Hex Inverters with Open-Drain Outputs

This device contains idenpendent inverts. It performs the Boolean function Y=A. The open collector outputs require pull-up resistor to perform correctly. Open-collector devices are often used to generate higher V_{OH} levels.

Pull-Up Resistor Equations

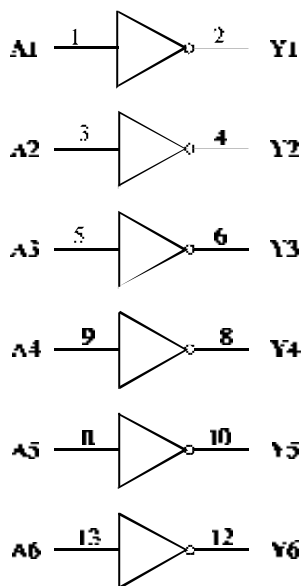$$R_{MAX} = \frac{V_{CC}(Min) - V_{OH}}{N_1(I_{OH}) + N_2(I_{IH})}$$

$$R_{MIN} = \frac{V_{CC}(Max) - V_{OL}}{(I_{OL} + N_3(I_{IL})}$$

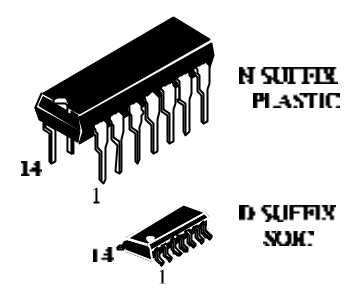Where: $N_1(I_{OH})$=total maximum output high current for all outputs tied to pull-up resistor

$N_2(I_{IH})$=total input high current for all inputs tied to pull-up resistor

$N_3(I_{IL})$=total input low current for all inputs tied to pull-up resistor

ORDERING INFORMATION
SL74LS05N Plastic
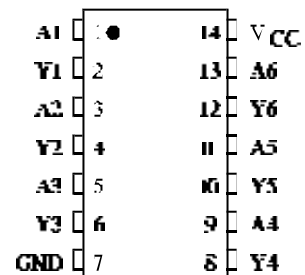SL74LS05D SOIC
T_A = -0° to 70° C
for all packages

LOGIC DIAGRAM

PIN 14 = V_{CC}
PIN 7 = GND

PIN ASSIGNMENT

FUNCTION TABLE

Inputs	Output
A	Y
L	H
H	L

SL74LS05

MAXIMUM RATINGS*

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	7.0	V
V_{IN}	Input Voltage	7.0	V
V_{OUT}	Output Voltage	7.0	V
Tstg	Storage Temperature Range	-65 to +150	°C

*Maximum Ratings are those values beyond which damage to the device may occur.
Functional operation should be restricted to the Recommended Operating Conditions.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V_{CC}	Supply Voltage	4.75	5.25	V
V_{IH}	High Level Input Voltage	2.0		V
V_{IL}	Low Level Input Voltage		0.8	V
V_{OH}	High Level Output Voltage		5.5	V
I_{OL}	Low Level Output Current		8.0	mA
T_A	Ambient Temperature Range	0	+70	°C

DC ELECTRICAL CHARACTERISTICS over full operating conditions

Symbol	Parameter	Test Conditions		Guaranteed Limit		Unit
				Min	Max	
V_{IK}	Input Clamp Voltage	V_{CC} = min, I_{IN} = -18 mA			-1.5	V
I_{OH}	High Level Output Current	V_{CC} = min, V_{OH} =max			0.1	mA
V_{OL}	Low Level Output Voltage	V_{CC} = min, I_{OL} = 4 mA			0.4	V
		V_{CC} = min, I_{OL} = 8 mA			0.5	
I_{IH}	High Level Input Current	V_{CC} = max, V_{IN} = 2.7 V			20	µA
		V_{CC} = max, V_{IN} = 7.0 V			0.1	mA
I_{IL}	Low Level Input Current	V_{CC} = max, V_{IN} = 0.4 V			-0.4	mA
I_{CC}	Supply Current	V_{CC} = max	Total with outputs high		2.4	mA
			Total with outputs low		6.6	

AC ELECTRICAL CHARACTERISTICS (V_{CC} = 5.0 V, C_L = 15 pF, T_A=25°C, R_L = 2 kΩ, t_r =15 ns, t_f = 6.0 ns)

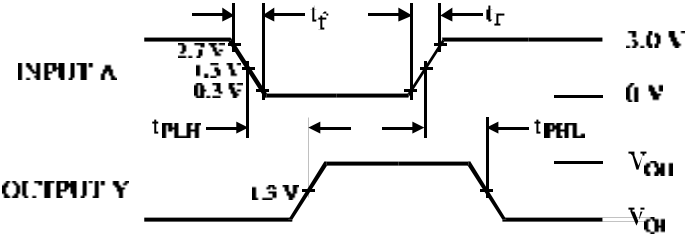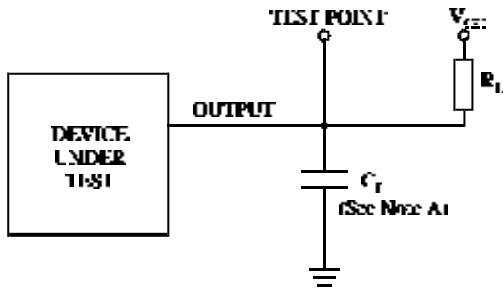| Symbol	Parameter	Min	Max	Unit
t_{PLH}	Propagation Delay Time		32	ns
t_{PHL}	Propagation Delay Time		28	ns

Figure 1. Switching Waveforms

NOTE A. C_L includes probe and jig capacitance.

Figure 2. Test Circuit

SLS System Logic
Semiconductor