SN74HC/HCT174 (LX)
Hex D-type Flip-flop with Reset; Positive-edge Trigger

Product Specification

Specification Revision History:

Version	Date	Description
2023-05-A1	2023-05	New

Contents

1、General Description

The SN74HC/HCT174 is a hex positive edge-triggered D-type flip-flop with individual data inputs (Dn) and outputs (Qn).

Features:

- Supply voltage range:
- SN74HC174: 2V to 6V
- SN74HCT174: 4.5V to 5.5V

Input levels:

- SN74HC174: CMOS level
- SN74HCT174: TTL level
- Temperature range:-40℃ to +125℃
- Packaging information: DIP16/SOP16/TSSOP16

Ordering Information:

Tube packing specifications:

Part number	Packaging form	Marking code	Tube quantity	Boxed tube quantity	Boxed quantity	Notes
SN74HC174N (LX)	DIP16	SN74HC174N	25 PCS/tube	40 tube/box	1000 PCS/box	Dimensions of plastic enclosure: 19.0mm×6.4mm Pin spacing: 2.54mm
SN74HCT174N (LX)	DIP16	SN74HCT174N	25 PCS/tube	40 tube/box	1000 PCS/box	Dimensions of plastic enclosure: 19.0mm×6.4mm Pin spacing: 2.54mm
SN74HC174D (LX)	SOP16	74HC174	50 PCS/tube	200 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing: 1.27mm
SN74HCT174D (LX)	SOP16	74HCT174	50 PCS/tube	200 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing: 1.27mm
SN74HC174PW (LX)	TSSOP16	74HC174	96 PCS/tube	200 tube/box	19200 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing: 0.65mm
SN74HCT174PW (LX)	TSSOP16	74HCT174	96 PCS/tube	200 tube/box	19200 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing: 0.65mm

Reel packing specifications:

Part number	Packaging form	Marking code	Reel quantity	Boxed reel quantity	Notes
SN74HC174DR (LX)	SOP16	HC174	2500 PCS/reel	5000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing: 1.27mm
SN74HCT174DR (LX)	SOP16	HCT174	2500 PCS/reel	5000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing: 1.27mm
SN74HC174PWR (LX)	TSSOP16	74HC174	5000 PCS/reel	10000 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing: 0.65mm
SN74HCT174PWR (LX)	TSSOP16	74HCT174	5000 PCS/reel	10000 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing: 0.65mm

Note: If the physical information is inconsistent with the ordering information, please refer to the actual product.

2、Block Diagram And Pin Description

2.1、Block Diagram

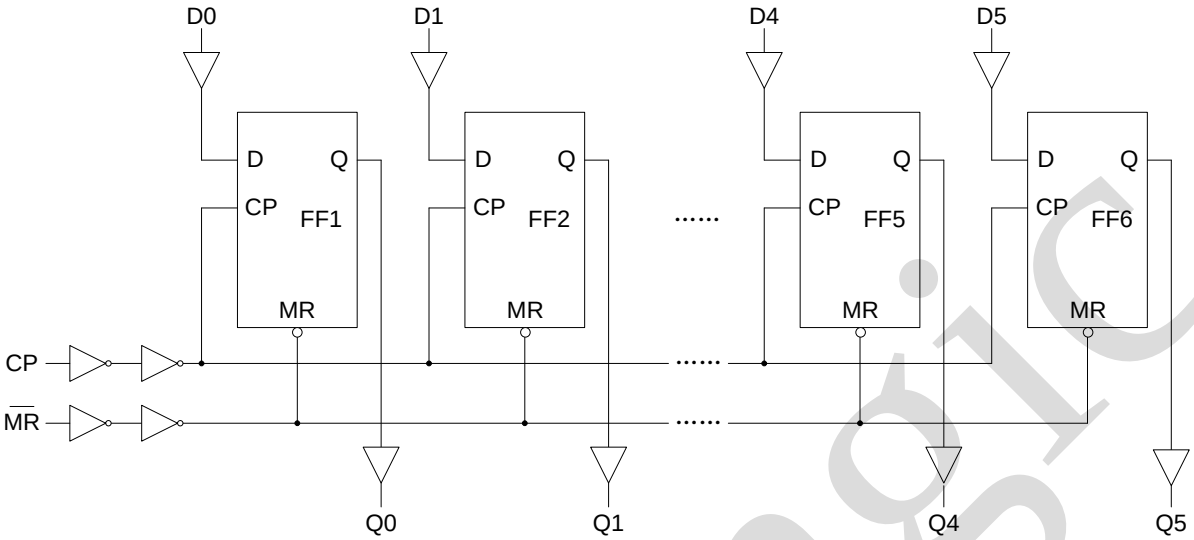


Figure 1. Logic diagram

2.2、Pin Configurations

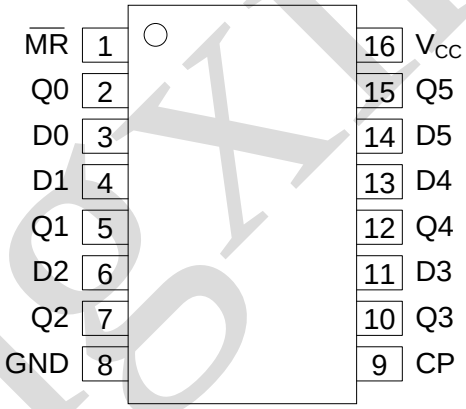


Figure 2. Pin configurations

2.3、Pin Description

Pin No.	Pin Name	Description
1	$\overline{MR}$	asynchronous master reset input (active LOW)
2	Q0	data output
3	D0	data input
4	D1	data input
5	Q1	data output
6	D2	data input
7	Q2	data output
8	GND	ground (0V)
9	CP	clock input (LOW-to-HIGH edge-triggered)
10	Q3	data output
11	D3	data input
12	Q4	data output
13	D4	data input
14	D5	data input
15	Q5	data output
16	V_{CC}	supply voltage

2.4、Function Table

Input			Output
$\overline{MR}$	CP	Dn	Qn
L	X	X	L
H	↑	h	H
H	↑	l	L

Note:
H=HIGH voltage level;
h=HIGH voltage level one set-up time prior to the LOW-to-HIGH clock transition;
L=LOW voltage level;
l=LOW voltage level one set-up time prior to the LOW-to-HIGH clock transition;
X=don't care;
↑=LOW-to-HIGH clock transition.

3、Electrical Parameter

3.1、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
supply current	I_{CC}	-		-	50	mA
ground current	I_{GND}	-		-50	-	mA
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
storage temperature	T_{stg}	-		-65	+150	℃
soldering temperature	T_L	10s	DIP	245		℃
			SOP/TSSOP	260		

3.2、Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
SN74HC174						
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
ambient temperature	T_{amb}	-	-40	-	+125	℃
SN74HCT174						
supply voltage	V_{CC}	-	4.5	5.0	5.5	V
input voltage	V_I	-	0	-	V_{CC}	V
output voltage	V_O	-	0	-	V_{CC}	V
ambient temperature	T_{amb}	-	-40	-	+125	℃

3.3、Electrical Characteristics

3.3.1、DC Characteristics 1

(T_{amb}=-40℃ to +85℃, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	V_{CC}	Conditions	Min.	Typ.	Max.	Unit
SN74HC174							
HIGH-level input voltage	V_{IH}	2.0V	-	1.5	1.2	-	V
		4.5V	-	3.15	2.4	-	V
		6.0V	-	4.2	3.2	-	V
LOW-level input voltage	V_{IL}	2.0V	-	-	0.8	0.5	V
		4.5V	-	-	2.1	1.35	V
		6.0V	-	-	2.8	1.8	V
HIGH-level output voltage	V_{OH}	2.0V	I_O=-20uA	1.9	2.0	-	V
		4.5V	I_O=-20uA	4.4	4.5	-	V
		6.0V	I_O=-20uA	5.9	6.0	-	V
		4.5V	I_O=-4.0mA	3.84	4.32	-	V
		6.0V	I_O=-5.2mA	5.34	5.81	-	V
LOW-level	V_{OL}	2.0V	I_O=20uA	-	0	0.1	V

output voltage		4.5V	I_O=20uA	-	0	0.1	V
		6.0V	I_O=20uA	-	0	0.1	V
		4.5V	I_O=4.0mA	-	0.15	0.33	V
		6.0V	I_O=5.2mA	-	0.16	0.33	V
input leakage current	I_I	6.0V	V_I=V_{CC} or GND	-	-	±1	uA
supply current	I_{CC}	6.0V	V_I=V_{CC} or GND;I_O=0A	-	-	80	uA
SN74HCT174							
HIGH-level input voltage	V_{IH}	4.5~ 5.5V	-	2.0	1.6	-	V
LOW-level input voltage	V_{IL}	4.5~ 5.5V	-	-	1.2	0.8	V
HIGH-level output voltage	V_{OH}	4.5V	I_O=-20uA	4.4	4.5	-	V
			I_O=-4.0mA	3.84	4.32	-	V
LOW-level output voltage	V_{OL}	4.5V	I_O=20uA	-	0	0.1	V
			I_O=4.0mA	-	0.15	0.33	V
input leakage current	I_I	5.5V	V_I=V_{CC} or GND	-	-	±1	uA
supply current	I_{CC}	6.0V	V_I=V_{CC} or GND;I_O=0A	-	-	80	uA
additional supply current	ΔI_{CC}	4.5~ 5.5V	One input at V_I=V_{CC}-2.1V; Other inputs at V_{CC} or GND; I_O=0A	-	-	500	uA

3.3.2、DC Characteristics 2

(T_{amb}=-40℃ to +125℃, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	V_{CC}	Conditions	Min.	Typ.	Max.	Unit
SN74HC174							
HIGH-level input voltage	V_{IH}	2.0V	-	1.5	-	-	V
		4.5V	-	3.15	-	-	V
		6.0V	-	4.2	-	-	V
LOW-level input voltage	V_{IL}	2.0V	-	-	-	0.5	V
		4.5V	-	-	-	1.35	V
		6.0V	-	-	-	1.8	V
HIGH-level output voltage	V_{OH}	2.0V	I_O=-20uA	1.9	-	-	V
		4.5V	I_O=-20uA	4.4	-	-	V
		6.0V	I_O=-20uA	5.9	-	-	V
		4.5V	I_O=-4.0mA	3.7	-	-	V
		6.0V	I_O=-5.2mA	5.2	-	-	V
LOW-level output voltage	V_{OL}	2.0V	I_O=20uA	-	-	0.1	V
		4.5V	I_O=20uA	-	-	0.1	V
		6.0V	I_O=20uA	-	-	0.1	V
		4.5V	I_O=4.0mA	-	-	0.4	V
		6.0V	I_O=5.2mA	-	-	0.4	V
input leakage current	I_I	6.0V	V_I=V_{CC} or GND	-	-	±1	uA
supply current	I_{CC}	6.0V	V_I=V_{CC} or GND;I_O=0A	-	-	160	uA
SN74HCT174							

HIGH-level input voltage	V_{IH}	4.5~5.5V	-	2.0	-	-	V
LOW-level input voltage	V_{IL}	4.5~5.5V	-	-	-	0.8	V
HIGH-level output voltage	V_{OH}	4.5V	I_O=-20uA	4.4	-	-	V
			I_O=-4.0mA	3.7	-	-	V
LOW-level output voltage	V_{OL}	4.5V	I_O=20uA	-	-	0.1	V
			I_O=4.0mA	-	-	0.4	V
input leakage current	I_I	5.5V	V_I=V_{CC} or GND	-	-	±1	uA
supply current	I_{CC}	6.0V	V_I=V_{CC} or GND;I_O=0A	-	-	160	uA
additional supply current	ΔI_{CC}	4.5~5.5V	One input at V_I=V_{CC}-2.1V; Other inputs at V_{CC} or GND; I_O=0A	-	-	500	uA

3.3.3、AC Characteristics 1

(T_{amb}=-40℃ to +85℃, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	V_{CC}	Conditions		Min.	Typ.	Max.	Unit
SN74HC174								
CP to Qn propagation delay	t_{PLH}, t_{PHL}	2.0V	C_L=50pF	see Figure 4	-	55	205	ns
		4.5V	C_L=50pF		-	20	41	ns
		5.0V	C_L=15pF		-	17	-	ns
		6.0V	C_L=50pF		-	16	35	ns
MR to Qn HIGH to LOW propagation delay	t_{PHL}	2.0V	C_L=50pF	see Figure 5	-	44	190	ns
		4.5V	C_L=50pF		-	16	38	ns
		5V	CL=15pF		-	13	-	ns
		6.0V	C_L=50pF		-	13	33	ns
transition time	t_{THL}, t_{TLH}	2.0V	C_L=50pF	see Figure 4	-	19	95	ns
		4.5V	C_L=50pF		-	7	19	ns
		6.0V	C_L=50pF		-	6	16	ns
CP input HIGH or LOW pulse width	t_W	2.0V	C_L=50pF	see Figure 4	100	17	-	ns
		4.5V	C_L=50pF		20	6	-	ns
		6.0V	C_L=50pF		17	5	-	ns
MR input LOW pulse width		2.0V	C_L=50pF	see Figure 5	100	12	-	ns
		4.5V	C_L=50pF		20	4	-	ns
		6.0V	C_L=50pF		17	3	-	ns
MR to CP Recovery time	t_{rec}	2.0V	C_L=50pF	see Figure 5	5	-11	-	ns
		4.5V	C_L=50pF		5	-4	-	ns
		6.0V	C_L=50pF		5	-3	-	ns
Dn to CP set-up time	t_{su}	2.0V	C_L=50pF	see Figure 4	75	6	-	ns
		4.5V	C_L=50pF		15	2	-	ns
		6.0V	C_L=50pF		13	2	-	ns
Dn to CP hold time	t_h	2.0V	C_L=50pF	see Figure 4	3	-6	-	ns
		4.5V	C_L=50pF		3	-2	-	ns
		6.0V	C_L=50pF		3	-2	-	ns
maximum	f_{max}	2.0V	C_L=50pF	see Figure 4	5	-	-	MHZ

frequency		4.5V	C_L=50pF		24	-	-	MHZ
		6.0V	C_L=50pF		28	-	-	MHZ
SN74HCT174								
CP to Qn propagation delay	t_{PLH}, t_{PHL}	4.5V	C_L=50pF	see Figure 4	-	21	44	ns
		5.0V	C_L=15pF		-	18	-	ns
MR to Qn HIGH to LOW propagation delay	t_{PHL}	4.5V	C_L=50pF	see Figure 5	-	20	44	ns
		5V	CL=15pF		-	17	-	ns
transition time	t_{THL}, t_{TLH}	4.5V	C_L=50pF	see Figure 4	-	7	19	ns
CP input HIGH or LOW pulse width	t_W	4.5V	C_L=50pF	see Figure 4	20	7	-	ns
MR input LOW pulse width		4.5V	C_L=50pF	see Figure 5	25	7	-	ns
MR to CP Recovery time	t_{rec}	4.5V	C_L=50pF	see Figure 5	15	-3	-	ns
Dn to CP set-up time	t_{su}	4.5V	C_L=50pF	see Figure 4	20	4	-	ns
Dn to CP hold time	t_h	4.5V	C_L=50pF	see Figure 4	5	-3	-	ns
maximum frequency	f_{max}	4.5V	C_L=15pF	see Figure 4	24	-	-	MHZ

3.3.4、AC Characteristics 2

(T_{amb}=-40℃ to +125℃, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	V_{CC}	Conditions		Min.	Typ.	Max.	Unit
SN74HC174								
CP to Qn propagation delay	t_{PLH}, t_{PHL}	2.0V	C_L=50pF	see Figure 4	-	-	250	ns
		4.5V	C_L=50pF		-	-	50	ns
		6.0V	C_L=50pF		-	-	43	ns
MR to Qn HIGH to LOW propagation delay	t_{PHL}	2.0V	C_L=50pF	see Figure 5	-	-	225	ns
		4.5V	C_L=50pF		-	-	45	ns
		6.0V	C_L=50pF		-	-	38	ns
transition time	t_{THL}, t_{TLH}	2.0V	C_L=50pF	see Figure 4	-	-	110	ns
		4.5V	C_L=50pF		-	-	22	ns
		6.0V	C_L=50pF		-	-	19	ns
CP input HIGH or LOW pulse width	t_W	2.0V	C_L=50pF	see Figure 4	120	-	-	ns
		4.5V	C_L=50pF		24	-	-	ns
		6.0V	C_L=50pF		20	-	-	ns
MR input LOW pulse width		2.0V	C_L=50pF	see Figure 5	120	-	-	ns
		4.5V	C_L=50pF		24	-	-	ns
		6.0V	C_L=50pF		20	-	-	ns
MR to CP Recovery time	t_{rec}	2.0V	C_L=50pF	see Figure 5	5	-	-	ns
		4.5V	C_L=50pF		5	-	-	ns
		6.0V	C_L=50pF		5	-	-	ns

Dn to CP set-up time	t_{su}	2.0V	C_L=50pF	see Figure 4	90	-	-	ns
		4.5V	C_L=50pF		18	-	-	ns
		6.0V	C_L=50pF		15	-	-	ns
Dn to CP hold time	t_h	2.0V	C_L=50pF	see Figure 4	3	-	-	ns
		4.5V	C_L=50pF		3	-	-	ns
		6.0V	C_L=50pF		3	-	-	ns
maximum frequency	f_{max}	2.0V	C_L=50pF	see Figure 4	4	-	-	MHZ
		4.5V	C_L=50pF		20	-	-	MHZ
		6.0V	C_L=50pF		24	-	-	MHZ
SN74HCT174								
CP to Qn propagation delay	t_{PLH}, t_{PHL}	4.5V	C_L=50pF	see Figure 4	-	-	53	ns
MR to Qn HIGH to LOW propagation delay	t_{PHL}	4.5V	C_L=50pF	see Figure 5	-	-	53	ns
		5V	CL=15pF		-	-	-	ns
transition time	t_{THL}, t_{TLH}	4.5V	C_L=50pF	see Figure 4	-	-	22	ns
CP input HIGH or LOW pulse width	t_W	4.5V	C_L=50pF	see Figure 4	24	-	-	ns
MR input LOW pulse width		4.5V	C_L=50pF	see Figure 5	30	-	-	ns
MR to CP Recovery time	t_{rec}	4.5V	C_L=50pF	see Figure 5	18	-	-	ns
Dn to CP set-up time	t_{su}	4.5V	C_L=50pF	see Figure 4	24	-	-	ns
Dn to CP hold time	t_h	4.5V	C_L=50pF	see Figure 4	5	-	-	ns
maximum frequency	f_{max}	4.5V	C_L=50pF	see Figure 4	20	-	-	MHZ

4、Testing Circuit

4.1、AC Testing Circuit

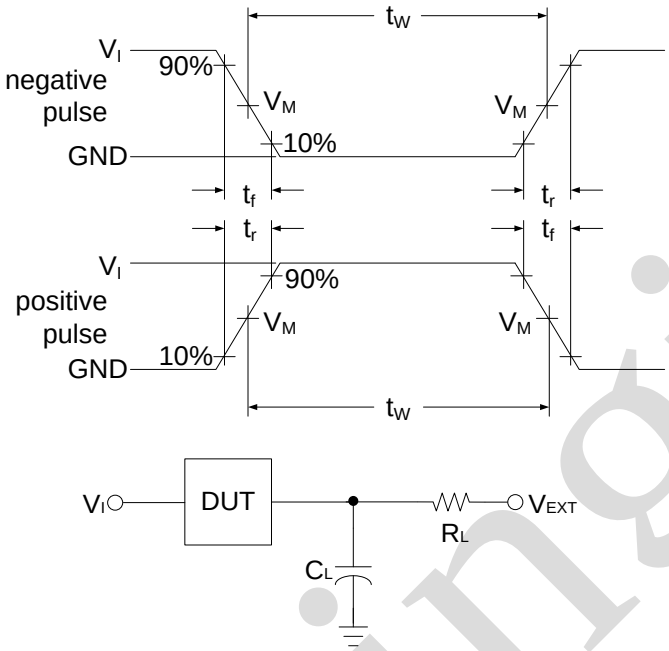


Figure 3. Test circuit for measuring switching times

C_L includes probe and jig capacitance.

4.2、Test Data

Type	Input		Load		V_{EXT}		
	V_I	$t_r = t_f$	C_L	R_L	t_{PLH}/t_{PHL}	t_{PLZ}/t_{PZL}	t_{PHZ}/t_{PZH}
SN74HC174	V_{CC}	6.0ns	15pF, 50pF	1KΩ	Open	V_{CC}	GND
SN74HCT174	3.0V	6.0ns	15pF, 50pF	1KΩ	Open	V_{CC}	GND

4.3、AC Testing Waveforms

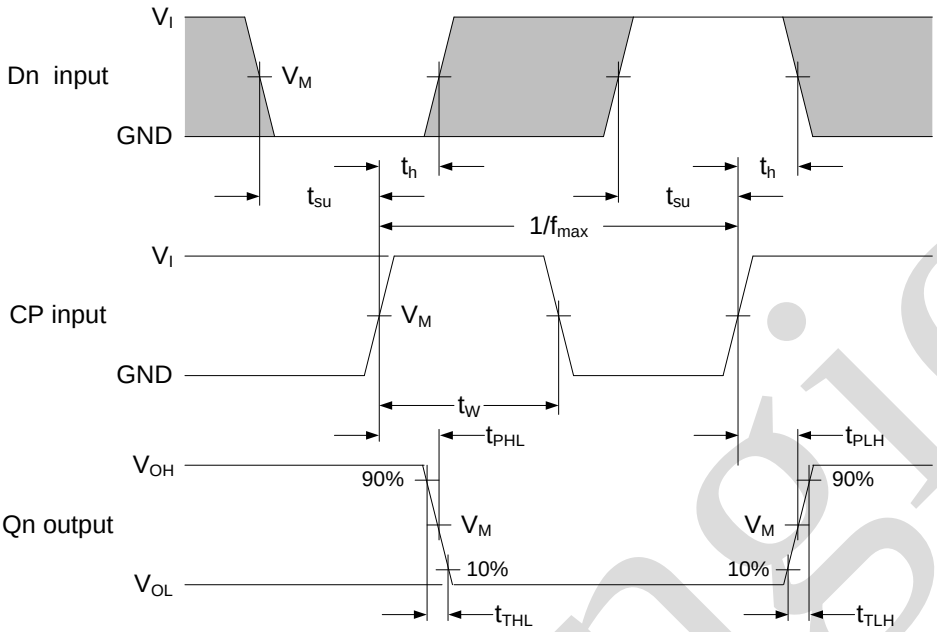


Figure 4. Input to output propagation delay, output transition time, clock input pulse width, set-up and hold times for data input and maximum frequency

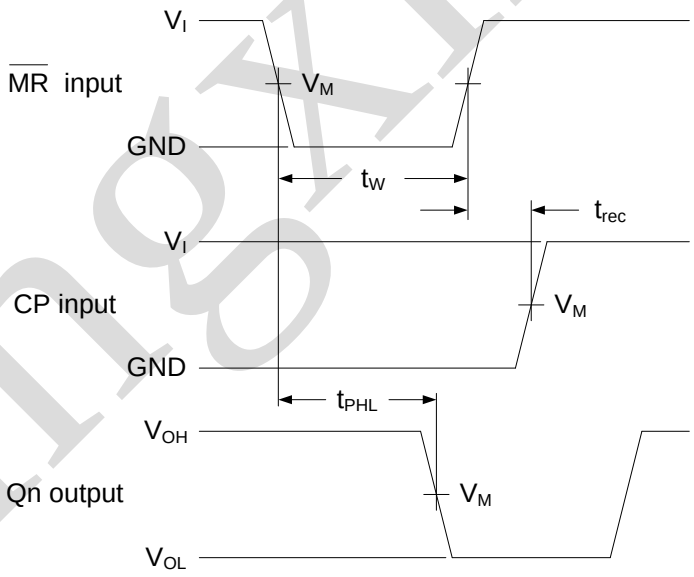


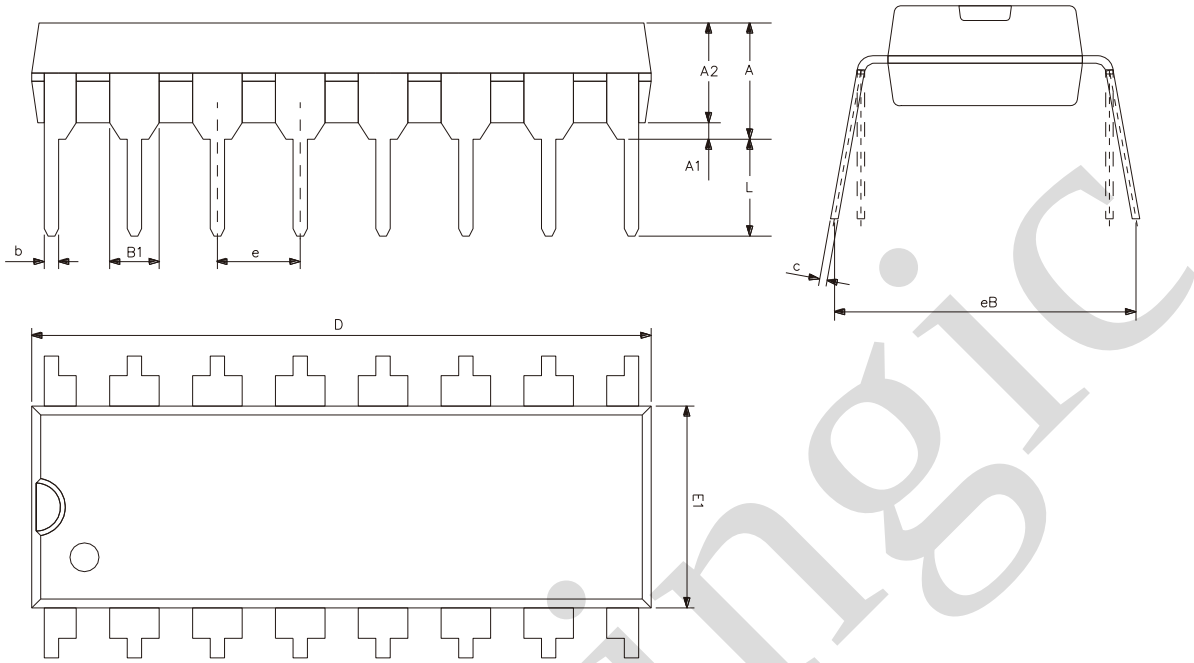
Figure 5. Master reset to output propagation delays, master reset pulse width and master reset to recovery time

4.4、Measurement Points

Type	Input	Output		
	V_M	V_M	V_X	V_Y
SN74HC174	$0.5\times V_{CC}$	$0.5\times V_{CC}$	$0.1\times V_{CC}$	$0.9\times V_{CC}$
SN74HCT174	1.3V	1.3V	$0.1\times V_{CC}$	$0.9\times V_{CC}$

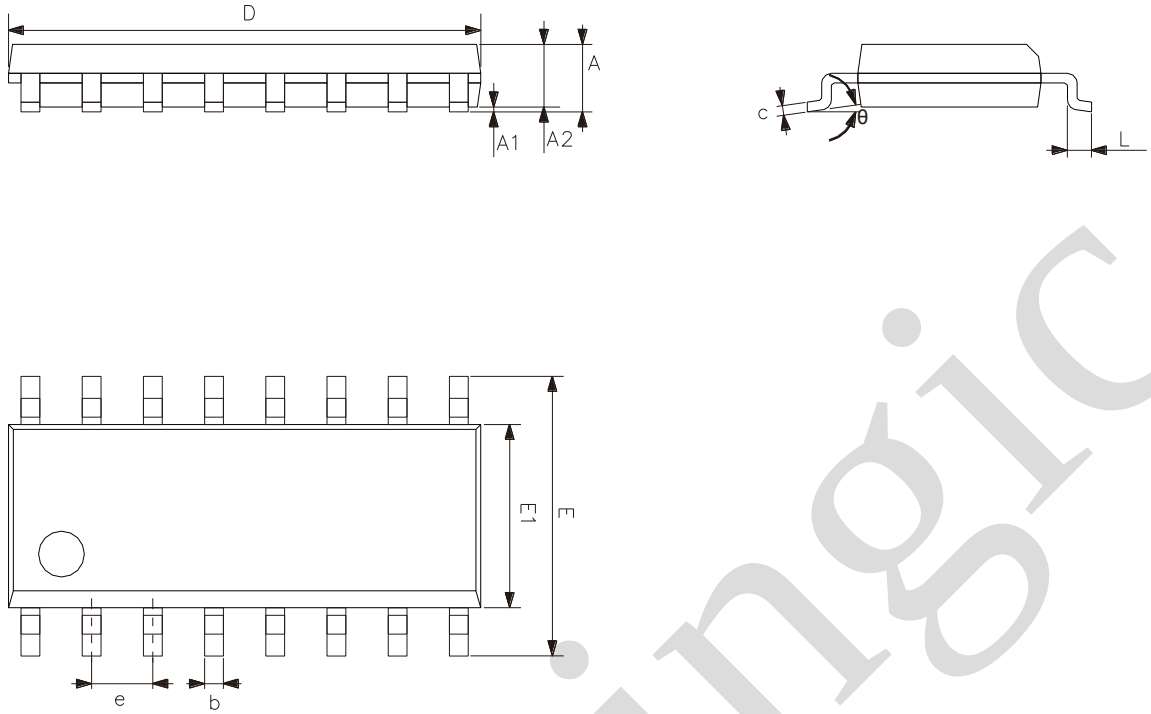
5、Package Information

5.1、DIP16



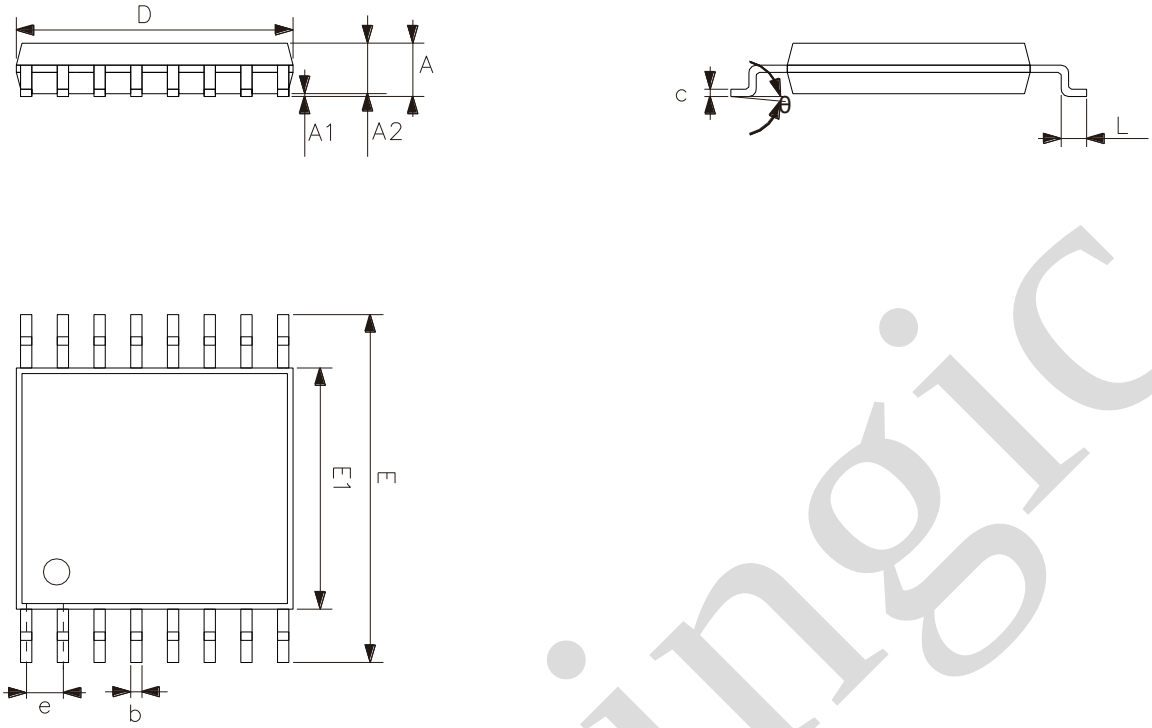
Symbol	Dimensions (mm)	
	Min.	Max.
A2	3.20	3.60
A1	0.51	-
A	3.60	5.33
L	3.00	3.60
b	0.36	0.56
B1	1.52	
D	18.80	19.94
E1	6.20	6.60
e	2.54	
c	0.20	0.36
eB	7.62	9.30

5.2、SOP16



Symbol	Dimensions (mm)	
	Min.	Max.
A	1.35	1.80
A1	0.10	0.25
A2	1.25	1.55
b	0.33	0.51
c	0.19	0.25
D	9.50	10.10
E	5.80	6.30
E1	3.70	4.10
e	1.27	
L	0.35	0.89
θ	0°	8°

5.3、TSSOP16



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
θ	0°	8°

6、Statements And Notes

6.1、The name and content of Hazardous substances or Elements in the product

Part name	Hazardous substances or Elements									
	Lead and lead compounds	Mercury and mercury compounds	Cadmium and cadmium compounds	Hexavalent chromium compounds	Polybrominated biphenyls	Polybrominated biphenyl ethers	Dibutyl phthalate	Butylbenzyl phthalate	Di-2-ethylhexyl phthalate	Diisobutyl phthalate
Lead frame	○	○	○	○	○	○	○	○	○	○
Plastic resin	○	○	○	○	○	○	○	○	○	○
Chip	○	○	○	○	○	○	○	○	○	○
The lead	○	○	○	○	○	○	○	○	○	○
Plastic sheet installed	○	○	○	○	○	○	○	○	○	○
explanation	○：Indicates that the content of hazardous substances or elements in the detection limit of the following the SJ/T11363-2006 standard. ×：Indicates that the content of hazardous substances or elements exceeding the SJ/T11363-2006 Standard limit requirements.									

6.2、Notes

We recommend you to read this chapter carefully before using this product.

The information in this chapter is provided for reference only and i-Core disclaims any express or implied warranties, including but not limited to applicability, special application or non-infringement of third party rights.

This product is not suitable for critical equipment such as life-saving, life-sustaining or safety equipment. It is also not suitable for applications that may result in personal injury, death, or serious property or environmental damage due to product malfunction or failure. I-Core will not be liable for any damages incurred by the customers at their own risk for such applications.

The customer is responsible for conducting all necessary tests i-Core's application to avoid failure in the application or the application of the customer' s third party users. I-Core does not accept any liability.

The Company reserves the right to change or improve the information published in this chapter at any time. The information in this chapter are subject to change without notice. We recommend the customer to consult our sales staff before purchasing.

Please obtain related materials form i-Core's regular channels and we are not responsible for its content if it is provided by sources other than our company.

In case of any conflict between the Chinese and English version, the version is subject to the Chinese one.

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for Flip-Flops ***category:***

Click to view products by lingxingic ***manufacturer:***

Other Similar products are found below :

NLV74HC74ADTR2G 74F574SC NLV14013BDR2G NLV74HC74ADR2G MC10EP131MNG MC74AC74DTR2 74VHC574FT(BJ) HT4093ARZ SN74HC374ANSR CD4528BE CD4027BE RS74HC74XQ RS1G79XC5 CD40106BM-JSM 74HCT273PW-Q100J CLVC2G74QDCURG4Q1 CD4067TA24.TB CD4013SA.TR AIP74HCT14TA14.TB CD4013BPWRG AiP74LVC74TA14.TB CD4013BDRG CD4528SA16.TR AIP74HC273SA.TB SN74HCS74QDYYRQ1 CD4013TA14.TB SN74LS107N SN74LS374DWR SN74LVC2G14DC(LX) 74VHCT574AFT TC4013BF(EL,N,F) 74VHCT9541AFT 74LCX374FT(AJ) TC7WZ74FK,LXGJ(CT 74LCX374FT 74VHC174FT(TB,BJ) TC7WH74FK,LJ SN74HC374PW(LX) SN74LVC1G17DC(LX) SN74HC174DR(LX) SN74HC112N(LX) SN74HC74DR(LX) CD40174BE(LX) CD40175BE(LX) SN74LS374N SN74HC173N SN74HC107DR(LX) SN74HC107N(LX) SN74LS174DR(LX) SN74LS273N(LX)