

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

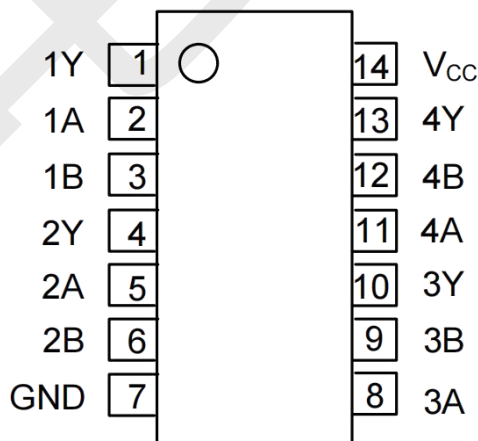
General Description

The 74HC02 contains four independent 2-input NOR gates, which provides the Function $Y=A+B$ in positive logic.

Applications

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

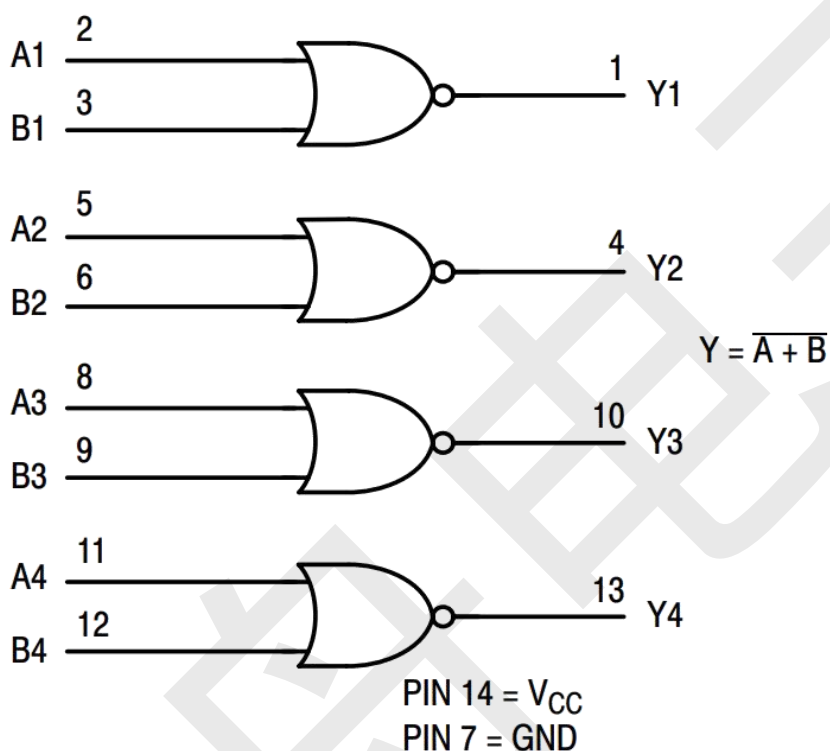
PIN CONFIGURATIONS (Top view)



PIN DESCRIPTION

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

Functional diagram



Function table

Control		Output
nA	nB	nY
L	L	H
H	L	L
L	H	L
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			--	4	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]	$V_{CC}=2.0\text{V}$	--	--	95	ns
			$V_{CC}=4.5\text{V}$	--	--	25	ns
			$V_{CC}=5.0\text{V}; C_L=15\text{pF}$	--	22	--	ns
			$V_{CC}=6.0\text{V}$	--	--	20	ns
Transition time	t_t	see Figure 5 ^[2]	$V_{CC}=2.0\text{V}$	--	--	75	ns
			$V_{CC}=4.5\text{V}$	--	--	20	ns
			$V_{CC}=6.0\text{V}$	--	--	15	ns
Power dissipation capacitance	C_{PD}	per package; $V_I = \text{GND to } V_{CC}$ ^[3]		--	22	--	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

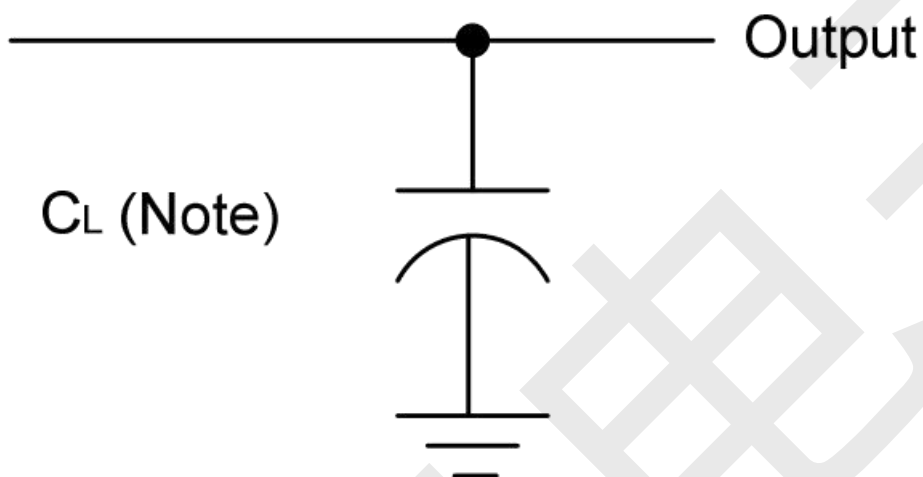
capacitance in pF; V_{CC} =supply

voltage in V; N =number of inputs

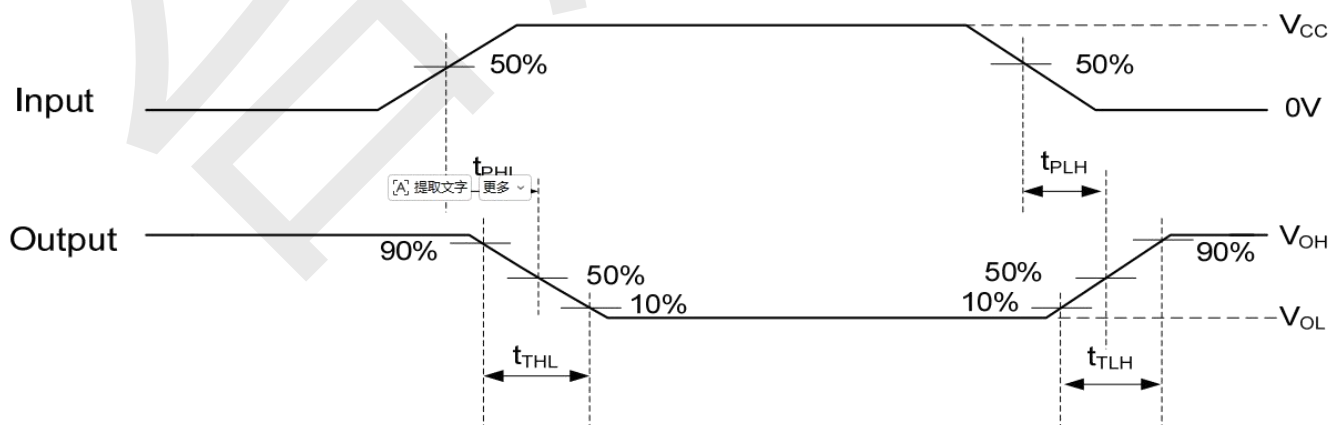
switching;

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

Testing Circuit

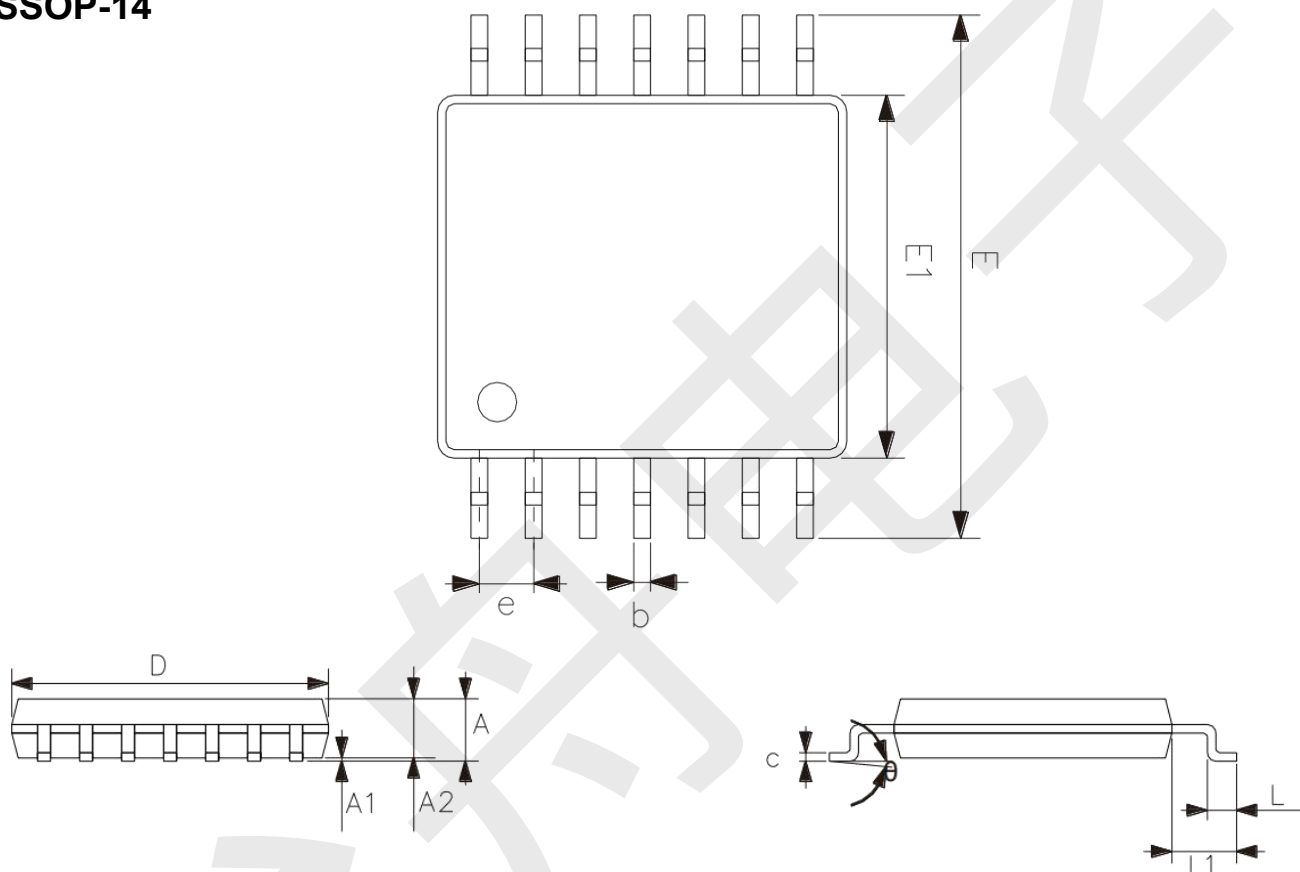


Note: C_L includes probe and jig capacitance.



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°