HX40106-S Six-way Schmidt trigger

General situation

HX40106-S is composed of six CMOS reverse circuits, each circuit input has a Schmitt trigger circuit, trigger switch at different potentials, output for positive and negative signals, the voltage difference between the positive voltage (VP) and the negative voltage (VN) is defined as the hysteresis voltage (VH).

When in use, the input end of the unused channel needs to be connected to the power supply or ground to reduce the power consumption of the chip.

Main feature

Schmidt trigger input

Standardized symmetrical output characteristics

Power supply voltage:3～16V

Input voltage:0～VDD

5V、10V、15V Parameter rating

Low static current:IDD＜1μA

Operating temperature：-20℃ ～85℃

Application field

Waveform and pulse shaping

Stable multivibrator

Monostable oscillator

High noise environment system

Internal block diagram

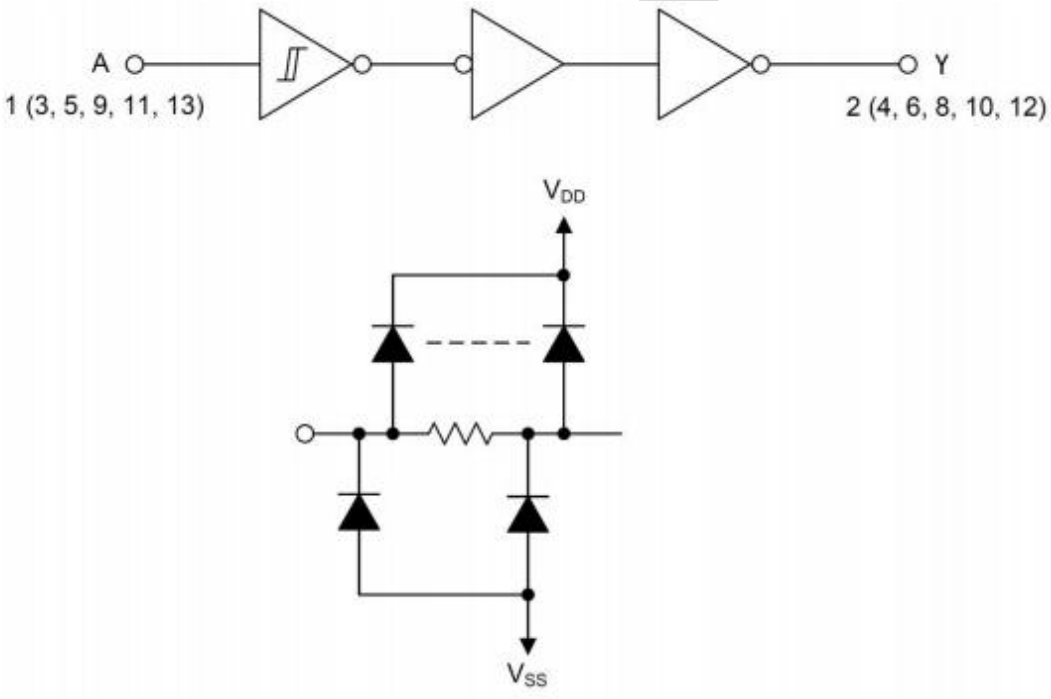
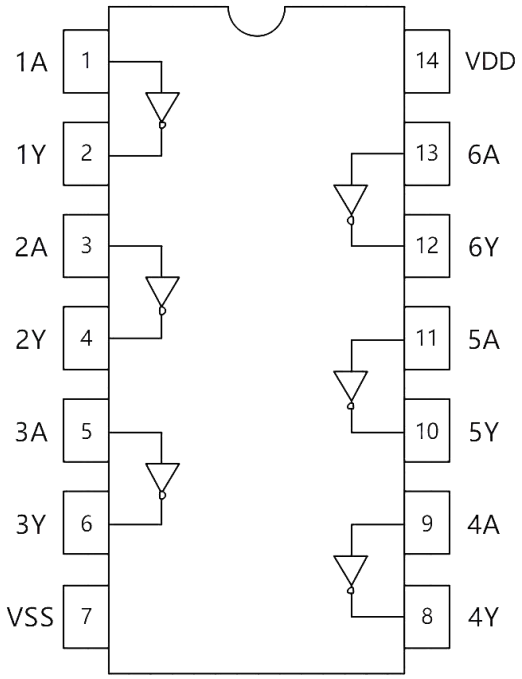


Figure 1. Logic diagram (one buffer) & simple block diagram

Pin specification



Serial number	Pin definition	Serial number	Pin definition
1	1Channel input	14	Power source
2	1Channel output	13	6Channel input
3	2Channel input	12	6Channel output
4	2Channel output	11	5Channel input
5	3Channel input	10	5Channel output
6	3Channel output	9	4Channel input
7	Ground	8	4Channel output

Limiting maximum parameter

Argument	Symbol	Min	Max
Supply voltage	VDD	-0.5V	16V
Input voltage	VIN	-0.5V	VDD+0.5V
Input current	IIN	-10mA	+10mA
Storage temperature	Tstg	-65℃	150℃
Junction temperature	TJ	-	150℃
Welding temperature	-	-	265℃
Electrostatic discharge	ESD(HBM)	-	2000V

Note: Exceeding the above limit value may cause permanent damage to the chip.

Recommended working conditions

Argument	Symbol	Min	Max
Operating voltage	VDD	3V	15V
Input voltage	VIN	0V	VDD
Operating temperature	T_A	-20℃	85℃

Input/output truth table

Input(n A)	Exportation(n Y)
L	H
H	L

Note: L= low-level voltage; H= high level voltage.

Electrical characteristics - Static parameters

(No special instructions，TA=25℃)

Symbol	Argument	Test condition		Min	Typ	Max	Unit
V_{OL}	Output low level voltage	V_{IN} = 5V	V_{DD} = 5V	-	0	0.05	V
		V_{IN} = 10V	V_{DD} = 10V	-	0	0.05	
		V_{IN} = 15V	V_{DD} = 15V	-	0	0.05	
V_{OH}	Output high level voltage	V_{IN} = 0V	V_{DD} = 5V	4.95	5	-	V
		V_{IN} = 0V	V_{DD} = 10V	9.95	10	-	
		V_{IN} = 0V	V_{DD} = 15V	14.95	15	-	
V_P	Positive trigger threshold voltage	-	V_{DD} = 5V	2.9	3.6	4.3	V
		-	V_{DD} = 10V	5.5	6.9	8.2	
		-	V_{DD} = 15V	8.5	10.5	12.5	
V_N	Negative trigger threshold voltage	-	V_{DD} = 5V	0.7	1.7	2.7	V
		-	V_{DD} = 10V	2.0	3.4	4.8	
		-	V_{DD} = 15V	3.4	5.2	7.2	

V_H	Hysteresis voltage	–	V_{DD} = 5V	0.9	1.9	2.8	V
		–	V_{DD} = 10V	1.8	3.5	4.0	
		–	V_{DD} = 15V	3.2	5.3	7.2	
I_{IL}	Output low level perfusion current	V_O = 0.4V	V_{DD} = 5V	0.5	1.6	–	mA
		V_O = 0.5V	V_{DD} = 10V	2.5	5	–	
		V_O = 1.5V	V_{DD} = 15V	3.5	16	–	
I_{OH}	Output high level source current	V_O = 4.6V	V_{DD} = 5V	–	-1	-0.5	mA
		V_O = 9.5V	V_{DD} = 10V	–	-2.6	-1.3	
		V_O = 13.5V	V_{DD} = 15V	–	-7.2	-3.5	
I_{IN}	Input current	V_{IN}=0V~15V	VDD=15V	-1	–	1	uA
I_{DD}	Supply current	V_{IN}=0V or 5V	V_{DD} = 5V	–	–	1	uA
		V_{IN}=0V or 10V	V_{DD} = 10V	–	–	1	
		V_{IN}=0V or 15V	V_{DD} = 15V	–	–	1	

Note: The conversion characteristic waveform is as follows

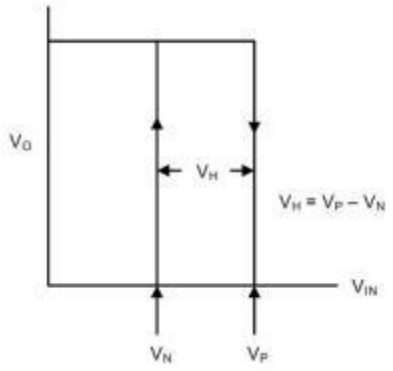


Figure 2. Transformation characteristics

Electrical characteristics – Time parameters

Argument		Test condition	Min	Typ	Max	Unit
t_{PHL}	C_L = 50pF R_L = 200K Ω V_{IN} = 1KHz, D = 50%Square wave tr=tf≤20ns	V_{DD}=5V	–	35	110	ns
		V_{DD}=10V	–	22	60	ns
		V_{DD}=15V	–	32	50	ns
t_{PLH}		V_{DD}=5V	–	46	110	ns
		V_{DD}=10V	–	30	60	ns
		V_{DD}=15V	–	20	50	ns
t_{THL}	C_L = 50pF R_L = 200K Ω V_{IN} = 1KHz, D = 50%Square wave tr=tf≤20ns	V_{DD}=5V	–	52	200	ns
		V_{DD}=10V	–	26	100	ns
		V_{DD}=15V	–	54	80	ns
t_{TLH}		V_{DD}=5V	–	75	200	ns
		V_{DD}=10V	–	40	100	ns
		V_{DD}=15V	–	36	80	ns
C_{IN}	Any Input		–	–	15	pF

Note: The time parameter test circuit is as follows

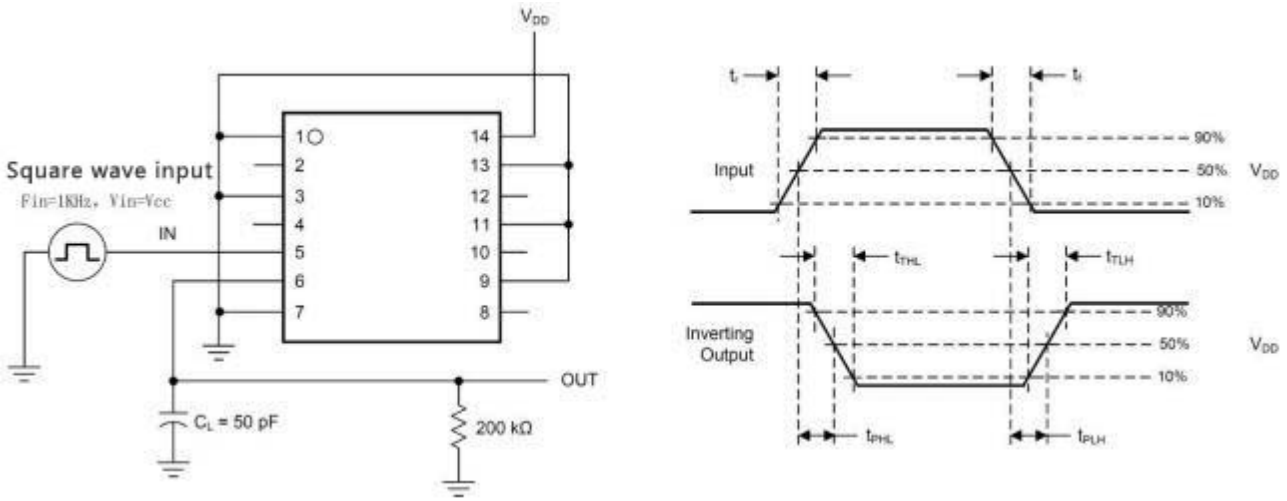


Figure 3. Schematic diagram of time test & output waveform

Typical application (1) Waveform shaper

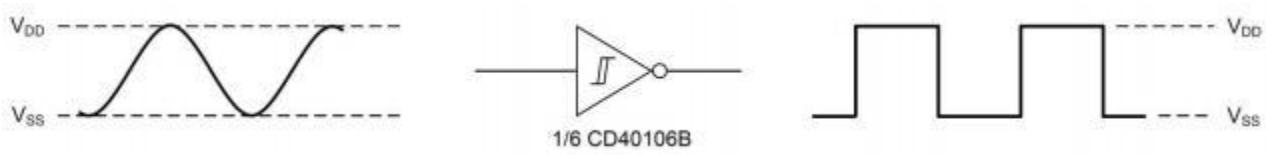
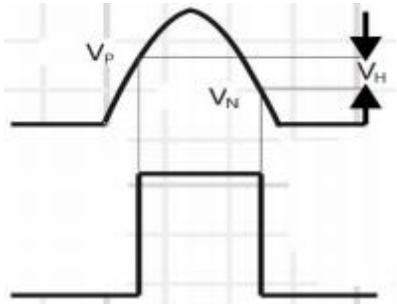


Figure 4. Waveform shaper



In the above app, note:

1) Input waveform voltage amplitude should not be too large, should be lower than VDD voltage;
2) The output load also needs to be limited to avoid exceeding the maximum power of the chip。

Figure 5. Shaping waveform

(2) Monostable multivibrator

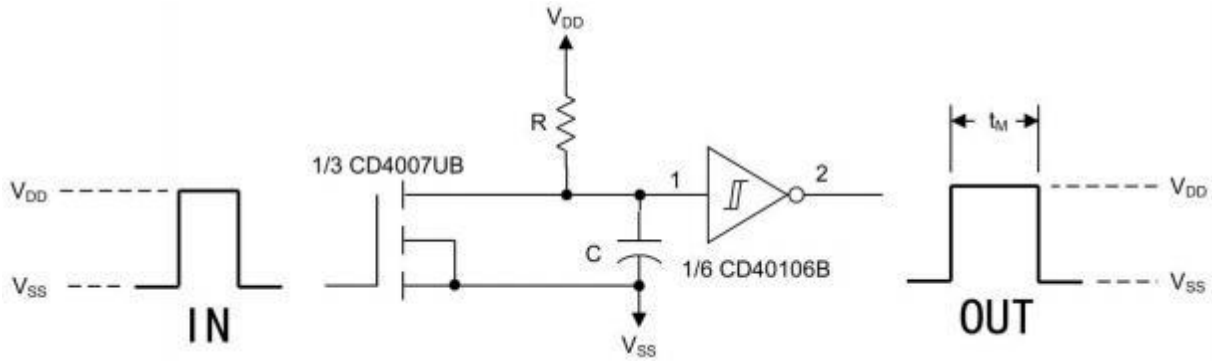


Figure 6. Monostable multivibrator

(3) Unsteady multivibrator

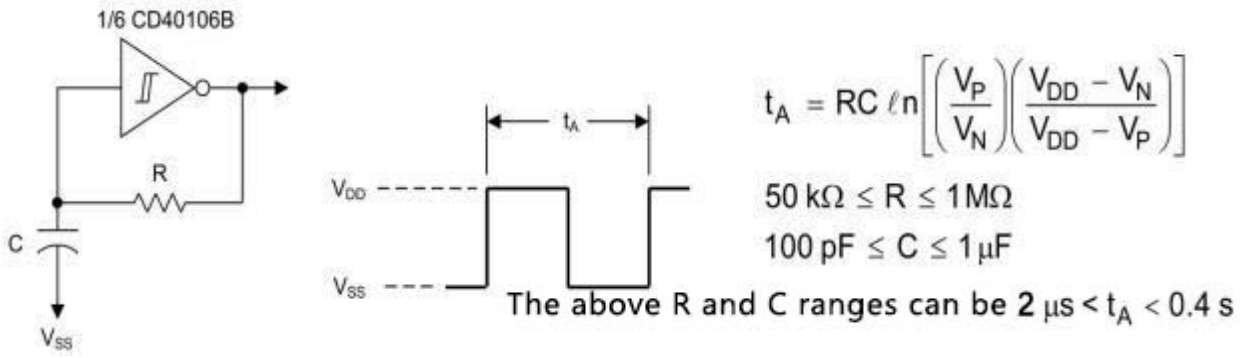
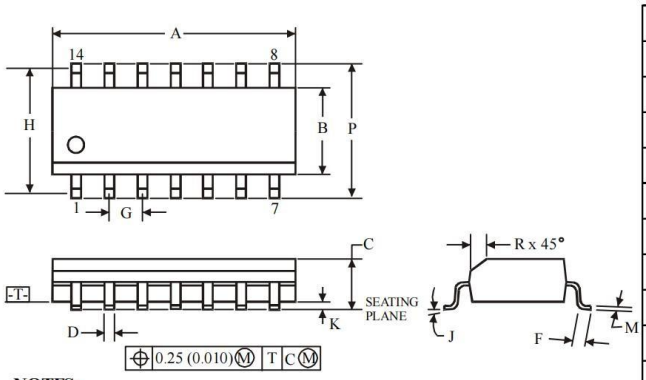


Figure 7. Unsteady multivibrator

Encapsulation

SOP14 (Package Outline Dimensions)

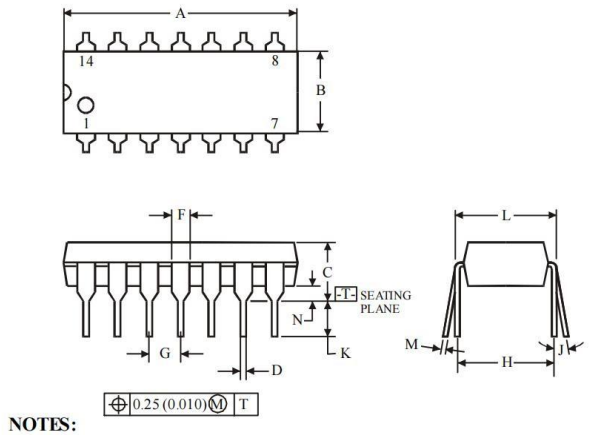


	Dimension, mm	
Symbol	MIN	MAX
A	8.55	8.75
B	3.8	4
C	1.35	1.75
D	0.33	0.51
F	0.4	1.27
G	1.27	
H	5.27	
J	0°	8°
K	0.1	0.25
M	0.19	0.25
P	5.8	6.2
R	0.25	0.5

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.

DIP14 (Package Outline Dimensions)



	Dimension, mm	
Symbol	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	

NOTES:

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

Part Number	Package Type	Package	quantity
HX40106-S	SOP-14	Taping	2500