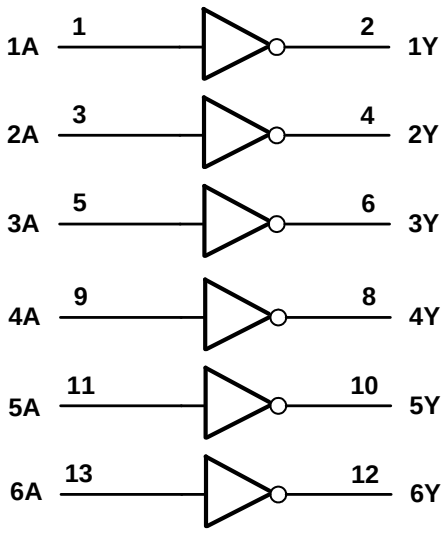
Pin Descriptions

Pin Number	Pin Name	Description
1	1A	Data Input
2	1Y	Data Output
3	2A	Data Input
4	2Y	Data Output
5	3A	Data Input
6	3Y	Data Output
7	GND	Ground
8	4Y	Data Output
9	4A	Data Input
10	5Y	Data Output
11	5A	Data Input
12	6Y	Data Output
13	6A	Data Input
14	V_{CC}	Supply Voltage

Logic Diagram



Function Table

Inputs	Outputs
A	**Y**
H	L
L	H

Absolute Maximum Ratings (Note 4) (@T_A = +25°C, unless otherwise specified.)

Symbol	Description	Rating	Unit
ESD HBM	Human Body Model ESD Protection	2	KV
ESD CDM	Charged Device Model ESD Protection	1	KV
ESD MM	Machine Model ESD Protection	200	V
V_{CC}	Supply Voltage Range	-0.5 to 6.5	V
V_I	Input Voltage Range	-0.5 to 6.5	V
V_o	Voltage Applied to Output in High Impedance or I_{OFF} State	-0.5 to 6.5	V
V_o	Voltage Applied to Output in High or Low State	-0.3 to V_{CC} +0.5	V
I_{IK}	Input Clamp Current V_I<0	-50	mA
I_{OK}	Output Clamp Current V_O<0	-50	mA
I_O	Continuous Output Current	50	mA
—	Continuous Current Through Vdd or GND	±100	mA
T_J	Operating Junction Temperature	-40 to +150	°C
T_{STG}	Storage Temperature	-65 to +150	°C
P_{TOT}	Total Power Dissipation	500	mW

Note: 4. Stresses beyond the absolute maximum may result in immediate failure or reduced reliability. These are stress values and device operation should be within recommend values.

Recommended Operating Conditions (Note 5) (@T_A = +25°C, unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CC}	Supply Voltage	—	1.65	5.5	V
V_I	Input Voltage	—	0	5.5	V
V_O	Output Voltage	Active Mode	0	V_{CC}	V
		V_{CC}= 0V; Power Down Mode	0	5.5	V
Δt/ΔV	Input Transition Rise or Fall Rate	V_{CC} = 1.65V to 2.7V	—	20	ns/V
		V_{CC} = 2.7V to 5.5V	—	10	
T_A	Operating Free-Air Temperature	—	-40	+125	°C

Notes: 5. Unused inputs should be held at V_{CC} or Ground.

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Symbol	Parameter	Test Conditions	V_{CC}	T_A = -40°C to +85°C		T_A = -40°C to +125°C		Unit
				Min	Max	Min	Max	
V_{IH}	High-Level Input Voltage	—	1.65V to 1.95V	0.65 × V_{CC}	—	0.65 × V_{CC}	—	V
		—	2.3V to 2.7V	1.7	—	1.6	—	
		—	2.7V to 3.6V	2.0	—	2.0	—	
		—	4.5V to 5.5V	0.7 × V_{CC}	—	2.0	—	
V_{IL}	Low-Level Input Voltage	—	1.65V to 1.95V	—	0.35 × V_{CC}	—	0.35 × V_{CC}	V
		—	2.3V to 2.7V	—	0.7	—	0.7	
		—	2.7V to 3.6V	—	0.8	—	0.8	
		—	4.5V to 5.5V	—	0.3 × V_{CC}	—	0.3 × V_{CC}	
V_{OH}	High Level Output Voltage	I_{OH} = -100µA	1.65V to 3.6V	V_{CC} – 0.2	—	V_{CC} – 0.3	—	V
		I_{OH} = -4mA	1.65V	1.2	—	—	—	
		I_{OH} = -8mA	2.3V	1.9	—	—	—	
		I_{OH} = -12mA	2.7V	2.2	—	2.05	—	
			3.0V	2.3	—	2.1	—	
		I_{OH} = -24mA	3.0V	2.2	—	2.0	—	
V_{OL}	High-Level Output Voltage	I_{OH} = 100µA	1.65V to 5.5V	—	0.2	—	0.3	V
		I_{OH} = 4mA	1.65V	—	0.45	—	0.6	
		I_{OH} = 8mA	2.3V	—	0.70	—	0.85	
		I_{OH} = 12mA	2.7V	—	0.40	—	0.6	
			3.0V	—	0.55	—	0.6	
		I_{OH} =-24mA	3.0V	—	0.55	—	0.6	
I_I	Input Current	V_I =GND to 5.5V	3.6V	—	±5	—	±20	µA
I_{OFF}	Power Down Leakage Current	V_I or V_O = 0V to 3.6V	0	—	10	—	20	µA
I_{CC}	Supply Current	V_I = GND or V_{CC} I_O = 0	3.6V	—	10	—	40	µA
ΔI_{CC}	Additional Supply Current	One input at V_{CC} – 0.6V Other	2.7V to 3.6V	—	500	—	5000	µA

Switching Characteristics

Symbol	Parameter	Test Conditions	V_{CC}	T_A = +25°C			-40°C to +85°C		-40°C to +125°C		Unit
				Min	Typ	Max	Min	Max	Min	Max	
t_{PD}	Propagation Delay A_N to Y_N	Figure 1	1.65V to1.95V	0.5	4.1	7.5	0.5	8.0	0.5	9.5	ns
			2.3V to 2.7V	0.5	3.6	7.0	0.5	7.5	0.5	9.0	
			2.7V	0.5	3.0	5.3	0.5	5.5	0.5	7.0	
			3V to 3.6V	0.5	2.5	4.3	0.5	4.5	0.5	6.0	
$t_{SK(0)}$	Output Skew Time	—	3V to 3.6V	—	—	—	—	1.0	—	1.5	ns

Operating Characteristics (@T_A = +25°C, unless otherwise specified.)

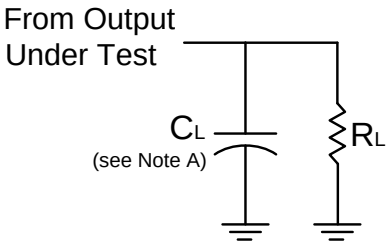
Parameter		Test Conditions	V_{CC} = 1.8V	V_{CC} = 2.5V	V_{CC} = 3.3V	V_{CC} = 5V	Unit
			Typ	Typ	Typ	Typ	
C_{pd}	Power Dissipation Capacitance per Gate	f = 10 MHz	7.0	7.5	8.0	8.6	pF
C_I	Input Capacitance	V_i = V_{CC} – or GND	4	4	4	4	pF

Package Characteristics

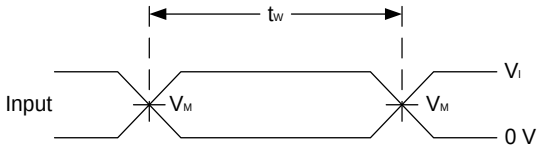
Symbol	Parameter	Test Conditions	V_{CC}	Min	Typ	Max	Unit
Θ_{JA}	Thermal Resistance Junction-to-Ambient	SO-14	(Note 6)	—	TBD	—	°C/W
		TSSOP-14		—	159	—	
Θ_{JC}	Thermal Resistance Junction-to-Case	SO-14	(Note 6)	—	TBD	—	°C/W
		TSSOP-14		—	25	—	

Note: 6. Test condition for SO-14 and TSSOP-14 : Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.

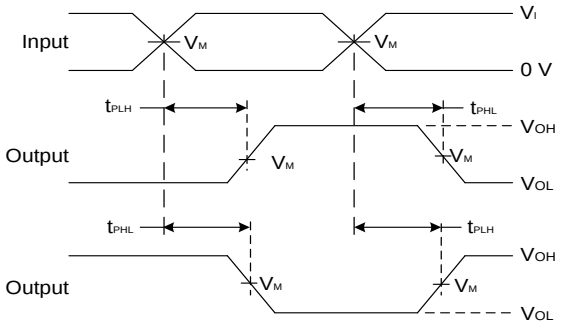
Parameter Measurement Information



V_{CC}	Inputs		V_M	C_L	R_L
	V_I	t_r/t_f			
1.8V ±0.15V	V_{CC}	≤2ns	$V_{CC}/2$	30pF	1KΩ
2.5V ±0.2V	V_{CC}	≤2ns	$V_{CC}/2$	30pF	500Ω
3.3V ±0.3V	3V	≤2.5ns	1.5V	50pF	500Ω
5V ±0.5V	V_{CC}	≤2.5ns	$V_{CC}/2$	50pF	500Ω



Voltage Waveform
Pulse Duration

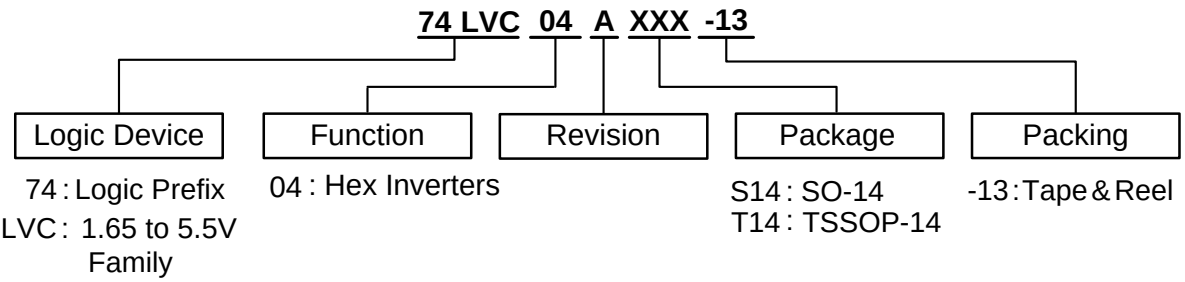


Voltage Waveform
Propagation Delay Times
Inverting and Non Inverting Outputs

Notes: A. Includes test lead and test apparatus capacitance.
B. All pulses are supplied at pulse repetition rate ≤ 10 MHz.
C. Inputs are measured separately one transition per measurement.
D. t_{PLH} and t_{PHL} are the same as t_{PD}.

Figure 1. Load Circuit and Voltage Waveforms

Ordering Information

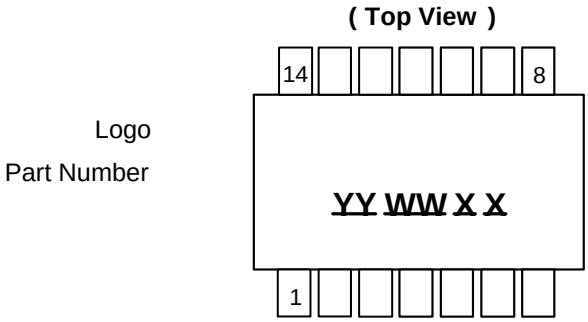


Device	Package Code	Packaging (Note 7)	13" Tape and Reel	
			Quantity	Part Number Suffix
74LVC04AS14-13	S14	SO-14	2500/Tape & Reel	-13
74LVC04AT14-13	T14	TSSOP-14	2500/Tape & Reel	-13

Notes: 7. The taping orientation and tape details can be found at http://www.diodes.com/datasheets/ap02007.pdf

Marking Information

(1) SO-14, TSSOP-14

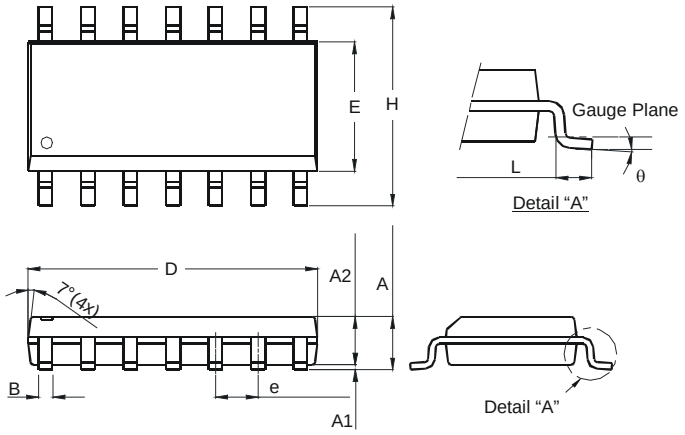


Part Number	Package
74LVC04AS14	SO-14
74LVC04AT14	TSSOP-14

Package Outline Dimensions (All dimensions in mm.)

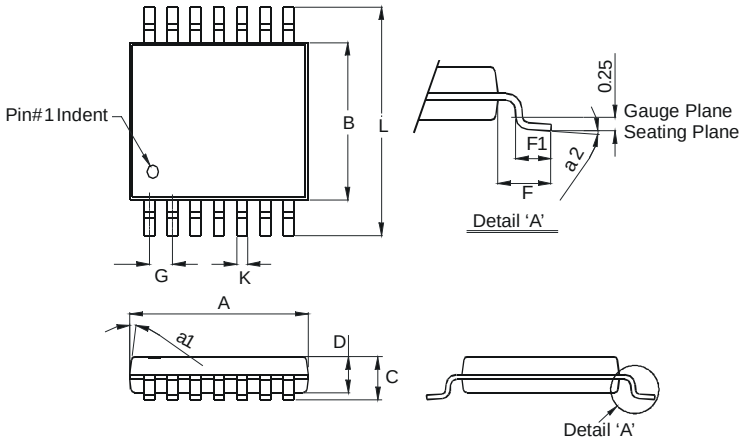
Please see http://www.diodes.com/package-outlines.html for the latest version.

SO-14



SO-14		
Dim	**Min**	**Max**
A	1.47	1.73
A1	0.10	0.25
A2	1.45 Typ	
B	0.33	0.51
D	8.53	8.74
E	3.80	3.99
e	1.27 Typ	
H	5.80	6.20
L	0.38	1.27
θ	0°	8°
All Dimensions in mm		

TSSOP-14

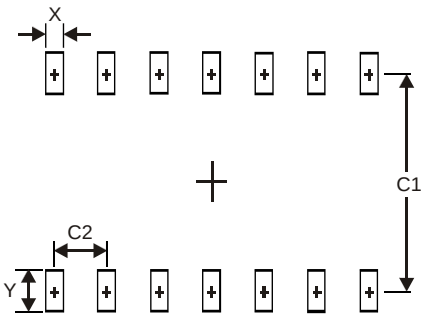


TSSOP-14		
Dim	**Min**	**Max**
a1	7° (4X)	
a2	0°	8°
A	4.9	5.10
B	4.30	4.50
C	-	1.2
D	0.8	1.05
F	1.00 Typ	
F1	0.45	0.75
G	0.65 Typ	
K	0.19	0.30
L	6.40 Typ	
All Dimensions in mm		

Suggested Pad Layout

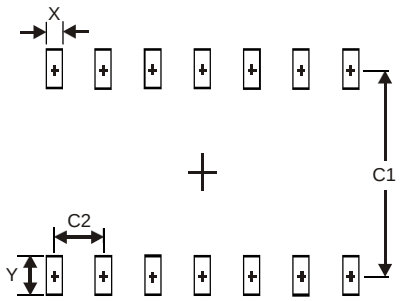
Please see http://www.diodes.com/package-outlines.html for the latest version.

SO-14



Dimensions	Value (in mm)
X	0.60
Y	1.50
C1	5.4
C2	1.27

TSSOP-14



Dimensions	Value (in mm)
X	0.45
Y	1.45
C1	5.9
C2	0.65

IMPORTANT NOTICE

DIODES INCORPORATED MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARDS TO THIS DOCUMENT, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION).

Diodes Incorporated and its subsidiaries reserve the right to make modifications, enhancements, improvements, corrections or other changes without further notice to this document and any product described herein. Diodes Incorporated does not assume any liability arising out of the application or use of this document or any product described herein; neither does Diodes Incorporated convey any license under its patent or trademark rights, nor the rights of others. Any Customer or user of this document or products described herein in such applications shall assume all risks of such use and will agree to hold Diodes Incorporated and all the companies whose products are represented on Diodes Incorporated website, harmless against all damages.

Diodes Incorporated does not warrant or accept any liability whatsoever in respect of any products purchased through unauthorized sales channel. Should Customers purchase or use Diodes Incorporated products for any unintended or unauthorized application, Customers shall indemnify and hold Diodes Incorporated and its representatives harmless against all claims, damages, expenses, and attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized application.

Products described herein may be covered by one or more United States, international or foreign patents pending. Product names and markings noted herein may also be covered by one or more United States, international or foreign trademarks.

LIFE SUPPORT

Diodes Incorporated products are specifically not authorized for use as critical components in life support devices or systems without the express written approval of the Chief Executive Officer of Diodes Incorporated. As used herein:

A. Life support devices or systems are devices or systems which:

1. are intended to implant into the body, or

2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

Customers represent that they have all necessary expertise in the safety and regulatory ramifications of their life support devices or systems, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of Diodes Incorporated products in such safety-critical, life support devices or systems, notwithstanding any devices- or systems-related information or support that may be provided by Diodes Incorporated. Further, Customers must fully indemnify Diodes Incorporated and its representatives against any damages arising out of the use of Diodes Incorporated products in such safety-critical, life support devices or systems.

www.diodes.com