QUADRUPLE 2-INPUT EXCLUSIVE OR GATES

NEW PRODUCT

Description

The 74AHC86 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.

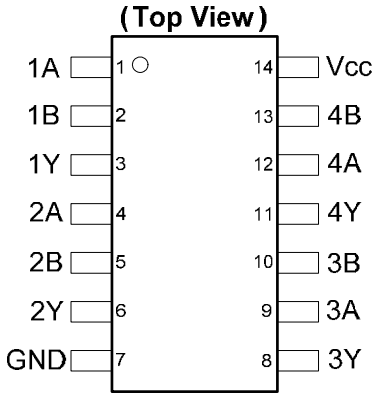
The gates perform the Boolean function:

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

Features

- Wide Supply Voltage Range from 2.0V to 5.5V
- Outputs Sink or Source 8mA at V_{CC} = 4.5V
- CMOS Low Power Consumption
- Schmitt Trigger Action at All Inputs
- Inputs can be driven by 3.3V or 5.5V allowing for voltage translation applications.
- ESD Protection Exceeds JESD 22
  - 200-V Machine Model (A115-A)
  - 2000-V Human Body Model (A114-A)
  - Exceeds 1000-V Charged Device Model (C101C)
- Latch-Up Exceeds 250mA per JESD 78, Class II
- Range of Package Options SO-14 and TSSOP-14
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

Pin Assignments



SO-14 / TSSOP-14

Applications

- General Purpose Logic
- Wide array of products such as:
  - PCs, Networking, Notebooks, 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 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.

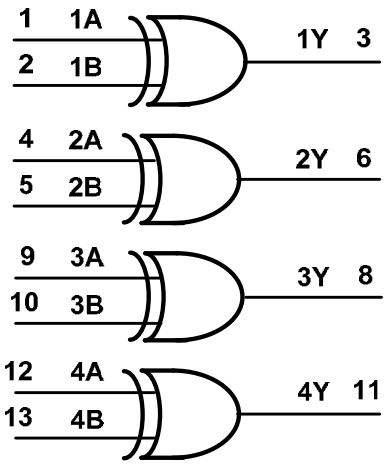
Click here for ordering information, located at the end of datasheet

NEW PRODUCT

Pin Descriptions

Pin Number	Pin Name	Function
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	V_{CC}	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) (@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 +7.0	V
V_I	Input Voltage Range	-0.5 to +7.0	V
I_{IK}	Input Clamp Current V_I < -0.5V	-20	mA
I_{OK}	Output Clamp Current V_O < -0.5V	-20	mA
I_{OK}	Output Clamp Current V_O > V_{CC} +0.5V	25	mA
I_O	Continuous Output current -0.5V < V_O V_{CC} +0.5V	+/- 25	mA
I_{CC}	Continuous Current Through V_{CC}	75	mA
I_{GND}	Continuous Current Through GND	-75	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.

NEW PRODUCT

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

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
Δt/ΔV	Input Transition Rise or Fall Rate	V_{CC} = 3.0V to 3.6V		100	ns/V
		V_{CC} = 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 (@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		2.0V	1.5		1.5		V
			3.0V	2.1		2.1		
			5.5V	3.85		3.85		
V_{IL}	Low-Level Input voltage		2.0V		0.5		0.5	V
			3.0V		0.9		0.9	
			5.5V		1.65		1.65	
V_{OH}	High-Level Output Voltage	I_{OH} = -50μA	2.0V	1.9		1.9		V
		I_{OH} = -50μA	3.0V	2.9		2.9		
		I_{OH} = -50μA	4.5V	4.4		4.4		
		I_{OH} = -4mA	3.0V	2.48		2.40		
		I_{OH} = -8mA	4.5V	3.80		3.70		
V_{OL}	Low-Level Output Voltage	I_{OL} = 50μA	2.0V		0.1		0.1	V
		I_{OL} = 50μA	3.0V		0.1		0.1	
		I_{OL} = 50μA	4.5V		0.1		0.1	
		I_{OL} = 4mA	3.0V		0.44		0.55	
		I_{OL} = 8mA	4.5V		0.44		0.55	
I_I	Input Current	V_I = GND to 5.5V	3.6V		±1		±2	μA
I_{CC}	Supply Current	V_I = GND or V_{CC}, I_O = 0	3.6V		20		40	μA

Operating Characteristics

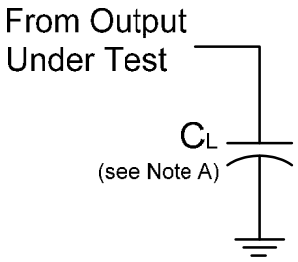
Parameter		Test Conditions	V_{CC} = 2.0V	V_{CC} = 3.3V	V_{CC} = 5V	Unit
			Typ	Typ	Typ	
C_{pd}	Power Dissipation Capacitance per Gate	f = 1MHz	9.7	11.5	15.5	pF
C_i	Input Capacitance	V_i = V_{CC} – or GND	4.0	4.0	4.0	pF

NEW PRODUCT

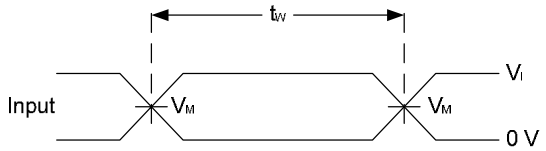
Switching Characteristics

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 C_L = 15pF	3.0V to 3.6V	0.5	4.8	11.0	0.5	13.0	0.5	14.0	ns
			4.5V to 5.5V	0.5	3.4	6.8	0.5	8.0	0.5	8.5	
		Figure 1 C_L = 50pF	3.0V to 3.6V	0.5	6.8	14.5	0.5	16.5	0.5	18.5	
			4.5V to 5.5V	0.5	4.8	8.8	0.5	10.0	0.5	11.0	

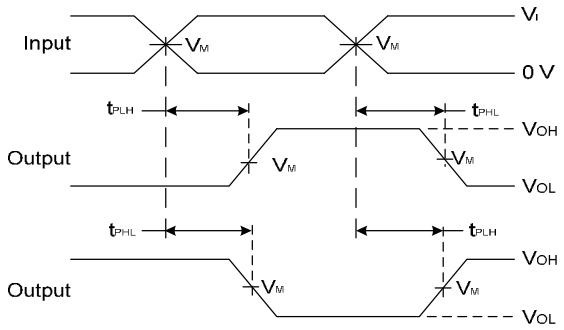
Parameter Measurement Information



V_{CC}	Inputs		V_M	C_L
	V_I	t_r/t_f		
3.3V -3.6V	V_{CC}	3ns	$V_{CC}/2$	15pF, 50pF
4.5V to 5.5V	V_{CC}	3ns	$V_{CC}/2$	15pF, 50pF



Voltage Waveform
Pulse Duration



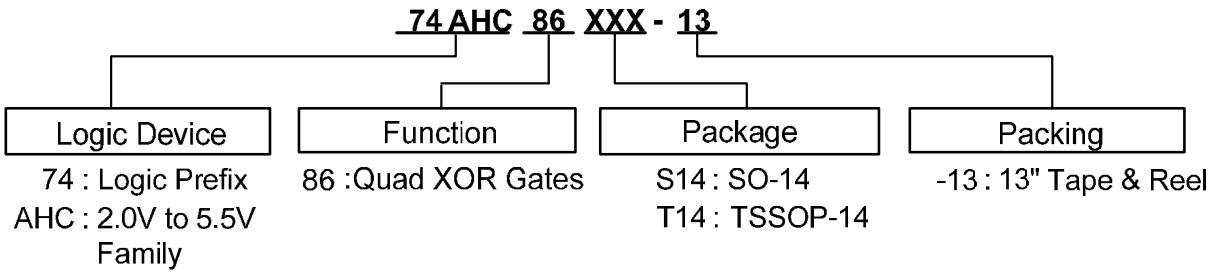
Voltage Waveform
Propagation Delay Times
Inverting and Non Inverting Outputs

Figure 1 Load Circuit and Voltage Waveforms

Notes: A. Includes test lead and test apparatus capacitance.
B. All pulses are supplied at pulse repetition rate ≤ 1 MHz.
C. Inputs are measured separately one transition per measurement.
D. t_{PLH} and t_{PHL} are the same as t_{PD}.

NEW PRODUCT

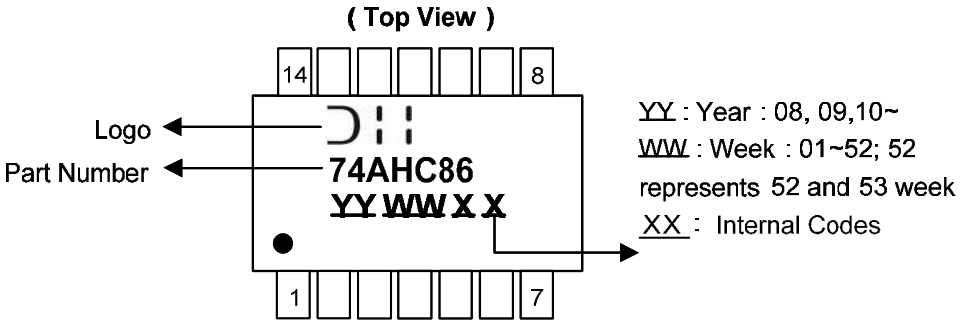
Ordering Information



Device	Package Code	Packaging	7" Tape and Reel	
			Quantity	Part Number Suffix
74AHC86S14-13	S14	SO-14	2500/Tape & Reel	-13
74AHC86T14-13	T14	TSSOP-14	2500/Tape & Reel	-13

Marking Information

(1) SO-14, TSSOP-14



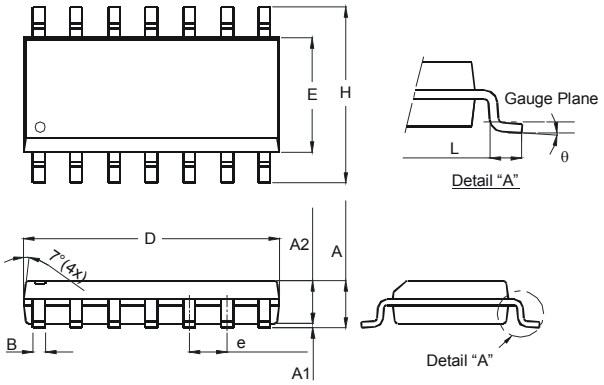
Part Number	Package
74AHC86S14	SO-14
74AHC86T14	TSSOP-14

NEW PRODUCT

Package Outline Dimensions (All dimensions in mm.)

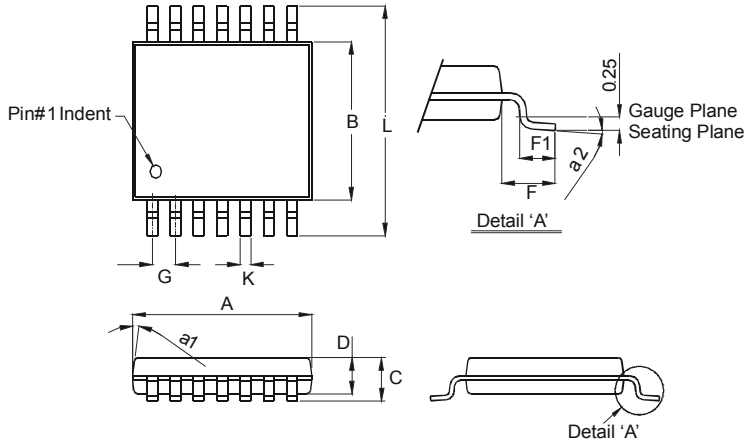
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.

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



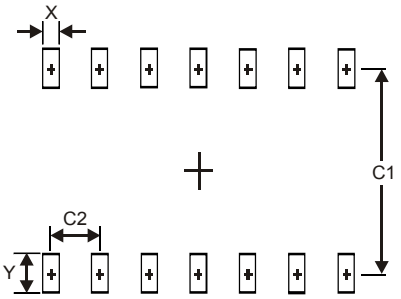
TSSOP-14		
Dim	**Min**	**Max**
a1	7° (4X)	
a2	0°	8°
A	4.9	5.10
B	4.30	4.50
C	—	1.2
D	0.8	1.05
F	1.00 Typ	
F1	0.45	0.75
G	0.65 Typ	
K	0.19	0.30
L	6.40 Typ	
All Dimensions in mm		

NEW PRODUCT

Suggested Pad Layout

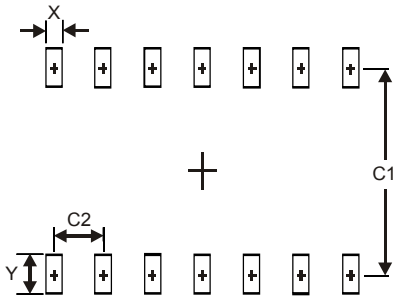
Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.

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

NEW PRODUCT

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