditions
t_{PLH}	Propagation Delay, Input to Output	22	ns	$V_{CC} = 5.0$ V
t_{PHL}	Propagation Delay, Input to Output	22	ns	$C_L = 15$ pF

Figure 1. AC Waveforms

Figure 2. V_{IN} versus V_{OUT} Transfer Function
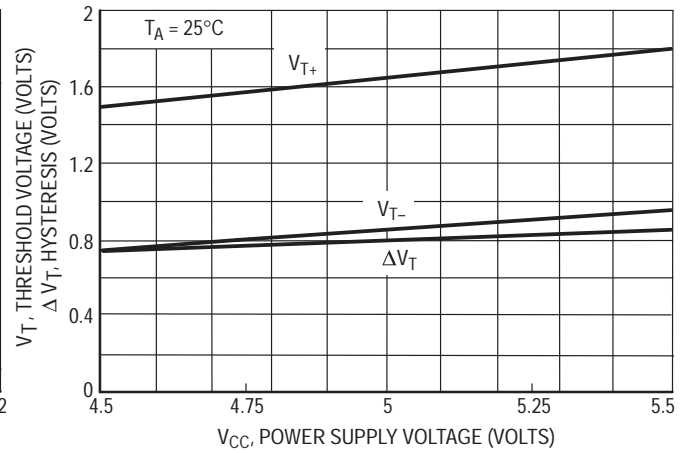

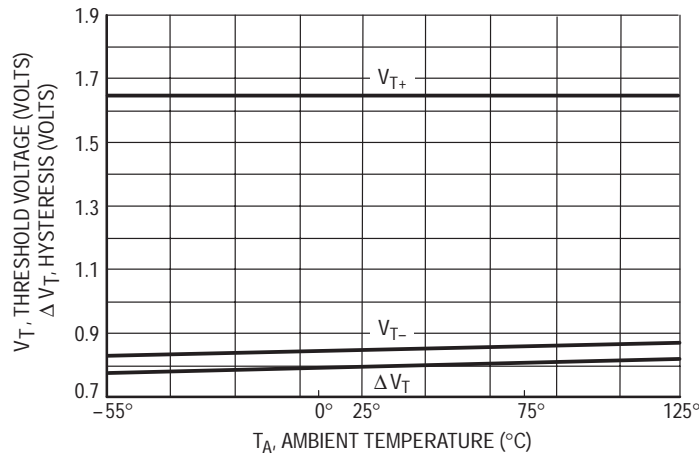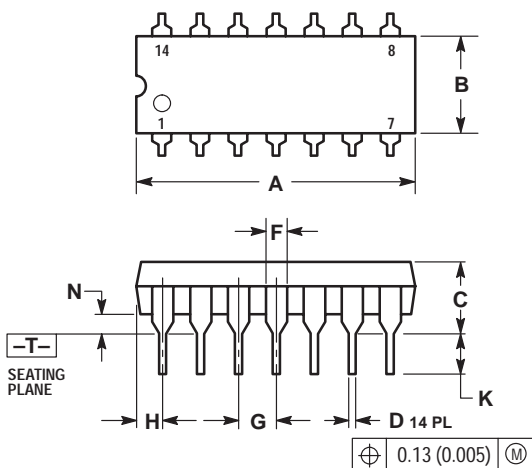Figure 3. Threshold Voltage and Hysteresis
versus Power Supply Voltage

Figure 4. Threshold Voltage Hysteresis
versus Temperature

PACKAGE DIMENSIONS

N SUFFIX
PLASTIC PACKAGE
CASE 646–06
ISSUE M

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.
5. ROUNDED CORNERS OPTIONAL.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.715	0.770	18.16	18.80
B	0.240	0.260	6.10	6.60
C	0.145	0.185	3.69	4.69
D	0.015	0.021	0.38	0.53
F	0.040	0.070	1.02	1.78
G	0.100 BSC		2.54 BSC	
H	0.052	0.095	1.32	2.41
J	0.008	0.015	0.20	0.38
K	0.115	0.135	2.92	3.43
L	0.290	0.310	7.37	7.87
M	–––	10°	–––	10°
N	0.015	0.039	0.38	1.01

SN74LS14

PACKAGE DIMENSIONS

D SUFFIX
PLASTIC SOIC PACKAGE
CASE 751A–03
ISSUE F
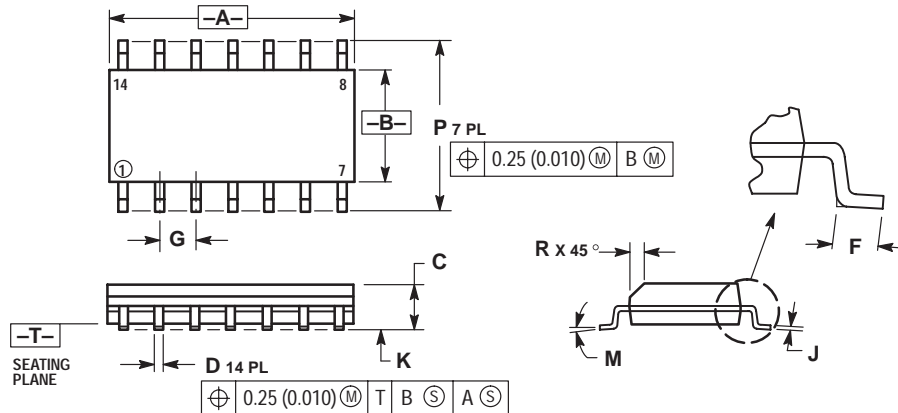
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	8.55	8.75	0.337	0.344
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27 BSC		0.050 BSC	
J	0.19	0.25	0.008	0.009
K	0.10	0.25	0.004	0.009
M	0 °	7 °	0 °	7 °
P	5.80	6.20	0.228	0.244
R	0.25	0.50	0.010	0.019