

QUADRUPLE 2-INPUT EXCLUSIVE OR GATES

1. Description

The 74HC86 is identical in pinout to the LS86. The device inputs are compatible with standard CMOS outputs; with pullup resistors, they are compatible with LSTTL outputs.

2. Features

- Output Drive Capability: 10 LSTTL Loads
- Outputs Directly Interface to CMOS, NMOS, and TTL
- Operating Voltage Range: 2.0 to 6.0 V
- Low Input Current: 1.0 μ A
- High Noise Immunity Characteristic of CMOS Devices
- In Compliance with JEDEC Standard No. 7A Requirements
- ESD Performance: HBM > 2000 V; Machine Model > 200 V
- Chip Complexity: 56 FETs or 14 Equivalent Gates
- These are Pb-Free Devices

3. Applications

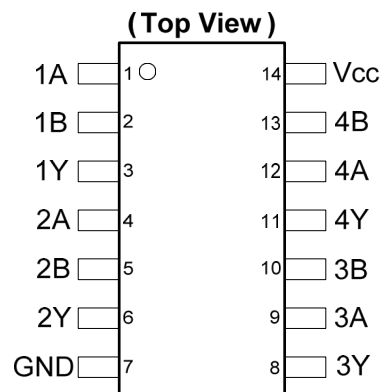
- General Purpose Logic
- Wide array of products such as:
 - PCs, Networking, Notebooks, Netbooks
 - Computer Peripherals, Hard Drives, CD/DVD ROM
 - TV, DVD, DVR, Set Top Box

4. Ordering Information

Table 1. Ordering Information

Type Number	Package Type	Packing
74HC86D	SOP-14	Reel
74HC86PW	TSSOP-14	Reel

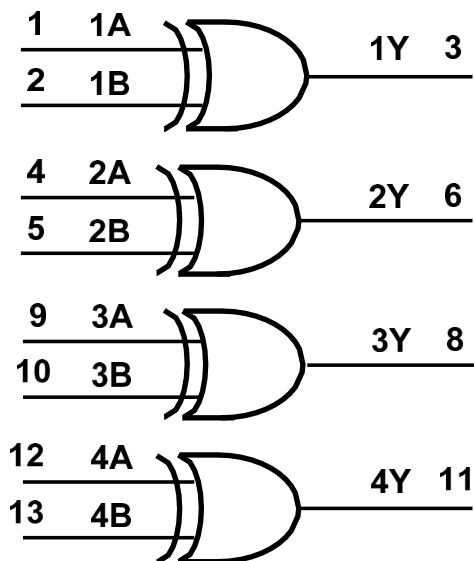
5. Pin Assignments



6. 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

7. Logic Diagram



8. Function Table

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

9. Absolute Maximum Ratings

(@ $T_A = +25^\circ\text{C}$, 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 $V_I < -0.5\text{V}$ or $V_I > V_{CC} + 0.5\text{V}$	± 20	mA
I_{OK}	Output Clamp Current $V_O < -0.5\text{V}$ or $V_O > V_{CC} + 0.5\text{V}$	± 20	mA
I_O	Continuous output current $-0.5\text{V} < V_O < V_{CC} + 0.5\text{V}$	+/- 25	mA
I_{CC}	Continuous Current Through V_{CC}	50	mA
I_{GND}	Continuous Current Through GND	-50	mA
T_J	Operating Junction Temperature	-40 to +150	$^\circ\text{C}$
T_{STG}	Storage Temperature	-65 to +150	$^\circ\text{C}$
P_{TOT}	Total Power Dissipation	500	mW

Notes:

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.

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

10. Recommended Operating Conditions

(@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CC}	Supply Voltage		2.0	6.0	V
V_I	Input Voltage		0	V_{CC}	V
V_O	Output Voltage		0	V_{CC}	V
$\Delta t/\Delta V$	Input Transition Rise or Fall Rate	$V_{CC} = 2.0\text{V}$		625	ns/V
		$V_{CC} = 4.5\text{V}$		140	
		$V_{CC} = 6.0\text{V}$		85	
T_A	Operating Free-Air Temperature		-40	+125	$^\circ\text{C}$

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

11. Electrical Characteristics

 (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Symbol	Parameter	Test Conditions	VCC	TA = -40°C to +85°C		TA = -40°C to +125°C		Unit
				Min	Max	Min	Max	
V _{IH}	High-level Input Voltage		2.0V	1.5		1.5		V
			4.5V	3.15		3.15		
			6.0V	4.2		4.2		
V _{IL}	Low-level input voltage		2.0V		0.5		0.5	V
			4.5V		1.35		1.35	
			6.0V		1.8		1.8	
V _{OH}	High-level Output Voltage	I _{OH} = -20μA	2.0V	1.9		1.9		V
		I _{OH} = -20μA	4.5V	4.4		4.4		
		I _{OH} = -20μA	6.0V	5.9		5.9		
		I _{OH} = -4.0mA	4.5V	3.84		3.7		
		I _{OH} = -5.2mA	6.0V	5.34		5.2		
V _{OL}	Low-level Output Voltage	I _{OL} = 20μA	2.0V		0.1		0.1	V
		I _{OL} = 20μA	4.5V		0.1		0.1	
		I _{OL} = 20μA	6.0V		0.1		0.1	
		I _{OL} = 4mA	4.5V		0.33		0.44	
		I _{OL} = 5.2mA	6.0V		0.33		0.44	
I _I	Input Current	V _I = GND to 5.5V	6.0V		± 1		± 1	μA
I _{CC}	Supply Current	V _I = GND or V _{CC} , I _O = 0	6.0V		20		40	μA

12. Switching Characteristics

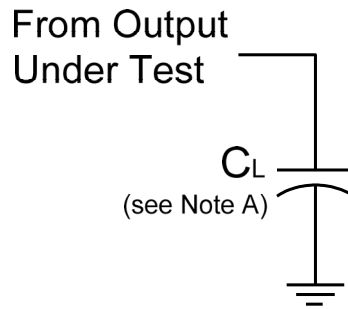
Symbol	Parameter	Test Conditions	VCC	TA = +25°C			-40°C to +85°C	-40°C to +125°C	Unit
				Min	Typ.	Max	Max	Max	
t _{PD}	Propagation Delay A _N to Y _N	Figure 1 C _L = 50pF	2.0V	—	25	90	115	135	ns
			4.5V	—	9	18	23	27	
			6.0V	—	7	15	20	23	
t _t	Transition time	Figure 1 C _L = 50pF	2.0V	—	19	75	95	110	ns
			4.5V	—	7	15	19	22	
			6.0V	—	6	13	16	19	

13. Operating Characteristics

 (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Parameter		Test Conditions	VCC = 6V	Unit
			Typ	
C _{pd}	Power Dissipation Capacitance per Gate	f = 1MHz	25	pF
C _I	Input Capacitance	V _I = V _{CC} – or GND	4	pF

14. Parameter Measurement Information



V _{CC}	Inputs		V _M	C _L
	V _I	t _r /t _f		
2.0V to 6.0V	V _{CC}	6ns	V _{CC} /2	15pF, 50pF

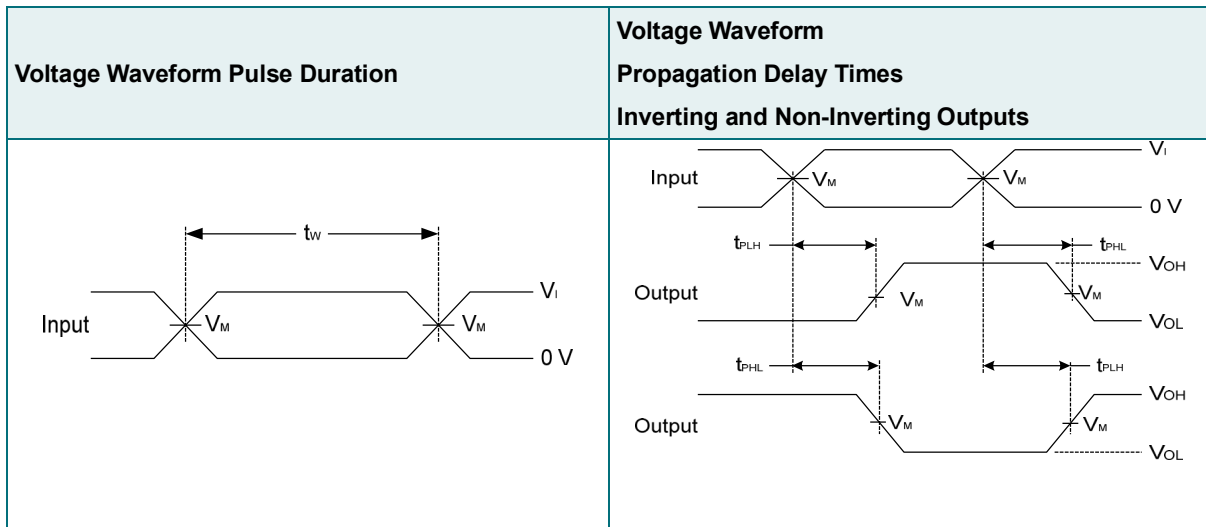


Fig. 1. Load Circuit and Voltage Waveforms

Notes:

Includes test lead and test apparatus capacitance.

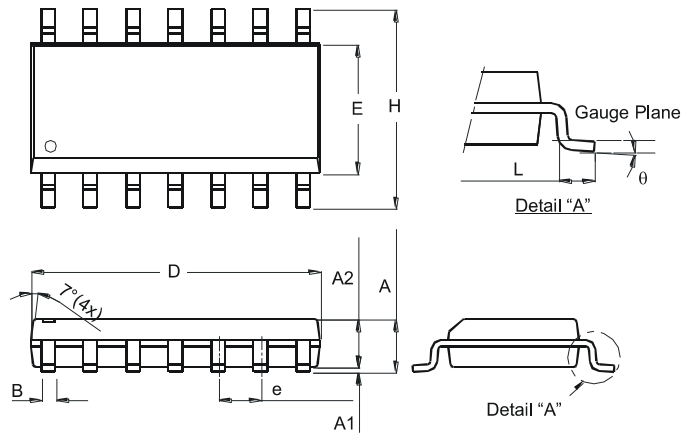
All pulses are supplied at pulse repetition rate ≤ 1 MHz.

Inputs are measured separately one transition per measurement.

t_{PLH} and t_{PHL} are the same as t_{PD}.

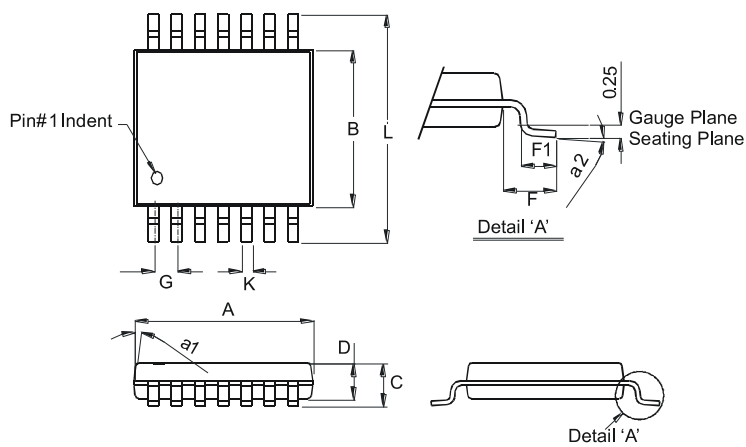
15. Package outlines

SOP-14



SOP-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		

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