

Features

- Wide supply voltage range from 2.0 V to 6.0 V
- CMOS low power dissipation
- High noise immunity
- Input CMOS level
- Packaging: TSSOP-14

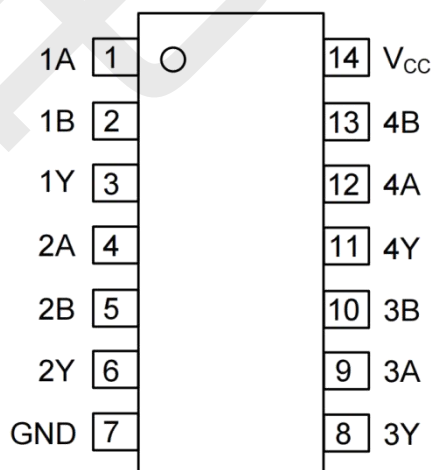
General Description

The 74HC86 device is quadruple 2-input EXCLUSIVE-OR gate which perform the function $Y=A \oplus B$ or $Y = \bar{A}B + \bar{A}\bar{B}$.

Applications

- S-R latch
- Alarm detection circuit
- Tampering detection circuit

PIN CONFIGURATIONS (Top view)



PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION	PIN NO.	PIN NAME	DESCRIPTION
1	1A	Data input	8	3Y	Data output
2	1B	Data input	9	3A	Data input
3	1Y	Data output	10	3B	Data input
4	2A	Data input	11	4Y	Data output
5	2B	Data input	12	4A	Data input
6	2Y	Data output	13	4B	Data input
7	GND	ground (0 V)	14	VCC	supply voltage

Functional diagram

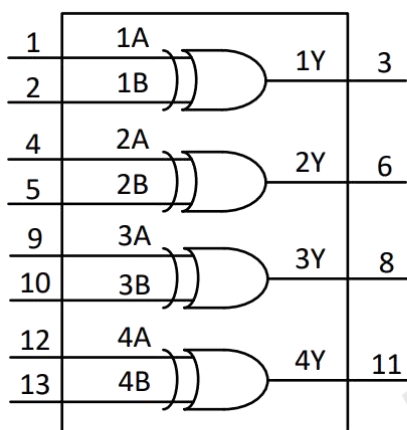


Fig. 1. Logic symbol

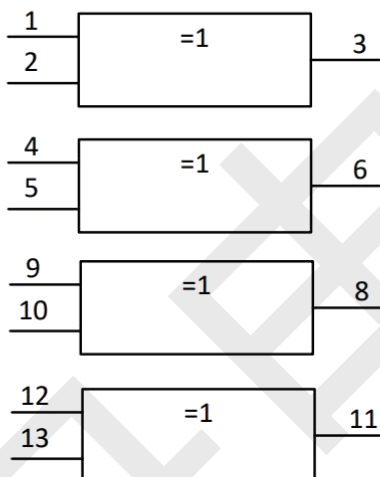


Fig. 2. IEC logic symbol

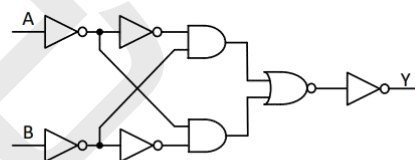


Fig. 3. Logic diagram(one gate)

Function table

Control		Output
nA	nB	nY
L	L	L
L	H	H
H	L	H
H	H	L

Note: H=HIGH voltage level; L=LOW voltage level.

ABSOLUTE MAXIMUM RATINGS

(Voltages are referenced to GND(ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min	Max	Unit
Supply voltage	V_{CC}		-0.5	+7	V
Input clamping current	I_{IK}	$V_I < -0.5V$ or $V_I > V_{CC} + 0.5V$	--	± 20	mA
Output clamping current	I_{OK}	$V_O < -0.5V$ or $V_O > V_{CC} + 0.5V$	--	± 20	mA
Output current	I_O	$-0.5V < V_O < V_{CC} + 0.5V$	--	± 25	mA
Supply current	I_{CC}		--	50	mA
Ground current	I_{GND}		-50	--	mA
Total power dissipation	P_{tot}		--	500	mW
Storage temperature	T_{stg}		-65	+150	°C
Soldering temperature	T_L		260		°C

Recommended operating conditions

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Supply voltage	V_{CC}		2.0	5.0	6.0	V
Input voltage	V_I		0	--	V_{CC}	V
Output voltage	V_O		0	--	V_{CC}	V
Input transition rise and fall rate	$\Delta t / \Delta V$	$V_{CC} = 2.0V$	--	--	1000	ns
		$V_{CC} = 4.5V$	--	--	500	ns
		$V_{CC} = 6.0V$	--	--	400	ns
Ambient temperature	T_{amb}		-40	--	+125	°C

Electrical Characteristics (DC)

($T_{amb}=25^{\circ}\text{C}$, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions		Min	Typ	Max	Unit
HIGH-level input voltage	V_{IH}	$V_{CC}=2.0V$		1.5	1.2	--	V
		$V_{CC}=4.5V$		3.15	2.4	--	V
		$V_{CC}=6.0V$		4.2	3.2	--	V
LOW-level input voltage	V_{IL}	$V_{CC}=2.0V$		--	0.8	0.5	V
		$V_{CC}=4.5V$		--	2.1	1.35	V
		$V_{CC}=6.0V$		--	2.8	1.8	V
HIGH-level output voltage	V_{OH}	$V_I=V_{IH}$ or V_{IL}	$I_O=-20\mu A; V_{CC}=2.0V$	1.9	2.0	--	V
			$I_O=-20\mu A; V_{CC}=4.5V$	4.4	4.5	--	V
			$I_O=-20\mu A; V_{CC}=6.0V$	5.9	6.0	--	V
			$I_O=-4.0mA; V_{CC}=4.5V$	3.98	4.32	--	V
			$I_O=-5.2mA; V_{CC}=6.0V$	5.48	5.81	--	V
LOW-level output voltage	V_{OL}	$V_I=V_{IH}$ or V_{IL}	$I_O=20\mu A; V_{CC}=2.0V$	--	0	0.1	V
			$I_O=20\mu A; V_{CC}=4.5V$	--	0	0.1	V
			$I_O=20\mu A; V_{CC}=6.0V$	--	0	0.1	V
			$I_O=4.0mA; V_{CC}=4.5V$	--	0.15	0.26	V
			$I_O=5.2mA; V_{CC}=6.0V$	--	0.16	0.26	V
Input leakage current	I_I	$V_I=V_{CC}$ or GND; $V_{CC}=6.0V$		--	--	± 1	μA
Supply current	I_{CC}	$V_I=V_{CC}$ or GND; $I_O=0A; V_{CC}=6.0V$		--	--	2.0	μA
Input capacitance	C_I			--	3	10	pF

Electrical Characteristics (AC)

($T_{amb}=25^{\circ}\text{C}$, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions		Min	Typ	Max	Unit
nA, nB, to nY propagation delay	t_{pd}	see Figure 5 ^[1]	$V_{CC}=2.0\text{V}$	--	--	100	ns
			$V_{CC}=4.5\text{V}$	--	--	30	ns
			$V_{CC}=5.0\text{V}; C_L=15\text{pF}$	--	20	--	ns
			$V_{CC}=6.0\text{V}$	--	--	17	ns
Transition time	t_t	see Figure 5 ^[2]	$V_{CC}=2.0\text{V}$	--	--	75	ns
			$V_{CC}=4.5\text{V}$	--	--	15	ns
			$V_{CC}=6.0\text{V}$	--	--	13	ns
Power dissipation capacitance	C_{PD}	per package; $V_I = \text{GND to } V_{CC}$ ^[3]		--	35	--	pF

Note:

[1] t_{pd} is the same as t_{PLH} and t_{PHL} .

[2] t_t is the same as t_{THL} and t_{TLH} .

[3] C_{PD} is used to determine the dynamic power dissipation (P_D in

μW). $P_D = (C_{PD} \times V_{CC}^2 \times f_i \times N) + \sum (C_L \times V_{CC}^2 \times f_o)$ where:

f_i =input frequency in MHz; f_o =output

frequency in MHz; C_L =output load

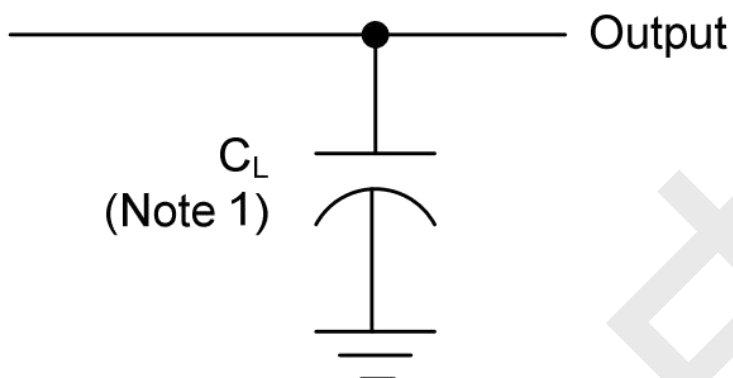
capacitance in pF; V_{CC} =supply

voltage in V; N =number of inputs

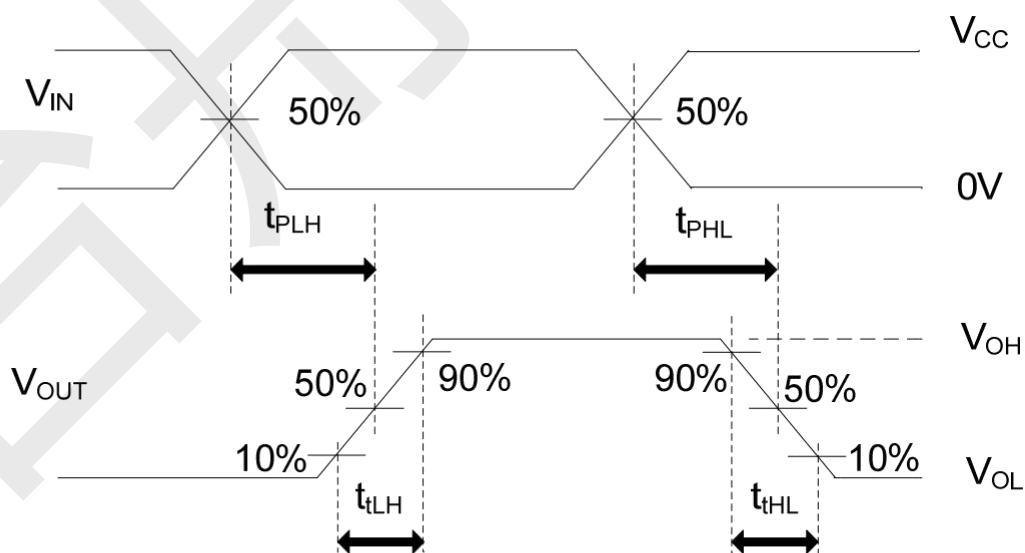
switching;

$\sum (C_L \times V_{CC}^2 \times f_o)$ =sum of outputs.

Testing Circuit



Test Circuit

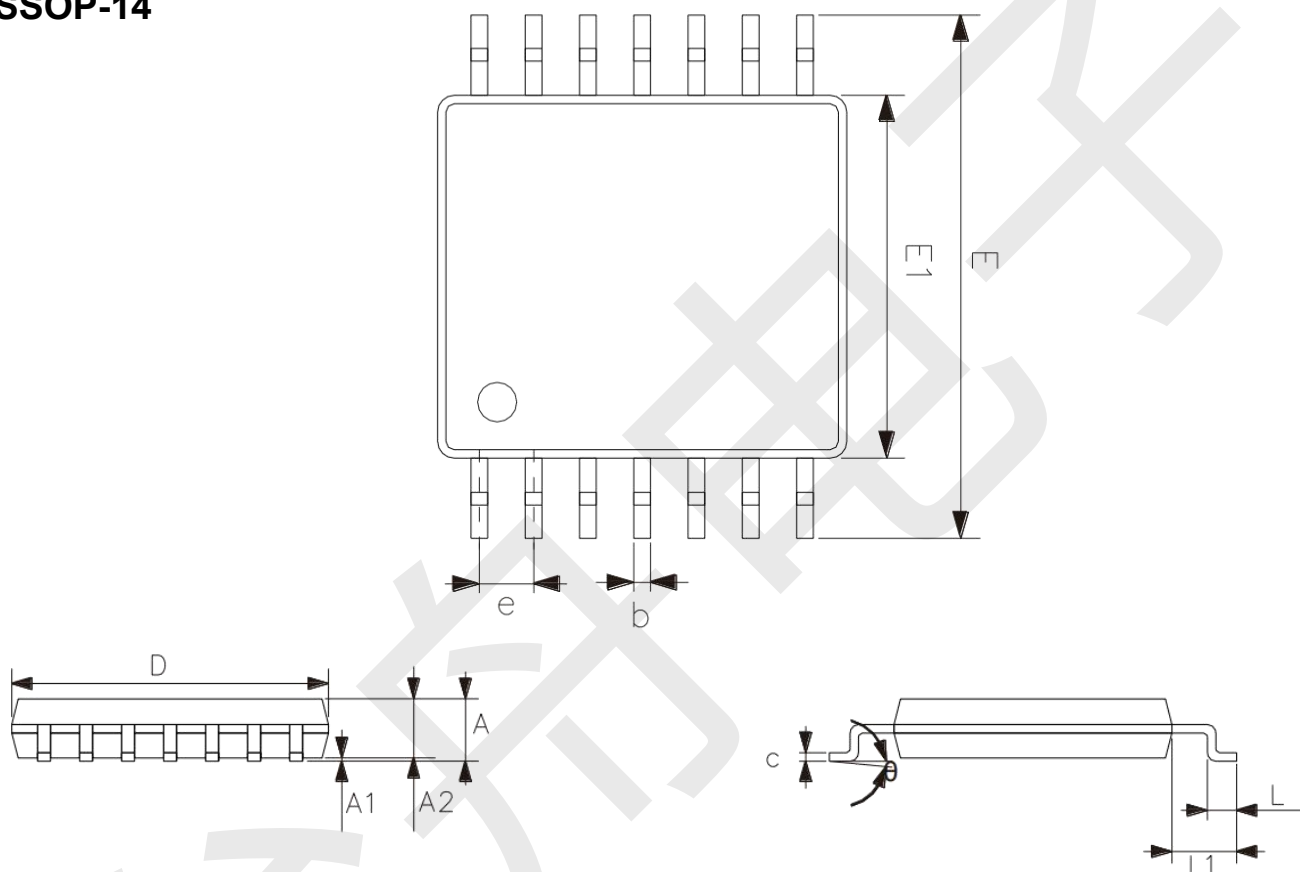


Propagation Delay Times

- Note: 1. C_L includes probe and jig capacitance.
 2. $PRR \leq 1\text{MHz}$, $Z_o = 50\Omega$, $t_R = 6\text{ns}$, $t_F = 6\text{ns}$.

Package information

TSSOP-14



Symbol	Dimensions (mm)	
	Min.	Max.
A	-	1.20
A1	0.05	0.15
A2	0.80	1.05
b	0.19	0.30
c	0.09	0.20
D	4.90	5.10
E1	4.30	4.50
E	6.20	6.60
e	0.65	
L	0.45	0.75
L1	1.00	
θ	0°	8°