

QUADRUPLE 2-INPUT EXCULSIVE OR GATES

Description

The 74HCT86 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 4.5V to 5.5V.

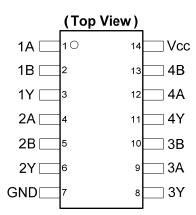
The gates perform the Boolean function:

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

Features

- Wide Supply Voltage Range from 4.5V to 5.5V
- Pin Compatible with Low Power Schottky (LSTTL)
- Inputs Are TTL Voltage Level Compatible
- Sinks or Sources 4mA at V_{CC} = 4.5V
- **CMOS Low Power Consumption**
- Schmitt Trigger Action at All Inputs
- 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)
- 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.

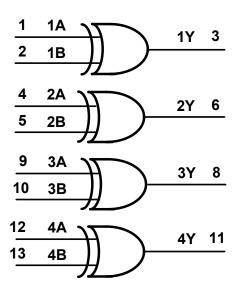
 3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.



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	Vcc	Supply Voltage

Logic Diagram



Function Table

Inp	Output	
Α	В	Y
L	L	L
L	Н	Н
Н	L	Н
Н	Н	L



Absolute Maximum Ratings (Note 4) (@TA = +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
Vcc	Supply Voltage Range	-0.5 to +7.0	V
VI	Input Voltage Range (Note 5)	-0.5 to +7.0	V
I _{IK}	Input Clamp Current V _I < -0.5V or Vi> V _{CC} +0.5V	±20	mA
lok	Output Clamp Current V _O < -0.5V or V _O > V _{CC} +0.5V	±20	mA
Io	Continuous Output Current -0.5V < V _O V _{CC} +0.5V	+/- 25	mA
I _{CC}	Continuous Current Through V _{CC}	50	mA
I _{GND}	Continuous Current Through GND	-50	mA
TJ	Operating Junction Temperature	-40 to +150	°C
T _{STG}	Storage Temperature	-65 to +150	°C
P _{TOT}	Total Power Dissipation	500	mW

Notes:

Recommended Operating Conditions (Note 6) (@TA = +25°C, unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Max	Unit
V _{CC}	Supply Voltage		4.5	5.5	V
VI	Input Voltage		0	Vcc	V
Vo	Output Voltage		0	V_{CC}	V
Δt/ΔV	Input Transition Rise or Fall Rate	V _{CC} = 4.5V to 5.5V		500	ns/V
T _A	Operating Free-Air Temperature		-40	+125	°C

Note: 6. Unused inputs should be held at V_{CC} or Ground.

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

Symbol	Parameter	Test Conditions	V	T _A = -40°C	C to +85°C	T _A = -40°C to +125°C		Unit
Syllibol	Parameter	rest Conditions	V _{CC}	Min	Max	Min	Max	Ollit
V _{IH}	High-level Input Voltage		4.5V to 5.5V	2.0	_	2.0	_	V
VIL	Low-level Input Voltage		4.5V to 5.5V	_	0.8	_	0.8	V
V	High-level Output	I _{OH} = -20μA	4.5V	4.4	_	4.4	_	V
VOH	V _{OH} Voltage	I _{OH} = -4mA	4.5V	3.84	_	3.70	_	
	Low-level Output	I _{OL} = 20μA	4.5V	_	0.1		0.1	V
V _{OL}	Voltage	I _{OL} = 4.0mA	4.5V	_	0.33	_	0.4	7
II	Input Current	V _I =GND to 6.0V	6.0V	_	± 1	_	± 1	μΑ
Icc	Supply Current	$V_I = GND \text{ or } V_{CC}, I_O = 0$	6.0V	_	20	_	40	μΑ
ΔI _{CC}	Additional Supply Current	One Input at V _{CC} -2.1V Other Pins at V _{CC} or GND	4.5V to 5.5V	_	675	_	735	μA

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^{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.

^{5.} Input Voltage cannot exceed V_{CC} to the extent the maximum clamp current is exceeded.



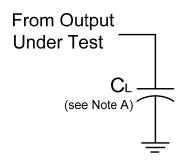
Switching Characteristics

Symbol	Parameter	Test	Vcc	7	Γ _A = +25°0	;	-40°C to +85°C	-40°C to +125°C	Unit
Syllibol	Farailletei	Conditions	VCC	Min	Тур	Max	Max	Max	Onit
t _{PD}	Propagation Delay A _N to Y _N	Figure 1 C _L = 50pF	4.5V	_	17	32	40	48	ns
t _t	Transition Time	Figure 1 C _L = 50pF	4.5V	_	7	15	19	22	ns

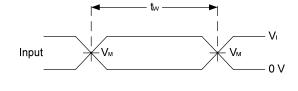
Operating Characteristics (@T_A = +25°C, unless otherwise specified.)

Parameter		Test Conditions	V _{CC} = 5.5V Typ	Unit
C _{pd}	Power Dissipation Capacitance per Gate	f = 1MHz	30	pF
Cı	Input Capacitance	$V_1 = V_{CC} - \text{or GND}$	3.5	pF

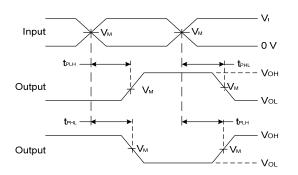
Parameter Measurement Information



V	Int	outs		0.	
Vcc	V _{CC} V _I	t _r /t _f	V _M	CL	
4.5V	3.0V	3ns	1.5V	V _{OH} /2	



Voltage Waveform Pulse Duration



Voltage Waveform Propagation Delay Times Inverting and Non Inverting Outputs

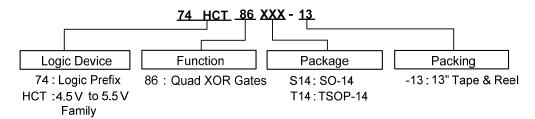
Notes: A. Includes test lead and test apparatus capacitance.

- B. All pulses are supplied at pulse repetition rate ≤ 1 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



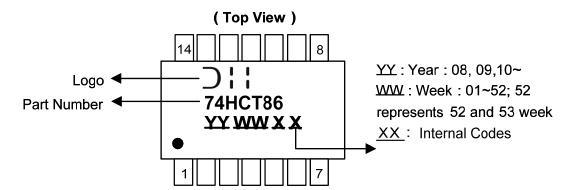
Ordering Information



	Device	Backage Code	Dockoning	7" Tape a	and Reel
	Device	Package Code	Packaging	Quantity	Part Number Suffix
Lead-free Green	74HCT86S14-13	S14	SO-14	2500/Tape & Reel	-13
Pb.	74HCT86T14-13	T14	TSSOP-14	2500/Tape & Reel	-13

Marking Information

(1) SO-14, TSSOP-14



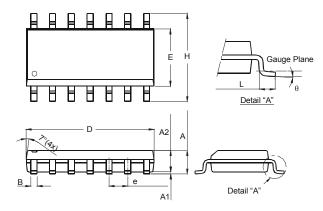
Part Number	Package
74HCT86S14	SO-14
74HCT86T14	TSSOP-14



Package Outline Dimensions (All dimensions in mm.)

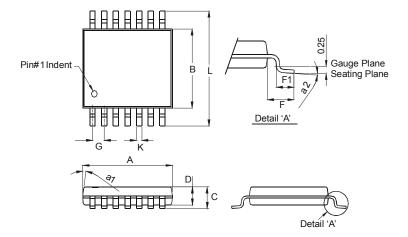
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.

Package Type: SO-14



SO-14					
Dim	Min	Max			
Α	1.47	1.73			
A1	0.10	0.25			
A2	1.45 Typ				
В	0.33	0.51			
D	8.53	8.74			
Е	3.80	3.99			
е	1.27	Тур			
Н	5.80	6.20			
L	0.38	1.27			
θ	0°	8°			
All Di	mensions	s in mm			

Package Type: TSSOP-14



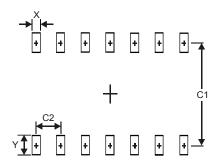
TSSOP-14				
Dim	Min	Max		
a1	7° (4X)		
a2	0°	8°		
Α	4.9	5.10		
В	4.30	4.50		
С		1.2		
D	8.0	1.05		
F	1.00	Тур		
F1	0.45	0.75		
G	0.65 Typ			
K	0.19	0.30		
L	6.40 Typ			
All Dimensions in mm				



Suggested Pad Layout

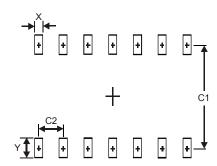
Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for latest version.

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)
Х	0.45
Y	1.45
C1	5.9
C2	0.65



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