QUADRUPLE 2-INPUT EXCULSIVE OR GATES

Description

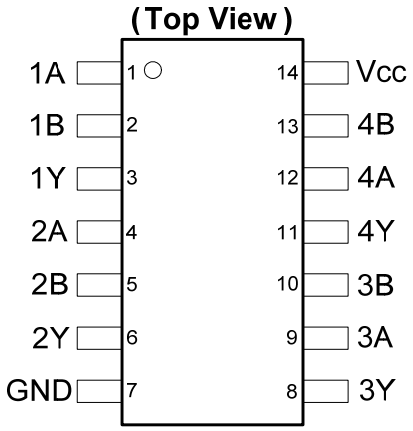
The 74LV86A provides provides four independent 2-input Exclusive OR gates with standard push-pull outputs. The device is designed for operation with a power supply range of 2.0V to 5.5V.

The inputs are tolerant to 5.5V allowing this device to be used in a mixed voltage environment. The device is fully specified for partial power down applications using I_{OFF}. The I_{OFF} circuitry disables the output preventing damaging current backflow when the device is powered down.

The gates perform the Boolean function:

$$Y = A \oplus B \text{ or } Y = \overline{A}B + A\overline{B}$$

Pin Assignments



SO-14 / TSSOP-14

Features

- Wide Supply Voltage Range from 2.0V to 5.5V
- Sinks or sources 12mA at V_{CC} = 4.5V
- CMOS low power consumption
- I_{OFF} Supports Partial -Power Down Operation
- Inputs or Outputs accept up to 5.5V
- Inputs can be driven by 3.3V or 5V allowing for voltage translation applications.
- Schmitt Trigger Action at All Inputs
- ESD Protection Tested per JESD 22
  - Exceeds 200-V Machine Model (A115)
  - Exceeds 2000-V Human Body Model (A114)
  - Exceeds 1000-V Charged Device Model (C101)
- Latch-Up Exceeds 100mA per JESD 78, Class I
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

Applications

- General Purpose Logic
- Power Down Signal Isolation
- Wide array of products such as:
  - PCs, networking, notebooks, ultrabooks, netbooks
  - Computer peripherals, hard drives, CD/DVD ROM
  - TV, DVD, DVR, set top box

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

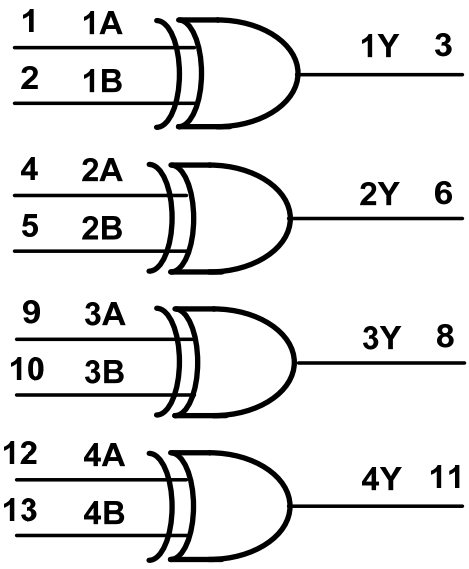
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Pin Descriptions

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

Logic Diagram



Function Table

Inputs		Output
A	B	Y
L	L	L
L	H	H
H	L	H
H	H	L

Absolute Maximum Ratings (Note 4)

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 7.0	V
V_I	Input Voltage Range note 4	-0.5 to 7.0	V
I_{IK}	Input Clamp Current V_I< 0V	-20	mA
I_{OK}	Output Clamp Current V_O<-0V	-50	mA
I_O	Continuous Output Current - 0.5V < V_O V_{CC} + 0.5V	+/- 25	mA
I_{CC}	Continuous Current Through Vcc	50	mA
I_{GND}	Continuous Current Through GND	-50	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.

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Recommended Operating Conditions (Note 5)

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CC}	Supply Voltage	–	2.0	5.5	V
V_I	Input Voltage	–	0	5.5	V
V_O	Output Voltage	–	0	V_{CC}	V
I_{OH}	High-Level Output Current	2.0V	–	-50	mA
		2.3V to 2.7V	–	-2	μA
		3.0V to 3.6V	–	-6	mA
		4.5V to 5.5V	–	-12	mA
I_{OL}	Low-Level Output Current	2.0V	–	50	μA
		2.3V to 2.7V	–	2	mA
		3.0V to 3.6V	–	6	mA
		4.5V to 5.5V	–	12	mA
Δt/ΔV	Input Transition Rise or Fall Rate	2.3V to 2.7V	–	200	ns/V
		3.0V to 3.6V	–	100	
		4.5V to 5.5V	–	20	
T_A	Operating Free-Air Temperature	–	-40	+125	°C

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

Electrical Characteristics

Symbol	Parameter	Test Conditions	Vcc	T_A = -40 to +85°C		T_A = -40 to +125°C		Unit
				Min	Max	Min	Max	
V_{IH}	High-Level Input Voltage	–	2.0V	1.5	–	1.5	–	V
		–	2.3V to 2.7V	V_{CC} X 0.7	–	V_{CC} X 0.7	–	
		–	3.0V to 3.6V	V_{CC} X 0.7	–	V_{CC} X 0.7	–	
		–	4.5V to 5.5V	V_{CC} X 0.7	–	V_{CC} X 0.7	–	–
V_{IL}	Low-Level Input Voltage	–	2.0V	–	0.5	–	0.5	V
		–	2.3V to 2.7V	–	V_{CC} X 0.3	–	V_{CC} X 0.3	
		–	3.0V to 3.6V	–	V_{CC} X 0.3	–	V_{CC} X 0.3	
		–	4.5V to 5.5V	–	V_{CC} X 0.3	–	V_{CC} X 0.3	–
V_{OH}	High-Level Output Voltage	I_{OH} = -50μA	2.0V to 5.5V	V_{CC}-0.1	–	V_{CC}-0.1	–	V
		I_{OH} = -2mA	2.3V	2.0	–	2.0	–	
		I_{OH} = -6mA	3.0V	2.48	–	2.48	–	
		I_{OH} = -12mA	4.5V	3.8	–	3.8	–	
V_{OL}	Low-Level Output Voltage	I_{OL} = 50μA	2.0V to 5.5V	–	0.1	–	0.1	V
		I_{OL} = 2mA	2.3V	–	0.4	–	0.4	
		I_{OL} = 6mA	3.0V	–	0.44	–	0.44	
		I_{OL} = 12mA	4.5V	–	0.55	–	0.55	
I_{OFF}	Power Down Leakage Current	V_I or V_O = 0 to 5.5V	0V	–	5	–	5	μA
I_I	Input Current	V_I =GND or 5.5V	0 to 5.5V	–	±1	–	±1	μA
I_{CC}	Supply Current	V_I = GND or V_{CC} I_O = 0	5.5V	–	20	–	20	μA

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Switching Characteristics

Symbol	Parameter	Test Conditions	V_{CC}	T_A = +25°C			-40 to +85°C		-40 to +125°C		Unit
				Min	Typ.	Max	Min	Max	Min	Max	
t_{PD}	Propagation Delay A_N to Y_N	Figure 1 C_L=15pF	2.5V ± 0.2V	-	7.9	17.6	1	21	1	22	ns
			3.3V ± 0.3V	-	5.5	11	1	13	1	14	
			5.0V ± 0.5V	-	3.7	6.8	1	8	1	9	
		Figure 1 C_L=50 pF	2.5V ± 0.2V	-	10.5	22.6	1	26.5	1	27.5	ns
			3.3V ± 0.3V	-	7.4	14.5	1	16.5	1	17.5	
			5.0V ± 0.5V	-	5.3	8.8	1	10	1	11	

Operating Characteristics

T_A = +25°C

Parameter		Test Conditions	V_{CC}	TYP	Unit
C_{pd}	Power Dissipation Capacitance per Gate	F = 10MHz C_L = 50pF	3.3V	8.4	pF
			5.0V	8.8	

Noise Characteristics

V_{CC} = 3V, C_L = 50pF T_A = +25°C

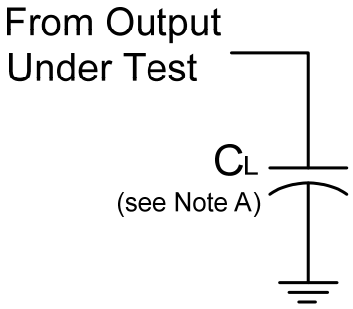
Symbol	Parameter	Min	Typ.	Max	Unit
$V_{OL(p)}$	Quiet output, maximum dynamic V_{OL}	–	0.2	0.8	V
$V_{OL(V)}$	Quiet output, minimum dynamic V_{OL}	–	-0.1	-0.8	V
$V_{OH(V)}$	Quiet output, minimum dynamic V_{OH}	–	3.1	–	V
$V_{IH(D)}$	High Level dynamic input voltage	2.31	–	–	V
$V_{IL(D)}$	Low Level dynamic input voltage	–	–	0.99	V

Package Characteristics

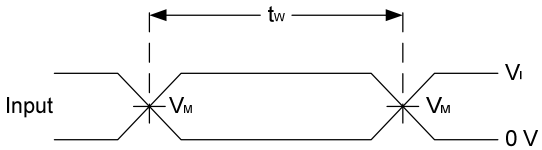
Symbol	Parameter	Test Conditions	Vcc	Min	Typ.	Max	Unit
C_i	Input Capacitance	V_i = V_{CC} – or GND	2.0 to 5.5V	–	3.3	10	pF

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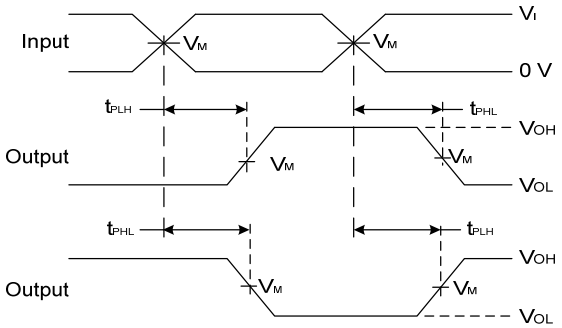
Parameter Measurement Information



V_{CC}	Inputs		V_M	C_L
	V_I	t_r/t_f		
2.0V to 5.5V	V_{CC}	<3ns	$V_{CC}/2$	15pF or 50pF



Voltage Waveform
Pulse Duration



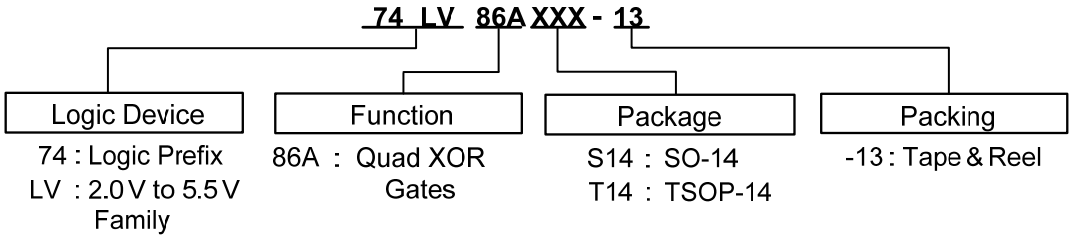
Voltage Waveform
Propagation Delay Times
Inverting and Non Inverting Outputs

Notes: A . Includes test lead and test apparatus capacitance.
B. All pulses are supplied at pulse repetition rate ≤ 10MHz
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

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Ordering Information

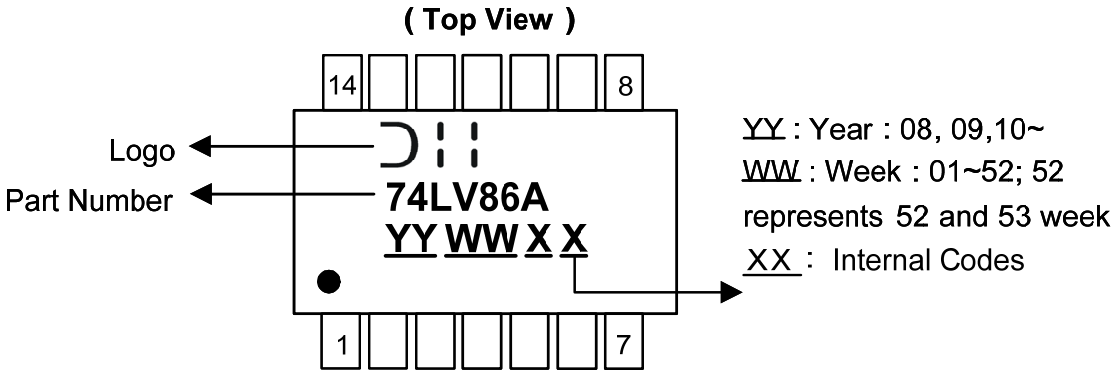


Device	Package Code	Packaging (Note 6)	13" Tape and Reel	
			Quantity	Part Number Suffix
74LV86AS14-13	S14	SO-14	2500/Tape & Reel	-13
74LV86AT14-13	T14	TSSOP-14	2500/Tape & Reel	-13

Note: 6. The taping orientation and tape details can be found at http://www.diodes.com/datasheets/ap02007.pdf

Marking Information

(1) SO14, TSSOP14

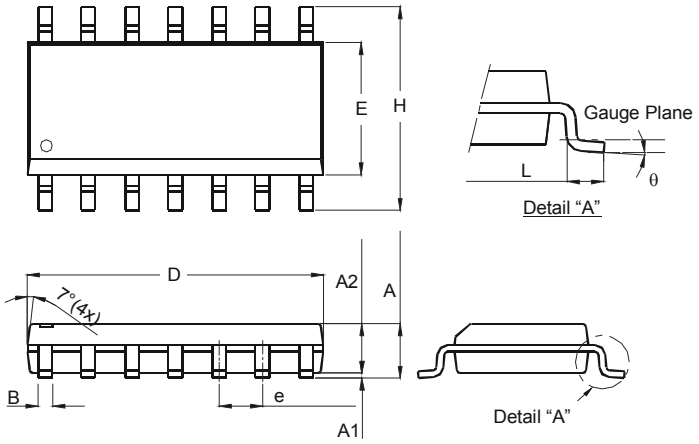


Part Number	Package
74LV86AS14	SO-14
74LV86AT14	TSSOP-14

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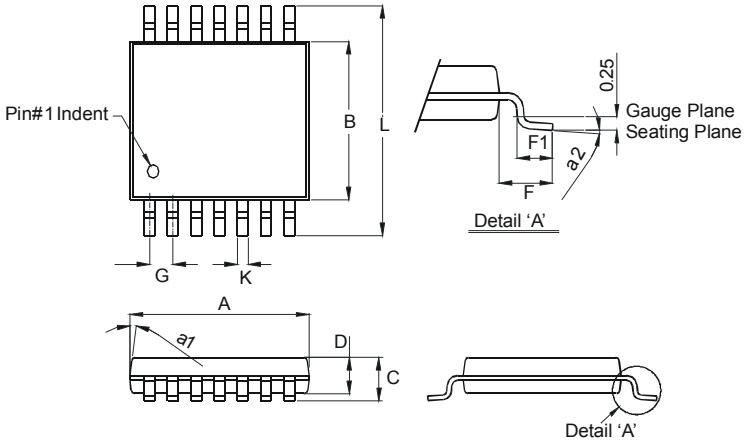
Package Outline Dimensions (All Dimensions in mm)

Package Type: 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		

Package Type: TSSOP-14

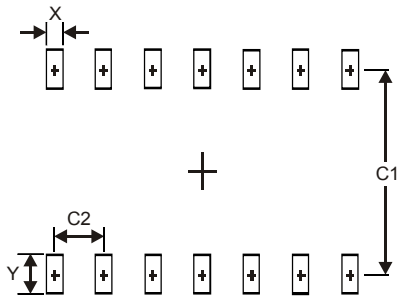


TSSOP-14		
Dim	**Min**	**Max**
a1	7° (4X)	
a2	0°	8°
A	4.9	5.10
B	4.30	4.50
C	—	1.2
D	0.8	1.05
F	1.00 Typ	
F1	0.45	0.75
G	0.65 Typ	
K	0.19	0.30
L	6.40 Typ	
All Dimensions in mm		

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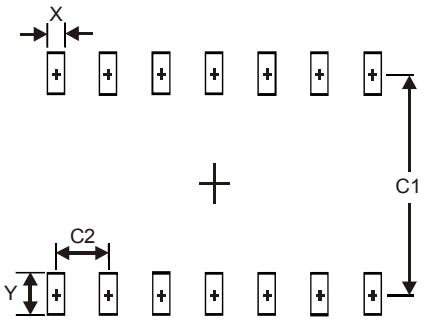
Suggested Pad Layout

Package Type: SO-14



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

Package Type: TSSOP-14



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

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