



SN74HC/HCT173 (LX)

Quad D-type flip-flop; positive-edge trigger; 3-state

Product Specification

Specification Revision History:

Version	Date	Description
2022-07-A1	2022-07	New



Contents

1、 General Description.....	1
2、 Block Diagram And Pin Description	4
2.1、 Block Diagram	4
2.2、 Pin Configurations	4
2.3、 Pin Description.....	6
2.4、 Function Table	6
3、 Electrical Parameter	7
3.1、 Absolute Maximum Ratings.....	7
3.2、 Recommended Operating Conditions	7
3.3、 Electrical Characteristics.....	8
3.3.1、 DC Characteristics 1	8
3.3.2、 DC Characteristics 2	9
3.3.3、 DC Characteristics 3	9
3.3.4、 AC Characteristics 1	11
3.3.5、 AC Characteristics 2	13
3.3.6、 AC Characteristics 3	14
4、 Testing Circuit	16
4.1、 AC Testing Circuit.....	16
4.2、 AC Testing Waveforms.....	16
4.3、 Measurement Points	18
4.4、 Test Data	18
5、 Package Information	19
5.1、 DIP16.....	19
5.2、 SOP16.....	20
5.3、 TSSOP16.....	21
6、 Statements And Notes	22
6.1、 The name and content of Hazardous substances or Elements in the product	22
6.2、 Notes.....	22



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1、General Description

The SN74HC/HCT173 is a quad positive-edge triggered D-type flip-flop. Inputs include clamp diodes. This enables the use of current limiting resistors to interface inputs to voltages in excess of V_{CC} .

Features:

- Input levels:
 - For SN74HC173: CMOS level
 - For SN74HCT173: TTL level
- Gated output enable control mode
- Edge-triggered D-type register
- Asynchronous master reset
- Specified from -40°C to $+125^{\circ}\text{C}$
- Packaging information: DIP16/SOP16/TSSOP16



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Ordering Information:

Tube packing specifications:

Part number	Packaging form	Marking code	Tube quantity	Boxed tube quantity	Boxed quantity	Notes
SN74HC173N(LX)	DIP16	SN74HC173N	25 PCS/tube	40 tube/box	1000 PCS/box	Dimensions of plastic enclosure: 19.0mm×6.4mm Pin spacing: 2.54mm
SN74HCT173N(LX)	DIP16	SN74HCT173N	25 PCS/tube	40 tube/box	1000 PCS/box	Dimensions of plastic enclosure: 19.0mm×6.4mm Pin spacing: 2.54mm
SN74HC173D(LX)	SOP16	HC173	50 PCS/tube	200 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing: 1.27mm
SN74HCT173D(LX)	SOP16	HCT173	50 PCS/tube	200 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing: 1.27mm
SN74HC173P(LX)	TSSOP16	HC173	96 PCS/tube	200 tube/box	19200 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing: 0.65mm
SN74HCT173P(LX)	TSSOP16	HCT173	96 PCS/tube	200 tube/box	19200 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing: 0.65mm



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Reel packing specifications:

Part number	Packaging form	Marking code	Reel quantity	Boxed reel quantity	Notes
SN74HC173DR(LX)	SOP16	HC173	2500 PCS/reel	5000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing:1.27mm
SN74HCT173DR(LX)	SOP16	HCT173	2500 PCS/reel	5000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing:1.27mm
SN74HC173PW(LX)	TSSOP16	HC173	5000 PCS/reel	10000 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing:0.65mm
SN74HCT173PW(LX)	TSSOP16	HCT173	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

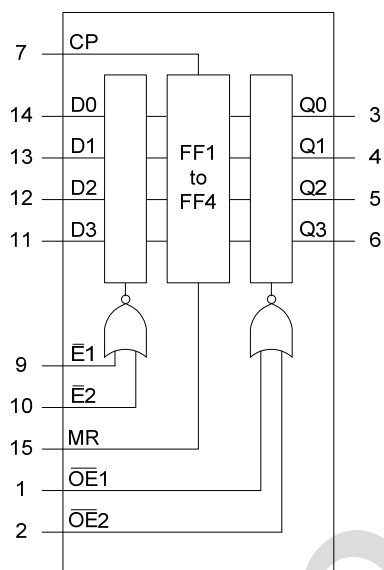


Figure 1. Functional diagram

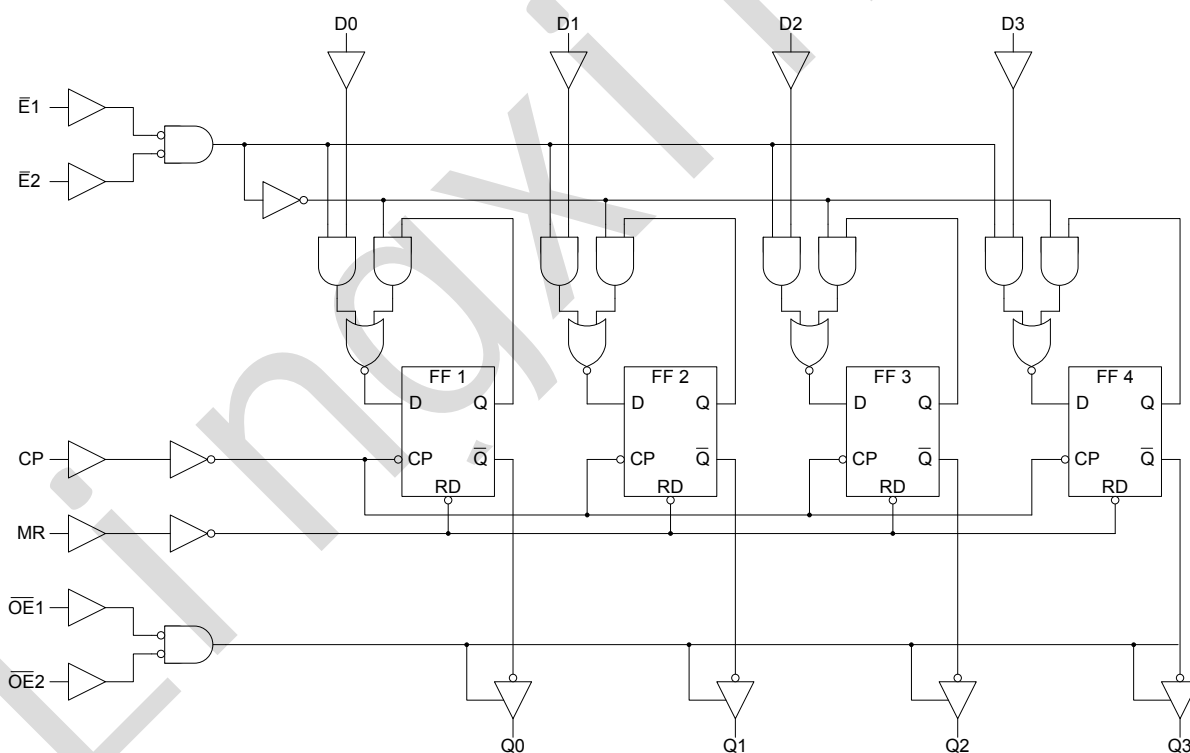


Figure 2. Logic diagram

2.2、Pin Configurations



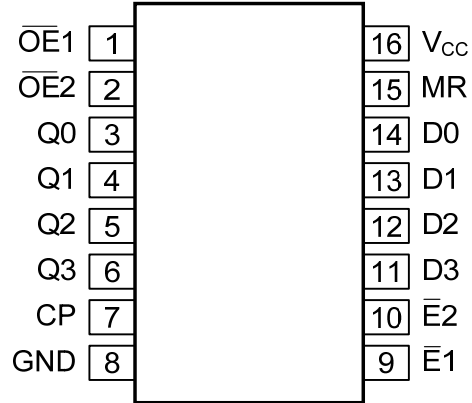
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深圳市灵星芯微电子科技有限公司

Shenzhen Lingxing Microelectronics Technology Co., Ltd.

Tab: 835-12-B4

Number: SN74HC/HCT173-AX-LJ-A086EN





2.3、Pin Description

Pin No.	Pin Name	Description
1	$\overline{OE1}$	output enable input (active LOW)
2	$\overline{OE2}$	output enable input (active LOW)
3	Q0	3-state flip-flop output
4	Q1	3-state flip-flop output
5	Q2	3-state flip-flop output
6	Q3	3-state flip-flop output
7	CP	clock input (LOW-to-HIGH, edge triggered)
8	GND	ground (0 V)
9	$\overline{E1}$	data enable input (active LOW)
10	$\overline{E2}$	data enable input (active LOW)
11	D3	data input
12	D2	data input
13	D1	data input
14	D0	data input
15	MR	asynchronous master reset (active HIGH)
16	V _{CC}	supply voltage

2.4、Function Table

Register operating mode	Inputs					Outputs
	MR	CP	$\overline{E1}$	$\overline{E2}$	Dn	Qn (register)
Reset (clear)	H	X	X	X	X	L
Parallel load	L	↑	l	l	l	L
	L	↑	l	l	h	H
Hold (do nothing)	L	X	h	X	X	qn
	L	X	X	h	X	qn

3-state buffer operating mode	Inputs			Outputs			
	Qn (register)	$\overline{OE1}$	$\overline{OE2}$	Q0	Q1	Q2	Q3
Read	L	L	L	L	L	L	L
	H	L	L	H	H	H	H
Disabled	X	H	X	Z	Z	Z	Z
	X	X	H	Z	Z	Z	Z

Note:

H=HIGH voltage level;

h=HIGH voltage level one set-up time prior to the LOW-to-HIGH CP transition;

L=LOW voltage level;

l=LOW voltage level one set-up time prior to the LOW-to-HIGH CP transition;

qn=lower case letters indicate the state of the referenced input (or output) one set-up time prior to the LOW-to-HIGH CP transition;

X=don't care;

Z=high impedance OFF-state;

↑=LOW-to-HIGH clock transition.



3、Electrical Parameter

3.1、Absolute Maximum Ratings

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

Characteristic	Symbol	Conditions	Min.	Max.	Unit
supply voltage	V_{CC}	-	-0.5	+7.0	V
input clamping current	I_{IK}	$V_I < -0.5\text{V}$ or $V_I > V_{CC} + 0.5\text{V}$	-	± 20	
output clamping current	I_{OK}	$V_O < -0.5\text{V}$ or $V_O > V_{CC} + 0.5\text{V}$	-	± 20	
output current	I_O	$V_O = -0.5\text{V}$ to $(V_{CC} + 0.5\text{V})$	-	± 35	
supply current	I_{CC}	-	-	+70	
ground current	I_{GND}	-	-70	-	
storage temperature	T_{stg}	-	-65	150	$^{\circ}\text{C}$
soldering temperature	T_L	10s	DIP		$^{\circ}\text{C}$
			SOP/TSSOP		260

3.2、Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
SN74HC173						
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	$^{\circ}\text{C}$
SN74HCT173						
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	$^{\circ}\text{C}$



3.3、Electrical Characteristics

3.3.1、DC Characteristics 1

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
SN74HC173							
HIGH-level input voltage	V_{IH}	$V_{CC}=2.0\text{V}$	1.5	1.2	-	V	
		$V_{CC}=4.5\text{V}$	3.15	2.4	-	V	
		$V_{CC}=6.0\text{V}$	4.2	3.2	-	V	
LOW-level input voltage	V_{IL}	$V_{CC}=2.0\text{V}$	-	0.8	0.5	V	
		$V_{CC}=4.5\text{V}$	-	2.1	1.35	V	
		$V_{CC}=6.0\text{V}$	-	2.8	1.8	V	
HIGH-level output voltage	V_{OH}	$V_I=V_{IH}$ or V_{IL}	$I_O=-20\mu\text{A}; V_{CC}=2.0\text{V}$	1.9	2.0	-	V
			$I_O=-20\mu\text{A}; V_{CC}=4.5\text{V}$	4.4	4.5	-	V
			$I_O=-20\mu\text{A}; V_{CC}=6.0\text{V}$	5.9	6.0	-	V
			$I_O=-6.0\text{mA}; V_{CC}=4.5\text{V}$	3.98	4.32	-	V
			$I_O=-7.8\text{mA}; V_{CC}=6.0\text{V}$	5.48	5.81	-	V
LOW-level output voltage	V_{OL}	$V_I=V_{IH}$ or V_{IL}	$I_O=20\mu\text{A}; V_{CC}=2.0\text{V}$	-	0	0.1	V
			$I_O=20\mu\text{A}; V_{CC}=4.5\text{V}$	-	0	0.1	V
			$I_O=20\mu\text{A}; V_{CC}=6.0\text{V}$	-	0	0.1	V
			$I_O=6.0\text{mA}; V_{CC}=4.5\text{V}$	-	0.15	0.26	V
			$I_O=7.8\text{mA}; V_{CC}=6.0\text{V}$	-	0.16	0.26	V
input leakage current	I_I	$V_I=V_{CC}$ or GND; $V_{CC}=6.0\text{V}$	-	-	± 1.0	μA	
OFF-state output current	I_{OZ}	$V_I=V_{IH}$ or $V_{IL}; V_{CC}=6.0\text{V}; V_O=V_{CC}$ or GND	-	-	± 1.0	μA	
supply current	I_{CC}	$V_I=V_{CC}$ or GND; $I_O=0\text{A}; V_{CC}=6.0\text{V}$	-	-	8.0	μA	
SN74HCT173							
HIGH-level input voltage	V_{IH}	$V_{CC}=4.5\text{V}$ to 5.5V	2.0	1.6	-	V	
LOW-level input voltage	V_{IL}	$V_{CC}=4.5\text{V}$ to 5.5V	-	1.2	0.8	V	
HIGH-level output voltage	V_{OH}	$V_I=V_{IH}$ or $V_{IL}; V_{CC}=4.5\text{V}$	$I_O=-20\mu\text{A}$	4.4	4.5	-	V
			$I_O=-6.0\text{mA}$	3.98	4.32	-	V
LOW-level output voltage	V_{OL}	$V_I=V_{IH}$ or $V_{IL}; V_{CC}=4.5\text{V}$	$I_O=20\mu\text{A}$	-	0	0.1	V
			$I_O=6.0\text{mA}$	-	0.15	0.26	V
input leakage current	I_I	$V_I=V_{CC}$ or GND; $V_{CC}=5.5\text{V}$	-	-	± 1.0	μA	
OFF-state output current	I_{OZ}	$V_I=V_{IH}$ or $V_{IL}; V_{CC}=5.5\text{V}; V_O=V_{CC}$ or GND	-	-	± 1.0	μA	
supply current	I_{CC}	$V_I=V_{CC}$ or GND; $I_O=0\text{A}; V_{CC}=5.5\text{V}$	-	-	8.0	μA	
additional supply current	ΔI_{CC}	per input pin; $V_I=V_{CC}-2.1\text{V};$ other inputs at V_{CC} or GND; $I_O=0\text{A}; V_{CC}=4.5\text{V}$ to 5.5V	$\overline{\text{OE}}1, \overline{\text{OE}}2$	-	50	180	μA
			MR	-	60	216	μA
			$\overline{\text{E}}1, \overline{\text{E}}2$	-	40	144	μA
			Dn	-	25	190	μA
			CP	-	100	360	μA



3.3.2、DC Characteristics 2

($T_{amb} = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$, voltages are referenced to GND (ground=0V), unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
SN74HC173							
HIGH-level input voltage	V_{IH}	$V_{CC}=2.0\text{V}$	1.5	-	-	V	
		$V_{CC}=4.5\text{V}$	3.15	-	-	V	
		$V_{CC}=6.0\text{V}$	4.2	-	-	V	
LOW-level input voltage	V_{IL}	$V_{CC}=2.0\text{V}$	-	-	0.5	V	
		$V_{CC}=4.5\text{V}$	-	-	1.35	V	
		$V_{CC}=6.0\text{V}$	-	-	1.8	V	
HIGH-level output voltage	V_{OH}	$V_I = V_{IH}$ or V_{IL}	$I_O = -20\mu\text{A}; V_{CC} = 2.0\text{V}$	1.9	-	-	V
			$I_O = -20\mu\text{A}; V_{CC} = 4.5\text{V}$	4.4	-	-	V
			$I_O = -20\mu\text{A}; V_{CC} = 6.0\text{V}$	5.9	-	-	V
			$I_O = -6.0\text{mA}; V_{CC} = 4.5\text{V}$	3.84	-	-	V
			$I_O = -7.8\text{mA}; V_{CC} = 6.0\text{V}$	5.34	-	-	V
LOW-level output voltage	V_{OL}	$V_I = V_{IH}$ or V_{IL}	$I_O = 20\mu\text{A}; V_{CC} = 2.0\text{V}$	-	-	0.1	V
			$I_O = 20\mu\text{A}; V_{CC} = 4.5\text{V}$	-	-	0.1	V
			$I_O = 20\mu\text{A}; V_{CC} = 6.0\text{V}$	-	-	0.1	V
			$I_O = 6.0\text{mA}; V_{CC} = 4.5\text{V}$	-	-	0.33	V
			$I_O = 7.8\text{mA}; V_{CC} = 6.0\text{V}$	-	-	0.33	V
input leakage current	I_I	$V_I = V_{CC}$ or GND; $V_{CC} = 6.0\text{V}$	-	-	± 1.0	μA	
OFF-state output current	I_{OZ}	$V_I = V_{IH}$ or $V_{IL}; V_{CC} = 6.0\text{V};$ $V_O = V_{CC}$ or GND	-	-	± 5.0	μA	
supply current	I_{CC}	$V_I = V_{CC}$ or GND; $I_O = 0\text{A}; V_{CC} = 6.0\text{V}$	-	-	80	μA	
SN74HCT173							
HIGH-level input voltage	V_{IH}	$V_{CC} = 4.5\text{V}$ to 5.5V	2.0	-	-	V	
LOW-level input voltage	V_{IL}	$V_{CC} = 4.5\text{V}$ to 5.5V	-	-	0.8	V	
HIGH-level output voltage	V_{OH}	$V_I = V_{IH}$ or $V_{IL};$ $V_{CC} = 4.5\text{V}$	$I_O = -20\mu\text{A}$	4.4	-	-	V
			$I_O = -6.0\text{mA}$	3.84	-	-	V
LOW-level output voltage	V_{OL}	$V_I = V_{IH}$ or $V_{IL};$ $V_{CC} = 4.5\text{V}$	$I_O = 20\mu\text{A}$	-	-	0.1	V
			$I_O = 6.0\text{mA}$	-	-	0.33	V
input leakage current	I_I	$V_I = V_{CC}$ or GND; $V_{CC} = 5.5\text{V}$	-	-	± 1.0	μA	
OFF-state output current	I_{OZ}	$V_I = V_{IH}$ or $V_{IL}; V_{CC} = 5.5\text{V};$ $V_O = V_{CC}$ or GND	-	-	± 5.0	μA	
supply current	I_{CC}	$V_I = V_{CC}$ or GND; $I_O = 0\text{A}; V_{CC} = 5.5\text{V}$	-	-	80	μA	
additional supply current	ΔI_{CC}	per input pin; $V_I = V_{CC} - 2.1\text{V};$ other inputs at V_{CC} or GND; $I_O = 0\text{A};$ $V_{CC} = 4.5\text{V}$ to 5.5V	$\overline{OE}1, \overline{OE}2$	-	-	225	μA
			MR	-	-	270	μA
			$\overline{E}1, \overline{E}2$	-	-	180	μA
			Dn	-	-	112.5	μA
			CP	-	-	450	μA

3.3.3、DC Characteristics 3

($T_{amb} = -40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$, voltages are referenced to GND (ground=0V), unless otherwise specified)



Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
SN74HC173							
HIGH-level input voltage	V_{IH}	$V_{CC}=2.0V$	1.5	-	-	V	
		$V_{CC}=4.5V$	3.15	-	-	V	
		$V_{CC}=6.0V$	4.2	-	-	V	
LOW-level input voltage	V_{IL}	$V_{CC}=2.0V$	-	-	0.5	V	
		$V_{CC}=4.5V$	-	-	1.35	V	
		$V_{CC}=6.0V$	-	-	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	-	-	V
			$I_O=-20\mu A$; $V_{CC}=4.5V$	4.4	-	-	V
			$I_O=-20\mu A$; $V_{CC}=6.0V$	5.9	-	-	V
			$I_O=-6.0mA$; $V_{CC}=4.5V$	3.7	-	-	V
			$I_O=-7.8mA$; $V_{CC}=6.0V$	5.2	-	-	V
LOW-level output voltage	V_{OL}	$V_I=V_{IH}$ or V_{IL}	$I_O=20\mu A$; $V_{CC}=2.0V$	-	-	0.1	V
			$I_O=20\mu A$; $V_{CC}=4.5V$	-	-	0.1	V
			$I_O=20\mu A$; $V_{CC}=6.0V$	-	-	0.1	V
			$I_O=6.0mA$; $V_{CC}=4.5V$	-	-	0.4	V
			$I_O=7.8mA$; $V_{CC}=6.0V$	-	-	0.4	V
input leakage current	I_I	$V_I=V_{CC}$ or GND; $V_{CC}=6.0V$	-	-	± 1.0	μA	
OFF-state output current	I_{OZ}	$V_I=V_{IH}$ or V_{IL} ; $V_{CC}=6.0V$; $V_O=V_{CC}$ or GND	-	-	± 10.0	μA	
supply current	I_{CC}	$V_I=V_{CC}$ or GND; $I_O=0A$; $V_{CC}=6.0V$	-	-	160	μA	
SN74HCT173							
HIGH-level input voltage	V_{IH}	$V_{CC}=4.5V$ to $5.5V$	2.0	-	-	V	
LOW-level input voltage	V_{IL}	$V_{CC}=4.5V$ to $5.5V$	-	-	0.8	V	
HIGH-level output voltage	V_{OH}	$V_I=V_{IH}$ or V_{IL} ; $V_{CC}=4.5V$	$I_O=-20\mu A$	4.4	-	-	V
			$I_O=-6.0mA$	3.7	-	-	V
LOW-level output voltage	V_{OL}	$V_I=V_{IH}$ or V_{IL} ; $V_{CC}=4.5V$	$I_O=20\mu A$	-	-	0.1	V
			$I_O=6.0mA$	-	-	0.4	V
input leakage current	I_I	$V_I=V_{CC}$ or GND; $V_{CC}=5.5V$	-	-	± 1.0	μA	
OFF-state output current	I_{OZ}	$V_I=V_{IH}$ or V_{IL} ; $V_{CC}=5.5V$; $V_O=V_{CC}$ or GND	-	-	± 10.0	μA	
supply current	I_{CC}	$V_I=V_{CC}$ or GND; $I_O=0A$; $V_{CC}=5.5V$	-	-	160	μA	
additional supply current	ΔI_{CC}	per input pin; $V_I=V_{CC}-2.1V$; other inputs at V_{CC} or GND; $I_O=0A$; $V_{CC}=4.5V$ to $5.5V$	$\overline{OE}1, \overline{OE}2$	-	-	245	μA
			MR	-	-	294	μA
			$\overline{E}1, \overline{E}2$	-	-	196	μA
			Dn	-	-	122.5	μA
			CP	-	-	490	μA



3.3.4、AC Characteristics 1

($T_{amb}=25^{\circ}C$, voltages are referenced to GND (ground=0V); $C_L=50pF$, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
SN74HC173							
propagation delay	t_{pd}	CP to Qn; see Figure 4 ^[1]	$V_{CC}=2.0V$	-	55	175	ns
			$V_{CC}=4.5V$	-	20	35	ns
			$V_{CC}=5.0V$; $C_L=15pF$	-	17	-	ns
			$V_{CC}=6.0V$	-	16	30	ns
High to LOW propagation delay	t_{PHL}	MR to Qn; see Figure 5	$V_{CC}=2.0V$	-	44	150	ns
			$V_{CC}=4.5V$	-	16	30	ns
			$V_{CC}=5.0V$; $C_L=15pF$	-	13	-	ns
			$V_{CC}=6.0V$	-	13	26	ns
enable time	t_{en}	\overline{OEn} to Qn; see Figure 6 ^[2]	$V_{CC}=2.0V$	-	52	150	ns
			$V_{CC}=4.5V$	-	19	30	ns
			$V_{CC}=6.0V$	-	15	26	ns
disable time	t_{dis}	\overline{OEn} to Qn; see Figure 6 ^[3]	$V_{CC}=2.0V$	-	52	150	ns
			$V_{CC}=4.5V$	-	19	30	ns
			$V_{CC}=6.0V$	-	15	26	ns
transition time	t_t	see Figure 4 ^[4]	$V_{CC}=2.0V$	-	14	60	ns
			$V_{CC}=4.5V$	-	5	12	ns
			$V_{CC}=6.0V$	-	4	10	ns
pulse width	t_w	CP HIGH or LOW; see Figure 4	$V_{CC}=2.0V$	80	14	-	ns
			$V_{CC}=4.5V$	16	5	-	ns
			$V_{CC}=6.0V$	14	4	-	ns
		MR HIGH; see Figure 5	$V_{CC}=2.0V$	80	14	-	ns
			$V_{CC}=4.5V$	16	5	-	ns
			$V_{CC}=6.0V$	14	4	-	ns
recovery time	t_{rec}	MR to CP; see Figure 5	$V_{CC}=2.0V$	60	-8	-	ns
			$V_{CC}=4.5V$	12	-3	-	ns
			$V_{CC}=6.0V$	10	-2	-	ns
set-up time	t_{su}	\overline{En} to CP; see Figure 7	$V_{CC}=2.0V$	100	33	-	ns
			$V_{CC}=4.5V$	20	12	-	ns
			$V_{CC}=6.0V$	17	10	-	ns
		Dn to CP; see Figure 7	$V_{CC}=2.0V$	60	17	-	ns
			$V_{CC}=4.5V$	12	6	-	ns
			$V_{CC}=6.0V$	10	5	-	ns
hold time	t_h	\overline{En} to CP; see Figure 7	$V_{CC}=2.0V$	0	-17	-	ns
			$V_{CC}=4.5V$	0	-6	-	ns
			$V_{CC}=6.0V$	0	-5	-	ns
		Dn to CP; see Figure 7	$V_{CC}=2.0V$	1	-11	-	ns
			$V_{CC}=4.5V$	1	-4	-	ns
			$V_{CC}=6.0V$	1	-3	-	ns
maximum frequency	f_{max}	CP; see Figure 4	$V_{CC}=2.0V$	6	26	-	MHz
			$V_{CC}=4.5V$	30	80	-	MHz
			$V_{CC}=5.0V$; $C_L=15pF$	-	88	-	MHz



			V _{CC} =6.0V	35	95	-	MHz
SN74HCT173							
propagation delay	t _{pd}	CP to Qn; see Figure 4 ^[1]	V _{CC} =4.5V	-	20	40	ns
			V _{CC} =5.0V; C _L =15pF	-	17	-	ns
High to LOW propagation delay	t _{PHL}	MR to Qn; see Figure 5	V _{CC} =4.5V	-	20	37	ns
			V _{CC} =5.0V; C _L =15pF	-	17	-	ns
enable time	t _{en}	$\overline{\text{OEn}}$ to Qn; V _{CC} =4.5V; see Figure 6 ^[2]	-	20	35	ns	
disable time	t _{dis}	$\overline{\text{OEn}}$ to Qn; V _{CC} =4.5V; see Figure 6 ^[3]	-	19	30	ns	
transition time	t _t	V _{CC} =4.5V; see Figure 4 ^[4]	-	5	12	ns	
pulse width	t _w	CP HIGH or LOW; V _{CC} =4.5V; see Figure 4	16	7	-	ns	
		MR HIGH; V _{CC} =4.5V; see Figure 5	15	6	-	ns	
recovery time	t _{rec}	MR to CP; V _{CC} =4.5V; see Figure 5	12	-2	-	ns	
set-up time	t _{su}	$\overline{\text{En}}$ to CP; V _{CC} =4.5V; see Figure 7	22	13	-	ns	
		Dn to CP; V _{CC} =4.5V; see Figure 7	12	7	-	ns	
hold time	t _{th}	$\overline{\text{En}}$ to CP; V _{CC} =4.5V; see Figure 7	0	-6	-	ns	
		Dn to CP; V _{CC} =4.5V; see Figure 7	0	-3	-	ns	
maximum frequency	f _{max}	CP; see Figure 4	V _{CC} =4.5V	30	80	-	MHz
			V _{CC} =5.0V; C _L =15pF	-	88	-	MHz

Note:

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

[2] t_{en} is the same as t_{PZH} and t_{PZL}.

[3] t_{dis} is the same as t_{PHZ} and t_{PLZ}.

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



3.3.5、AC Characteristics 2

($T_{amb} = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$, voltages are referenced to GND (ground=0V); $C_L = 50\text{pF}$, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
SN74HC173							
propagation delay	t_{pd}	CP to Qn; see Figure 4 ^[1]	$V_{CC} = 2.0\text{V}$	-	-	220	ns
			$V_{CC} = 4.5\text{V}$	-	-	44	ns
			$V_{CC} = 6.0\text{V}$	-	-	37	ns
High to LOW propagation delay	t_{PHL}	MR to Qn; see Figure 5	$V_{CC} = 2.0\text{V}$	-	-	190	ns
			$V_{CC} = 4.5\text{V}$	-	-	38	ns
			$V_{CC} = 6.0\text{V}$	-	-	33	ns
enable time	t_{en}	$\overline{\text{OEn}}$ to Qn; see Figure 6 ^[2]	$V_{CC} = 2.0\text{V}$	-	-	190	ns
			$V_{CC} = 4.5\text{V}$	-	-	38	ns
			$V_{CC} = 6.0\text{V}$	-	-	33	ns
disable time	t_{dis}	$\overline{\text{OEn}}$ to Qn; see Figure 6 ^[3]	$V_{CC} = 2.0\text{V}$	-	-	190	ns
			$V_{CC} = 4.5\text{V}$	-	-	38	ns
			$V_{CC} = 6.0\text{V}$	-	-	33	ns
transition time	t_t	see Figure 4 ^[4]	$V_{CC} = 2.0\text{V}$	-	-	75	ns
			$V_{CC} = 4.5\text{V}$	-	-	15	ns
			$V_{CC} = 6.0\text{V}$	-	-	13	ns
pulse width	t_w	CP HIGH or LOW; see Figure 4	$V_{CC} = 2.0\text{V}$	100	-	-	ns
			$V_{CC} = 4.5\text{V}$	20	-	-	ns
			$V_{CC} = 6.0\text{V}$	17	-	-	ns
		MR HIGH; see Figure 5	$V_{CC} = 2.0\text{V}$	100	-	-	ns
			$V_{CC} = 4.5\text{V}$	20	-	-	ns
			$V_{CC} = 6.0\text{V}$	17	-	-	ns
recovery time	t_{rec}	MR to CP; see Figure 5	$V_{CC} = 2.0\text{V}$	75	-	-	ns
			$V_{CC} = 4.5\text{V}$	15	-	-	ns
			$V_{CC} = 6.0\text{V}$	13	-	-	ns
set-up time	t_{su}	$\overline{\text{En}}$ to CP; see Figure 7	$V_{CC} = 2.0\text{V}$	125	-	-	ns
			$V_{CC} = 4.5\text{V}$	25	-	-	ns
			$V_{CC} = 6.0\text{V}$	21	-	-	ns
		Dn to CP; see Figure 7	$V_{CC} = 2.0\text{V}$	75	-	-	ns
			$V_{CC} = 4.5\text{V}$	15	-	-	ns
			$V_{CC} = 6.0\text{V}$	13	-	-	ns
hold time	t_h	$\overline{\text{En}}$ to CP; see Figure 7	$V_{CC} = 2.0\text{V}$	0	-	-	ns
			$V_{CC} = 4.5\text{V}$	0	-	-	ns
			$V_{CC} = 6.0\text{V}$	0	-	-	ns
		Dn to CP; see Figure 7	$V_{CC} = 2.0\text{V}$	1	-	-	ns
			$V_{CC} = 4.5\text{V}$	1	-	-	ns
			$V_{CC} = 6.0\text{V}$	1	-	-	ns
maximum frequency	f_{max}	CP; see Figure 4	$V_{CC} = 2.0\text{V}$	4.8	-	-	MHz
			$V_{CC} = 4.5\text{V}$	24	-	-	MHz
			$V_{CC} = 6.0\text{V}$	28	-	-	MHz
SN74HCT173							



propagation delay	t_{pd}	CP to Qn; $V_{CC}=4.5V$; see Figure 4 ^[1]	-	-	50	ns
High to LOW propagation delay	t_{PHL}	MR to Qn; $V_{CC}=4.5V$; see Figure 5	-	-	46	ns
enable time	t_{en}	\overline{OEn} to Qn; $V_{CC}=4.5V$; see Figure 6 ^[2]	-	-	44	ns
disable time	t_{dis}	\overline{OEn} to Qn; $V_{CC}=4.5V$; see Figure 6 ^[3]	-	-	38	ns
transition time	t_t	$V_{CC}=4.5V$; see Figure 4 ^[4]	-	-	15	ns
pulse width	t_w	CP HIGH or LOW; $V_{CC}=4.5V$; see Figure 4	20	-	-	ns
		MR HIGH; $V_{CC}=4.5V$; see Figure 5	19	-	-	ns
recovery time	t_{rec}	MR to CP; $V_{CC}=4.5V$; see Figure 5	15	-	-	ns
set-up time	t_{su}	\overline{En} to CP; $V_{CC}=4.5V$; see Figure 7	28	-	-	ns
		Dn to CP; $V_{CC}=4.5V$; see Figure 7	15	-	-	ns
hold time	t_h	\overline{En} to CP; $V_{CC}=4.5V$; see Figure 7	0	-	-	ns
		Dn to CP; $V_{CC}=4.5V$; see Figure 7	0	-	-	ns
maximum frequency	f_{max}	CP; $V_{CC}=4.5V$; see Figure 4	24	-	-	MHz

Note:

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

[2] t_{en} is the same as t_{PZH} and t_{PZL} .

[3] t_{dis} is the same as t_{PHZ} and t_{PLZ} .

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

3.3.6. AC Characteristics 3

($T_{amb}=-40^{\circ}C$ to $+125^{\circ}C$, voltages are referenced to GND (ground=0V); $C_L=50pF$, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
SN74HC173							
propagation delay	t_{pd}	CP to Qn; see Figure 4 ^[1]	$V_{CC}=2.0V$	-	-	265	ns
			$V_{CC}=4.5V$	-	-	53	ns
			$V_{CC}=6.0V$	-	-	45	ns
High to LOW propagation delay	t_{PHL}	MR to Qn; see Figure 5	$V_{CC}=2.0V$	-	-	225	ns
			$V_{CC}=4.5V$	-	-	45	ns
			$V_{CC}=6.0V$	-	-	38	ns
enable time	t_{en}	\overline{OEn} to Qn; see Figure 6 ^[2]	$V_{CC}=2.0V$	-	-	225	ns
			$V_{CC}=4.5V$	-	-	45	ns
			$V_{CC}=6.0V$	-	-	38	ns
disable time	t_{dis}	\overline{OEn} to Qn; see Figure 6 ^[3]	$V_{CC}=2.0V$	-	-	225	ns
			$V_{CC}=4.5V$	-	-	45	ns
			$V_{CC}=6.0V$	-	-	38	ns
transition time	t_t	see Figure 4 ^[4]	$V_{CC}=2.0V$	-	-	90	ns
			$V_{CC}=4.5V$	-	-	18	ns
			$V_{CC}=6.0V$	-	-	15	ns
pulse width	t_w	CP HIGH or LOW; see Figure 4	$V_{CC}=2.0V$	120	-	-	ns
			$V_{CC}=4.5V$	24	-	-	ns
			$V_{CC}=6.0V$	20	-	-	ns



		MR HIGH; see Figure 5	V _{CC} =2.0V	120	-	-	ns
			V _{CC} =4.5V	24	-	-	ns
			V _{CC} =6.0V	20	-	-	ns
recovery time	t _{rec}	MR to CP; see Figure 5	V _{CC} =2.0V	90	-	-	ns
			V _{CC} =4.5V	18	-	-	ns
			V _{CC} =6.0V	15	-	-	ns
set-up time	t _{su}	$\overline{\text{En}}$ to CP; see Figure 7	V _{CC} =2.0V	150	-	-	ns
			V _{CC} =4.5V	30	-	-	ns
			V _{CC} =6.0V	26	-	-	ns
		Dn to CP; see Figure 7	V _{CC} =2.0V	90	-	-	ns
			V _{CC} =4.5V	18	-	-	ns
			V _{CC} =6.0V	15	-	-	ns
hold time	t _h	$\overline{\text{En}}$ to CP; see Figure 7	V _{CC} =2.0V	0	-	-	ns
			V _{CC} =4.5V	0	-	-	ns
			V _{CC} =6.0V	0	-	-	ns
		Dn to CP; see Figure 7	V _{CC} =2.0V	1	-	-	ns
			V _{CC} =4.5V	1	-	-	ns
			V _{CC} =6.0V	1	-	-	ns
maximum frequency	f _{max}	CP; see Figure 4	V _{CC} =2.0V	4	-	-	MHz
			V _{CC} =4.5V	20	-	-	MHz
			V _{CC} =6.0V	24	-	-	MHz

SN74HCT173

propagation delay	t _{pd}	CP to Qn; V _{CC} =4.5V; see Figure 4 ^[1]	-	-	60	ns
High to LOW propagation delay	t _{PHL}	MR to Qn; V _{CC} =4.5V; see Figure 5	-	-	56	ns
enable time	t _{en}	$\overline{\text{OEn}}$ to Qn; V _{CC} =4.5V; see Figure 6 ^[2]	-	-	53	ns
disable time	t _{dis}	$\overline{\text{OEn}}$ to Qn; V _{CC} =4.5V; see Figure 6 ^[3]	-	-	45	ns
transition time	t _t	V _{CC} =4.5V; see Figure 4 ^[4]	-	-	19	ns
pulse width	t _w	CP HIGH or LOW; V _{CC} =4.5V; see Figure 4	24	-	-	ns
		MR HIGH; V _{CC} =4.5V; see Figure 5	22	-	-	ns
recovery time	t _{rec}	MR to CP; V _{CC} =4.5V; see Figure 5	18	-	-	ns
set-up time	t _{su}	$\overline{\text{En}}$ to CP; V _{CC} =4.5V; see Figure 7	33	-	-	ns
		Dn to CP; V _{CC} =4.5V; see Figure 7	18	-	-	ns
hold time	t _h	$\overline{\text{En}}$ to CP; V _{CC} =4.5V; see Figure 7	0	-	-	ns
		Dn to CP; V _{CC} =4.5V; see Figure 7	0	-	-	ns
maximum frequency	f _{max}	CP; V _{CC} =4.5V; see Figure 4	20	-	-	MHz

Note:

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

[2] t_{en} is the same as t_{PZH} and t_{PZL}.

[3] t_{dis} is the same as t_{PHZ} and t_{PLZ}.

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

4、Testing Circuit

4.1、AC Testing Circuit

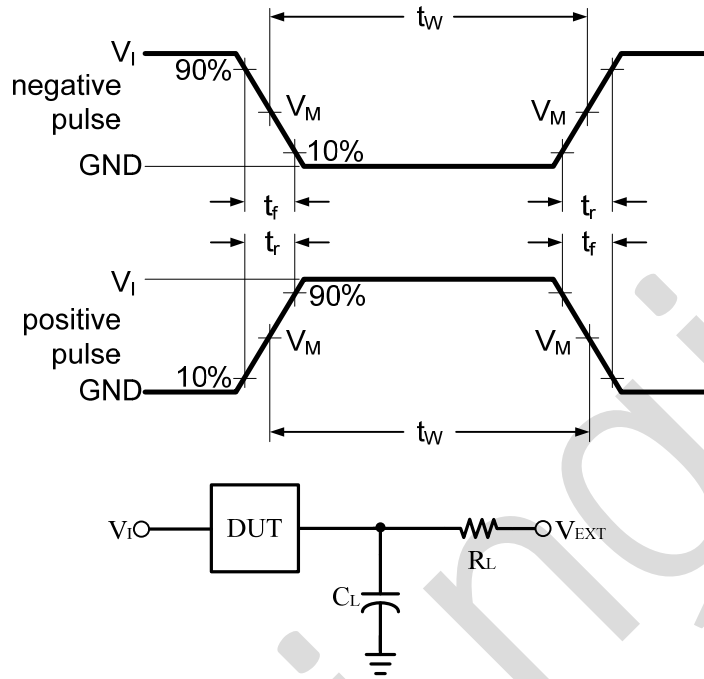


Figure 3. Test circuit for measuring switching times

Test circuit definitions:

C_L includes probe and jig capacitance.

4.2、AC Testing Waveforms

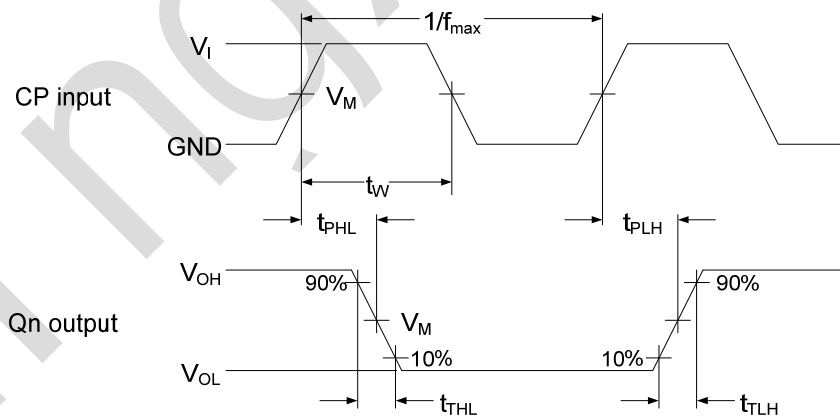


Figure 4. The clock (CP) to outputs (Qn) propagation delays, clock pulse width, output transition times and maximum frequency

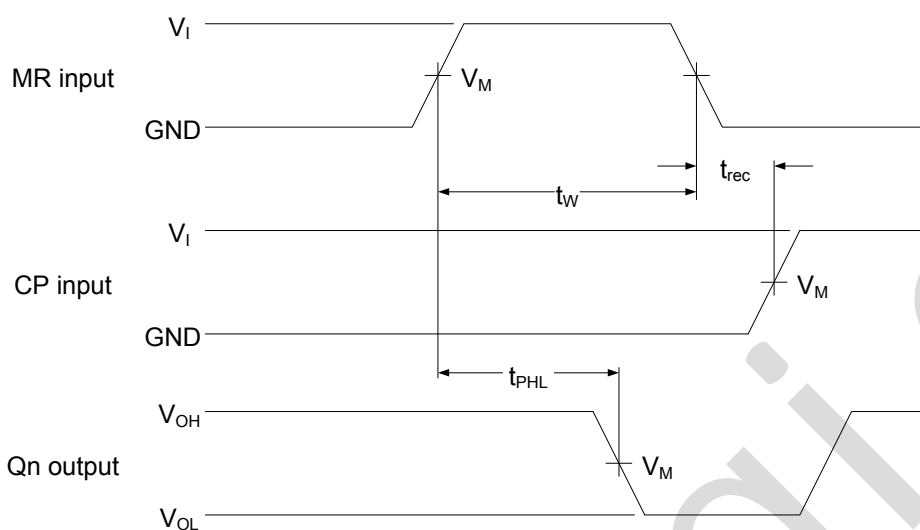


Figure 5. The master reset (MR) pulse width, master reset to output (Qn) propagation delays, and the master reset to clock (CP) recovery times

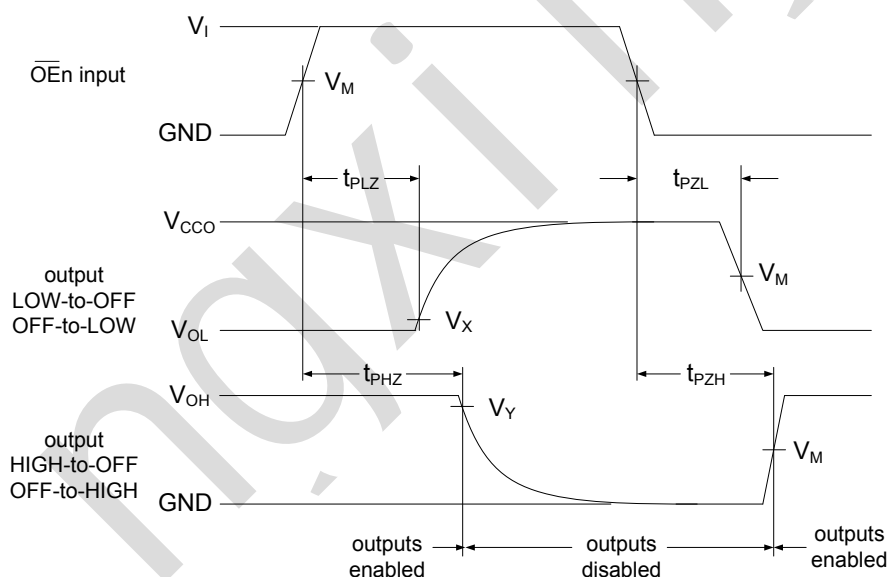


Figure 6. 3-state enable and disable times

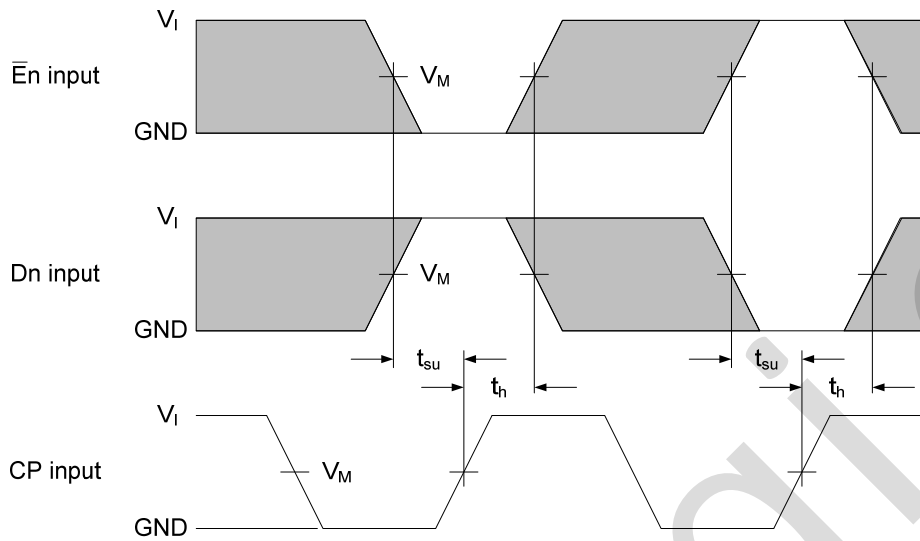


Figure 7. The data set-up and hold times from input (\bar{E}_n , D_n) to clock (CP)

4.3. Measurement Points

Type	Input		Output	
	V_M	V_M	V_X	V_Y
SN74HC173	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	$0.1 \times V_{CC}$	$0.9 \times V_{CC}$
SN74HCT173	1.3V	1.3V	$0.1 \times V_{CC}$	$0.9 \times V_{CC}$

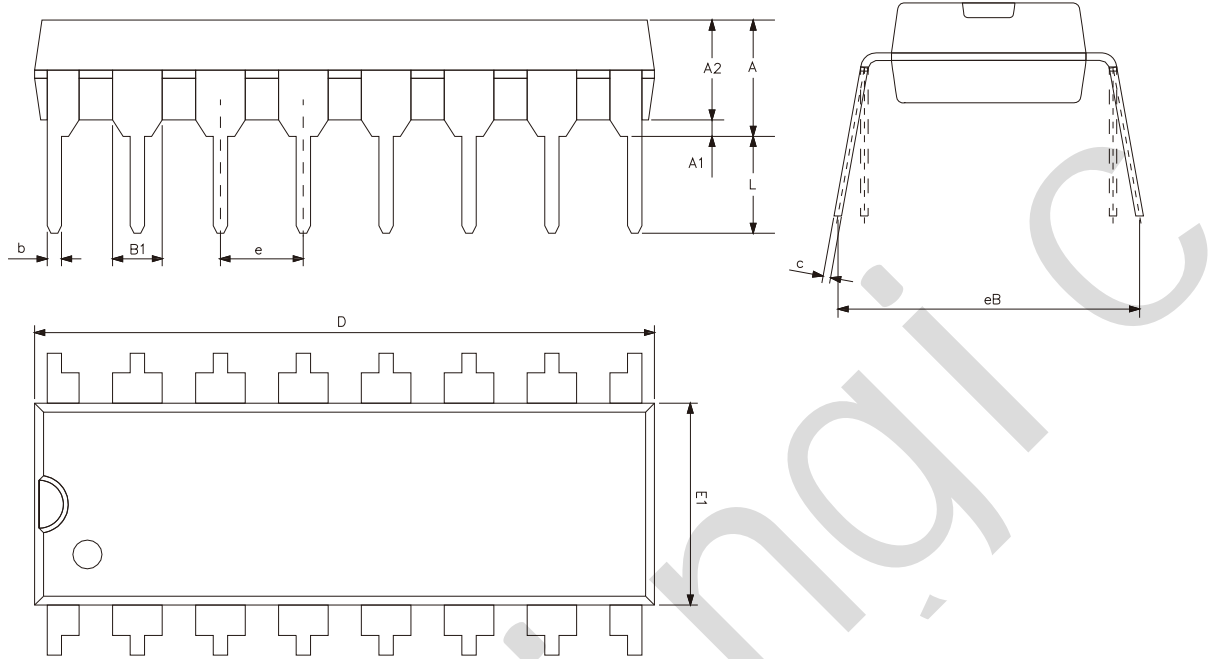
4.4. Test Data

Type	Input		Load		Test		
	V_I	t_r, t_f	C_L	R_L	t_{PHL}, t_{PLH}	t_{PZH}, t_{PHZ}	t_{PZL}, t_{PLZ}
SN74HC173	V_{CC}	6ns	15pF, 50pF	1k Ω	open	GND	V_{CC}
SN74HCT173	3V	6ns	15pF, 50pF	1k Ω	open	GND	V_{CC}



5、Package Information

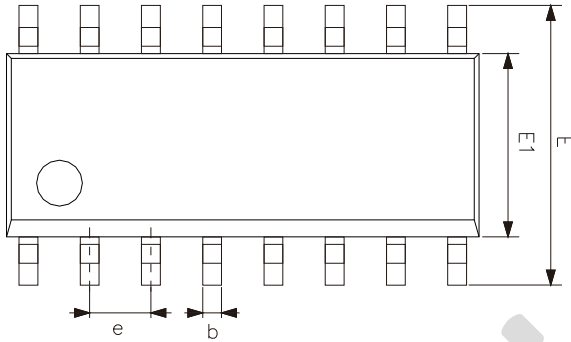
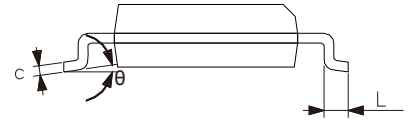
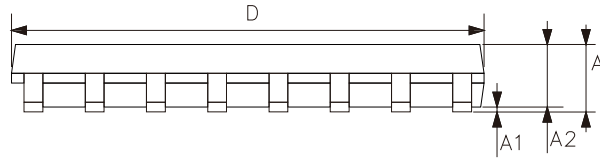
5.1、DIP16



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



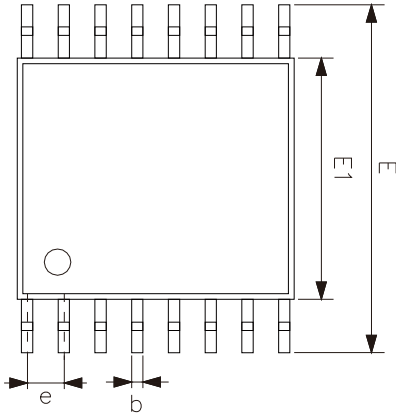
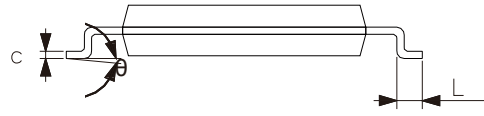
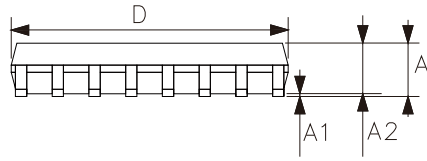
5.2、SOP16



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

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[TC7WZ74FK,LXGJ\(CT](#) [74LCX374FT](#) [74VHC174FT\(TB,BJ\)](#) [TC7WH74FK,LJ](#) [SN74HC374PW\(LX\)](#) [SN74LVC1G17DC\(LX\)](#)
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