



# 3.3V CMOS HEX BUFFER/DRIVER WITH OPEN-DRAIN OUTPUTS AND 5 VOLT TOLERANT I/O

**IDT74LVC07A**

## FEATURES:

- 0.5 MICRON CMOS Technology
- ESD > 2000V per MIL-STD-883, Method 3015; > 200V using machine model (C = 200pF, R = 0)
- Vcc = 3.3V ± 0.3V, Normal Range
- Vcc = 2.7V to 3.6V, Extended Range
- CMOS power levels (0.4µ W typ. static)
- Rail-to-Rail output swing for increased noise margin
- All inputs, outputs, and I/Os are 5V tolerant
- Supports hot insertion
- Available in SOIC, SSOP, and TSSOP packages

## DRIVE FEATURES:

- High Output Drivers: ±24mA
- Reduced system switching noise

## DESCRIPTION:

This hex buffer/driver is built using advanced dual metal CMOS technology. The outputs of the LVC07A device are open-drain and can be connected to other open-drain outputs to implement active-low wired-OR or active-high wired-AND functions. The maximum sink current is 24mA.

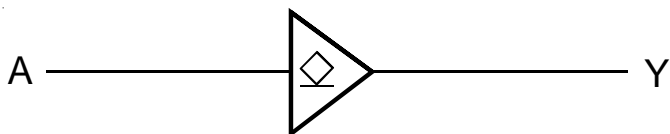
The LVC07A has been designed with a +24mA output driver. This driver is capable of driving a moderate to heavy load while maintaining speed performance.

Inputs can be driven from either 2.5V, 3.3V (LVTTTL), or 5V (CMOS) devices. This feature allows the use of this device as a translator in a mixed-system environment.

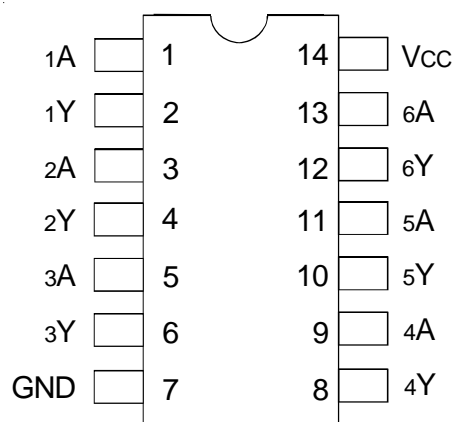
## APPLICATIONS:

- 5V and 3.3V mixed voltage systems
- Data communication and telecommunication systems

## FUNCTIONAL BLOCK DIAGRAM



## PIN CONFIGURATION



SOIC/ SSOP/ TSSOP  
TOP VIEW

## PIN DESCRIPTION

Pin Names	Description
x A	Data Inputs
x Y	Data Outputs

## FUNCTION TABLE (EACH BUFFER/DRIVER)<sup>(1)</sup>

Inputs	Outputs (with pull-up)
x A	x Y
H	H
L	L

### NOTE:

1. H = HIGH Voltage Level  
L = LOW Voltage Level

### ABSOLUTE MAXIMUM RATINGS<sup>(1)</sup>

Symbol	Description	Max	Unit
VTERM	Terminal Voltage with Respect to GND	-0.5 to +6.5	V
TSTG	Storage Temperature	-65 to +150	°C
I <sub>OUT</sub>	DC Output Current	-50 to +50	mA
I <sub>IK</sub> I <sub>OK</sub>	Continuous Clamp Current, V <sub>I</sub> < 0 or V <sub>O</sub> < 0	-50	mA
I <sub>CC</sub> I <sub>SS</sub>	Continuous Current through each V <sub>CC</sub> or GND	±100	mA

**NOTE:**

1. Stresses greater than those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

### CAPACITANCE (T<sub>A</sub> = +25°C, F = 1.0MHz)

Symbol	Parameter <sup>(1)</sup>	Conditions	Typ.	Max.	Unit
C <sub>IN</sub>	Input Capacitance	V <sub>IN</sub> = 0V	4.5	6	pF
C <sub>OUT</sub>	Output Capacitance	V <sub>OUT</sub> = 0V	5.5	8	pF
C <sub>I/O</sub>	I/O Port Capacitance	V <sub>IN</sub> = 0V	6.5	8	pF

**NOTE:**

1. As applicable to the device type.

### DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

Following Conditions Apply Unless Otherwise Specified:

Operating Condition: T<sub>A</sub> = -40°C to +85°C

Symbol	Parameter	Test Conditions		Min.	Typ. <sup>(1)</sup>	Max.	Unit
V <sub>IH</sub>	Input HIGH Voltage Level	V <sub>CC</sub> = 2.3V to 2.7V		1.7	—	—	V
		V <sub>CC</sub> = 2.7V to 3.6V		2	—	—	
		V <sub>CC</sub> = 4.5V to 5.5V		0.7 x V <sub>CC</sub>	—	—	
V <sub>IL</sub>	Input LOW Voltage Level	V <sub>CC</sub> = 2.3V to 2.7V		—	—	0.7	V
		V <sub>CC</sub> = 2.7V to 3.6V		—	—	0.8	
		V <sub>CC</sub> = 4.5V to 5.5V		—	—	0.3 x V <sub>CC</sub>	
I <sub>IH</sub> I <sub>IL</sub>	Input Leakage Current	V <sub>CC</sub> = 3.6V	V <sub>I</sub> = 0 to 5.5V	—	—	±5	μA
I <sub>OZH</sub> I <sub>OZL</sub>	High Impedance Output Current (3-State Output pins)	V <sub>CC</sub> = 3.6V	V <sub>O</sub> = 0 to 5.5V	—	—	±10	μA
I <sub>OFF</sub>	Input/Output Power Off Leakage	V <sub>CC</sub> = 0V, V <sub>IN</sub> or V <sub>O</sub> ≤ 5.5V		—	—	±50	μA
V <sub>IK</sub>	Clamp Diode Voltage	V <sub>CC</sub> = 2.3V, I <sub>IIN</sub> = -18mA		—	-0.7	-1.2	V
V <sub>H</sub>	Input Hysteresis	V <sub>CC</sub> = 3.3V		—	100	—	mV
I <sub>CC1</sub> I <sub>CC2</sub> I <sub>CC3</sub>	Quiescent Power Supply Current	V <sub>CC</sub> = 3.6V, V <sub>IN</sub> = GND or V <sub>CC</sub>		—	—	10	μA
ΔI <sub>CC</sub>	Quiescent Power Supply Current Variation	One input at V <sub>CC</sub> - 0.6V, other inputs at V <sub>CC</sub> or GND		—	—	500	μA

**NOTE:**

1. Typical values are at V<sub>CC</sub> = 3.3V, +25°C ambient.

## OUTPUT DRIVE CHARACTERISTICS

Symbol	Parameter	Test Conditions <sup>(1)</sup>		Min.	Max.	Unit
VOL	Output LOW Voltage	VCC = 2.3V to 3.6V	IoL = 0.1mA	—	0.2	V
		VCC = 2.3V	IoL = 6mA	—	0.4	
			IoL = 12mA	—	0.7	
		VCC = 2.7V	IoL = 12mA	—	0.4	
		VCC = 3V	IoL = 24mA	—	0.55	

## NOTE:

- V<sub>IH</sub> and V<sub>IL</sub> must be within the min. or max. range shown in the DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE table for the appropriate V<sub>CC</sub> range.  
T<sub>A</sub> = - 40°C to + 85°C.

OPERATING CHARACTERISTICS, T<sub>A</sub> = 25°C

Symbol	Parameter	Test Conditions	VCC = 2.5V±0.2V	VCC = 3.3V±0.3V	VCC = 5V±0.5V	Unit
			Typical	Typical	Typical	
CPD	Power Dissipation Capacitance per Buffer/Driver	CL = 0pF, f = 10Mhz	2.5	4	7	pF

SWITCHING CHARACTERISTICS<sup>(1)</sup>

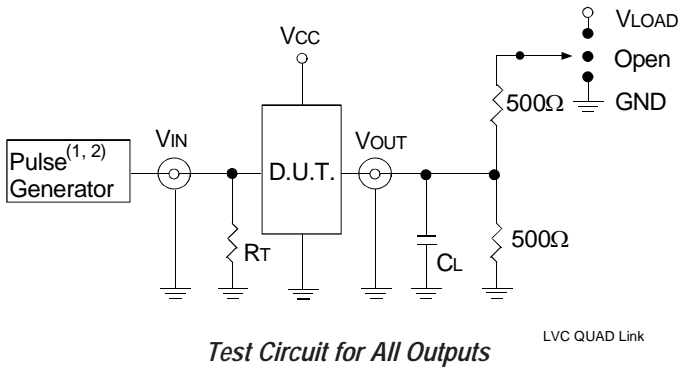
Symbol	Parameter	VCC = 2.5V±0.2V		VCC = 2.7V		VCC = 3.3V ± 0.3V		VCC = 5V±0.5V		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
tPZL	xA to xY	1	2.8	1	3.3	1	2.9	1	2.6	ns
tPLZ										
t <sub>sk(0)</sub>	Output Skew <sup>(2)</sup>	—	—	—	—	—	—	—	500	ps

## NOTES:

- See TEST CIRCUITS AND WAVEFORMS. T<sub>A</sub> = - 40°C to + 85°C.
- Skew between any two outputs of the same package and switching in the same direction.

TEST CIRCUITS AND WAVEFORMS  
TEST CONDITIONS

Symbol	V <sub>CC</sub> <sup>(1)</sup> = 2.5V±0.2V	V <sub>CC</sub> <sup>(2)</sup> = 3.3V±0.3V & 2.7V	V <sub>CC</sub> <sup>(2)</sup> = 5V±0.5V	Unit
V <sub>LOAD</sub>	2 x V <sub>CC</sub>	6	2 x V <sub>CC</sub>	V
V <sub>IH</sub>	V <sub>CC</sub>	2.7	3	V
V <sub>T</sub>	V <sub>CC</sub> / 2	1.5	1.5	V
V <sub>LZ</sub>	150	300	200	mV
V <sub>HZ</sub>	150	300	200	mV
C <sub>L</sub>	30	50	50	pF



DEFINITIONS:

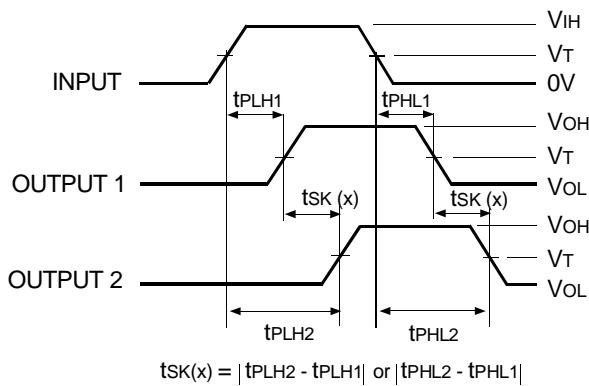
C<sub>L</sub> = Load capacitance: includes jig and probe capacitance.  
R<sub>T</sub> = Termination resistance: should be equal to Z<sub>OUT</sub> of the Pulse Generator.

NOTES:

1. Pulse Generator for All Pulses: Rate ≤ 10MHz; tr ≤ 2ns; tr ≤ 2ns.
2. Pulse Generator for All Pulses: Rate ≤ 10MHz; tr ≤ 2.5ns; tr ≤ 2.5ns.

SWITCH POSITION

Test	Switch
t <sub>PZL</sub>	V <sub>LOAD</sub>
t <sub>PLZ</sub>	
t <sub>PHZ</sub>	
t <sub>PZH</sub>	

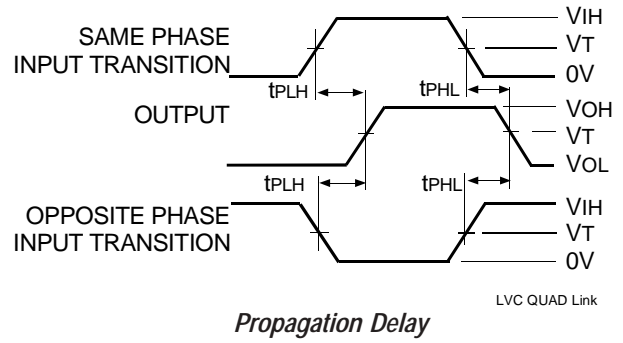


$$t_{SK}(x) = |t_{PLH2} - t_{PLH1}| \text{ or } |t_{PHL2} - t_{PHL1}|$$

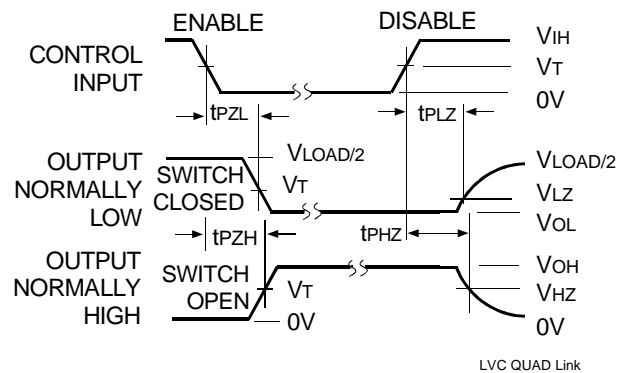
Output Skew - t<sub>SK</sub>(x)

NOTES:

1. For t<sub>SK</sub>(o) OUTPUT1 and OUTPUT2 are any two outputs.
2. For t<sub>SK</sub>(b) OUTPUT1 and OUTPUT2 are in the same bank.



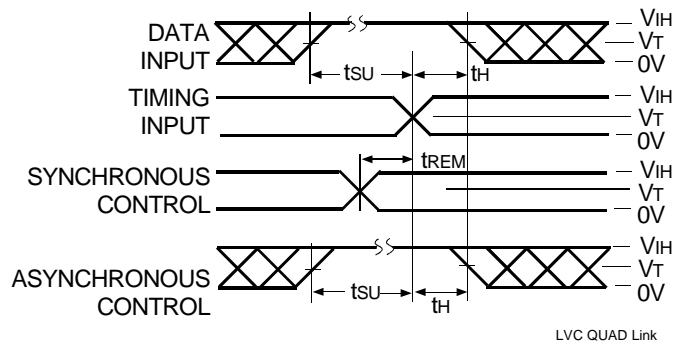
Propagation Delay



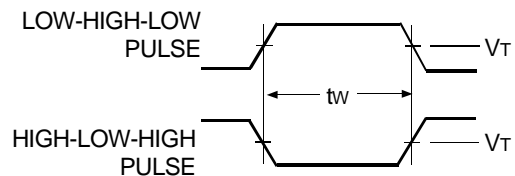
NOTE:

1. Diagram shown for input Control Enable-LOW and input Control Disable-HIGH.

Enable and Disable Times

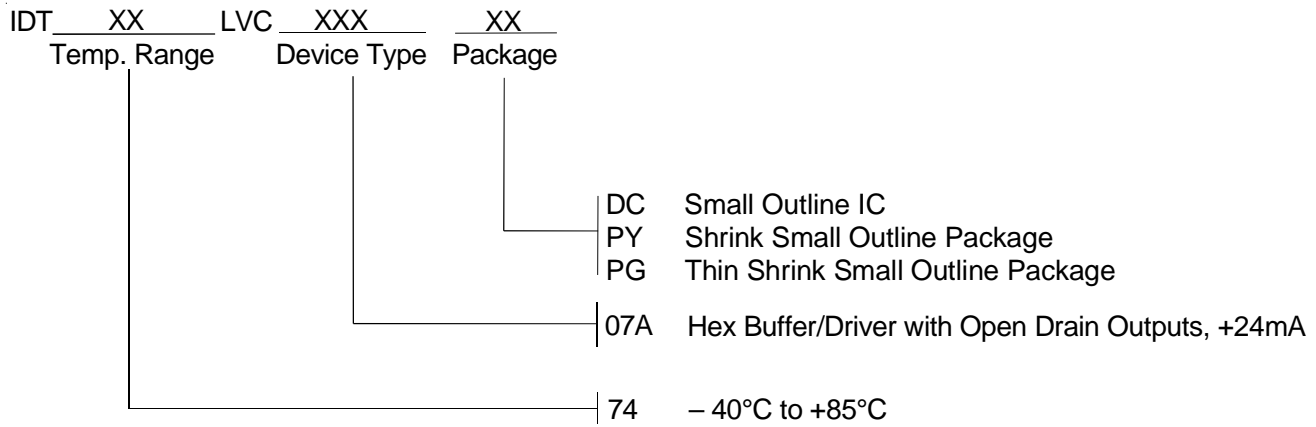


Set-up, Hold, and Release Times



Pulse Width

## ORDERING INFORMATION



**CORPORATE HEADQUARTERS**  
2975 Stender Way  
Santa Clara, CA 95054

**for SALES:**  
800-345-7015 or 408-727-6116  
fax: 408-492-8674  
www.idt.com

**for Tech Support:**  
logichelp@idt.com  
(408) 654-6459