

HX4093-S four-way 2-input Schmidt and not gate

General situation

The HX4093-S is a circuit consisting of four 2-input and non-gates, with Schmidt flip-flops at each input end of each path. The output switches state with the input signal, and the difference between the positive threshold voltage (V_P) and the negative threshold voltage (V_N) is defined as the hysteresis voltage (V_H).

It operates at 3V to 15V, and unused inputs must be connected to VDD, VSS or other inputs.

Main feature

Power supply voltage range: 3V~15V

Schmidt input job

Input voltage: 0 ~ VDD

Fast output response

Low static current: $I_{DD} < 1\mu A$

Application field

A pulse shaper

High noise environment system

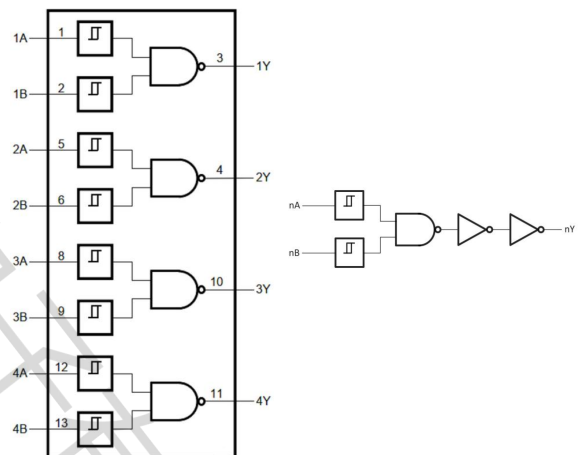
Monostable multivibrator

Unstable multivibrator

And non-logic gates

Pin specification

Internal block diagram and logic block diagram



Serial number	Symbol	I/O	Feature	Pin arrangement
1	1A	I	Data entry	
2	1B	I	Data entry	
3	1Y	O	Data output	
4	2Y	O	Data output	
5	2A	I	Data entry	
6	2B	I	Data entry	
7	VSS	P	Ground (0V)	
8	3A	I	Data entry	
9	3B	I	Data entry	
10	3Y	O	Data output	
11	4Y	O	Data output	
12	4A	I	Data entry	
13	4B	I	Data entry	
14	VDD	P	Supply voltage	

Function table

Input		Exportation
nA	nB	nY
L	L	H
L	H	H
H	L	H
H	H	L

Note: H= high level; L= Low level.

Limiting parameter

(Unless otherwise specified, $T_{amb}=25^{\circ}\text{C}$, $V_{SS}=0\text{V}$)

Argument	Symbol	Conditions		Min	Max	Unit
Supply voltage	V _{DD}	—		−0.5	+18	V
Dc input current	I _{IK}	Any input		—	±10	mA
Input voltage	V _I	All input		−0.5	V _{DD} +0.5	V
Storage temperature	T _{stg}	—		−65	+150	℃
Total power consumption	P _{tot}	—		—	500	mW
Device power consumption	P	Per output transistor		—	100	
Welding temperature	T _L	10 秒	DIP	245		℃
			SOP	260		

Recommended conditions of use

Parameter name	Symbol	Conditions	Min	Typ	Max	Unit
Supply voltage	V_{DD}	—	3	—	15	V
Operating ambient temperature	T_{stg}	In free air	-20	—	+85	$^{\circ}\text{C}$

Dc parameter

(Unless otherwise specified, $T_{amb}=25^{\circ}\text{C}$, $V_{SS}=0\text{V}$)

Argument	Symbol	Test condition			Norm			Unit
		V_0	V_{IN}	V_{DD}	Min	Typ	Max	
Static current	I_{DD}	—	0, 5	5	—	—	0.1	uA
		—	0, 10	10	—	—	0.1	
		—	0, 15	15	—	—	0.1	
Low level output current	I_{OL}	0.4	0, 5	5	1.6	1.9	—	mA
		0.5	0, 10	10	4.5	5.5	—	
		1.5	0, 15	15	21	22	—	
High level output current	I_{OH}	4.6	0, 5	5	-2.5	-2.4	—	mA
		2.5	0, 5	5	-9.3	-9.2	—	
		9.5	0, 10	10	-5.5	-5.2	—	
		13.5	0, 15	15	-21	-20	—	
Low output voltage	V_{OL}	—	0, 5	5	—	0	0.05	V
		—	0, 10	10	—	0	0.05	
		—	0, 15	15	—	0	0.05	
High level output voltage	V_{OH}	—	0, 5	5	4.95	5	—	V
		—	0, 10	10	9.95	10	—	
		—	0, 15	15	14.95	15	—	
Input leakage current	I_I	—	0, 15	15	-0.1	—	+0.1	uA

Ac parameter

(Unless otherwise specified, $T_{amb}=25^{\circ}\text{C}$, $V_{SS}=0\text{V}$, $C_L = 50\text{pF}$, $R_L = 200\text{k}\Omega$, Input $t_r=14\text{ns}$, $t_f=6\text{ns}$)

Argument	Symbol	Test condition	Min	Typ	Max	Unit
Transmission delay	t_{PHL}, t_{PLH}	$V_{DD}=5\text{V}$	—	105	210	ns
		$V_{DD}=10\text{V}$	—	45	90	
		$V_{DD}=15\text{V}$	—	55	110	
Conversion delay	t_{THL}, t_{TLH}	$V_{DD}=5\text{V}$	—	75	150	ns
		$V_{DD}=10\text{V}$	—	35	70	
		$V_{DD}=15\text{V}$	—	25	50	
Input capacitance	C_i	Any input		5	7.5	pF

Transmission characteristic

(Unless otherwise specified, $T_{amb}=25^{\circ}\text{C}$, $V_{SS}=0\text{V}$)

Argument	Symbol	Test condition			Norm			Unit
		V_O	V_{IN}	V_{DD}	Min	Typ	Max	
Positive threshold voltage	V_{T+}	—	[1]	5	3.3	3.5	3.7	V
		—	[1]	10	6.4	6.5	6.6	
		—	[1]	15	9.3	9.4	9.5	
		—	[2]	5	3.3	3.5	3.7	
		—	[2]	10	6.4	6.5	6.6	
		—	[2]	15	9.3	9.4	9.5	
Negative threshold voltage	V_{T-}	—	[1]	5	1.6	1.7	1.8	V
		—	[1]	10	3.6	3.7	3.8	
		—	[1]	15	5.5	5.6	5.7	
		—	[2]	5	1.6	1.7	1.8	
		—	[2]	10	3.6	3.7	3.8	
		—	[2]	15	5.5	5.6	5.7	
		—	[1]	5	1.5	1.8	2.1	
		—	[1]	10	2.6	2.8	3	

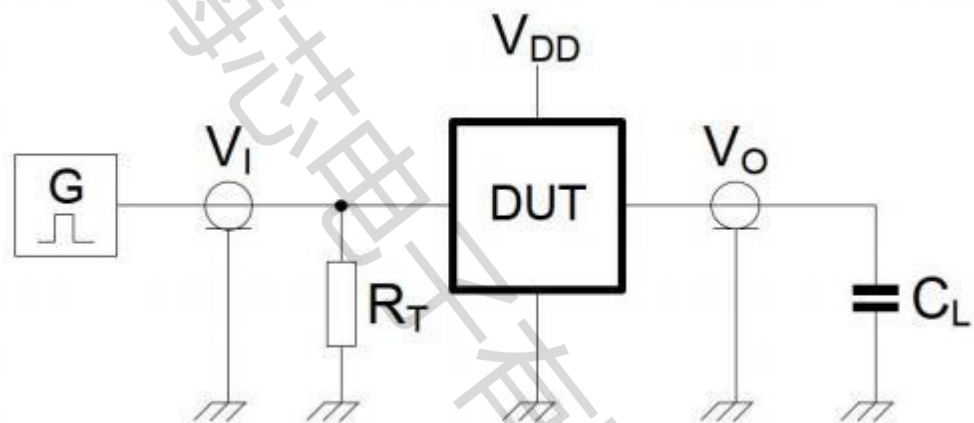
Lag voltage	V_H	-	[1]	15	3.6	3.8	4	V
		-	[2]	5	1.5	1.8	2.1	
		-	[2]	10	2.6	2.8	3	
		-	[2]	15	3.6	3.8	4	

Note:

[1] Input on ports 1, 5, 8, 12 or 2, 6, 9, 13; Other input connection VDD

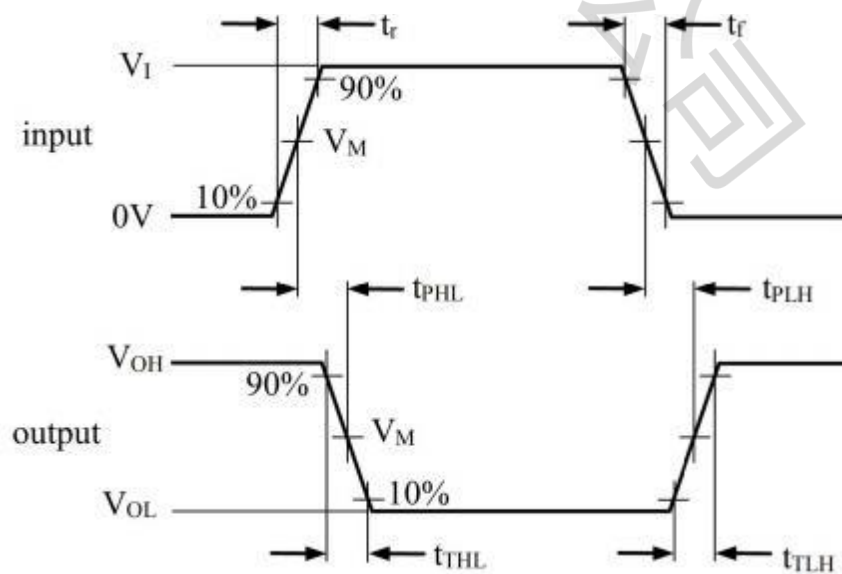
[2] Input on ports 1 and 2, 5 and 6, 8 and 9, or 12 and 13; Other input connection VDD

Ac test circuit



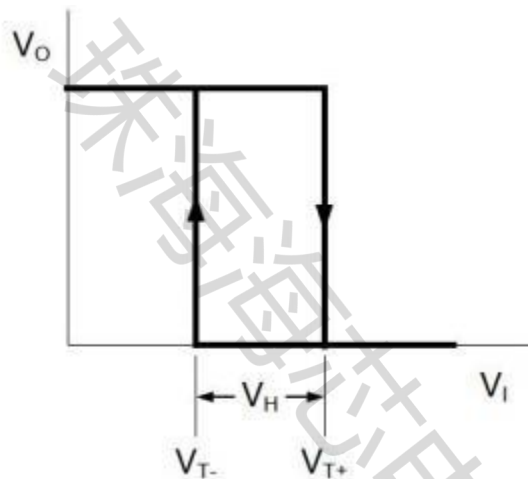
Switch time test circuit

Ac test waveform

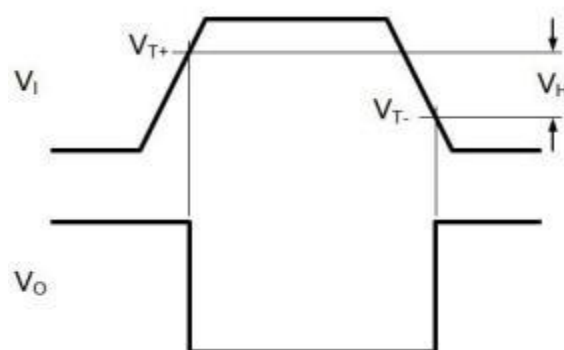


Transmission delay and output conversion time

Transmission characteristic waveform

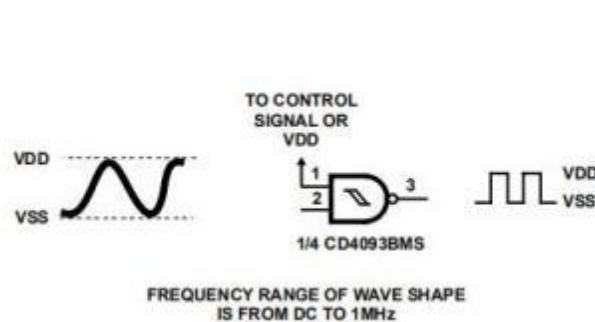


Input and output characteristics

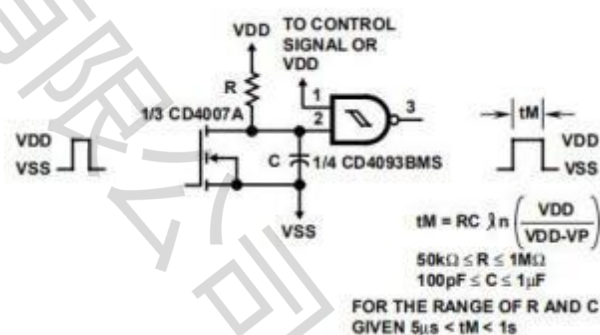


Definition of V_{T+} , V_{T-} and V_H

Typical application



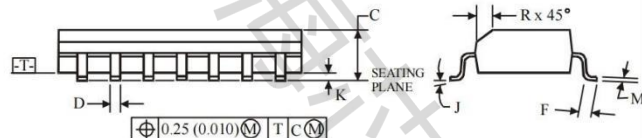
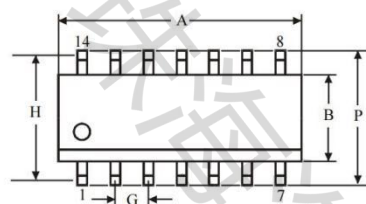
A pulse shaper



Monostable multivibrator

Encapsulation

SOP14 (Package Outline Dimensions)

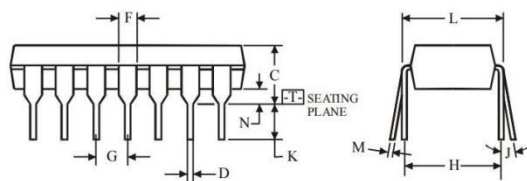
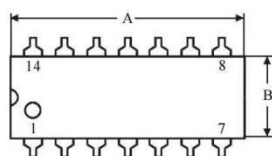


NOTES:

1. Dimensions A and B do not include mold flash or protrusion.
2. Maximum mold flash or protrusion 0.15 mm (0.006) per side for A; for B - 0.25 mm (0.010) per side.

Symbol	Dimension, mm	
	MIN	MAX
A	8.55	8.75
B	3.8	4
C	1.35	1.75
D	0.33	0.51
F	0.4	1.27
G	1.27	
H	5.27	
J	0°	8°
K	0.1	0.25
M	0.19	0.25
P	5.8	6.2
R	0.25	0.5

DIP14 (Package Outline Dimensions)



NOTES:

1. Dimensions "A", "B" do not include mold flash or protrusions.
Maximum mold flash or protrusions 0.25 mm (0.010) per side.

Symbol	Dimension, mm	
	MIN	MAX
A	18.67	19.69
B	6.1	7.11
C	5.33	
D	0.36	0.56
F	1.14	1.78
G	2.54	
H	7.62	
J	0°	10°
K	2.92	3.81
L	7.62	8.26
M	0.2	0.36
N	0.38	

Part Number	Package Type	Package	quantity
HX4093-S	SOP-14	Taping	2500