



AiP74HC/HCT175
Quad D-type flip-flop with reset;
positive-edge trigger

Product Specification

Specification Revision History:

Version	Date	Description
2022-12-A1	2022-12	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	5
2.4、 Function table	5
3、 Electrical Parameter	6
3.1、 Absolute Maximum Ratings	6
3.2、 Recommended Operating Conditions	6
3.3、 Electrical Characteristics	7
3.3.1、 DC Characteristics 1	7
3.3.2、 DC Characteristics 2	8
3.3.3、 DC Characteristics 3	9
3.3.4、 AC Characteristics 1	10
3.3.5、 AC Characteristics 2	11
3.3.6、 AC Characteristics 3	12
4、 Testing Circuit	14
4.1、 AC Testing Circuit.....	14
4.2、 AC Testing Waveforms	15
4.3、 Measurement Points.....	16
4.4、 Test Data.....	16
5、 Package Information	17
5.1、 DIP16.....	17
5.2、 SOP16.....	18
5.3、 TSSOP16	19



6、 Statements And Notes	20
6.1、 The name and content of Hazardous substances or Elements in the product	20
6.2、 Notes	20





1、 General Description

The AiP74HC/HCT175 is a quad positive-edge triggered D-type flip-flop with individual data inputs (Dn) and complementary outputs (Qn and \overline{Qn}).

Features:

- Input levels:
For AiP74HC175: CMOS level
For AiP74HCT175: TTL level
- Four edge-triggered D-type flip-flops
- Asynchronous master reset
- Specified from -40°C to +125°C
- Packaging information:DIP16/SOP16/TSSOP16

**Ordering Information:****Tube packing specifications:**

Part number	Packaging form	Marking code	Tube quantity	Boxed tube quantity	Boxed quantity	Notes
AiP74HC175DA16.TB	DIP16	74HC175	25 PCS/tube	40 tube/box	1000 PCS/box	Dimensions of plastic enclosure: 19.0mm×6.4mm Pin spacing: 2.54mm
AiP74HCT175DA16.TB	DIP16	74HCT175	25 PCS/tube	40 tube/box	1000 PCS/box	Dimensions of plastic enclosure: 19.0mm×6.4mm Pin spacing: 2.54mm
AiP74HC175SA16.TB	SOP16	74HC175	50 PCS/tube	200 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing: 1.27mm
AiP74HCT175SA16.TB	SOP16	74HCT175	50 PCS/tube	200 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing: 1.27mm
AiP74HC175TA16.TB	TSSOP16	74HC175	96 PCS/tube	200 tube/box	19200 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing: 0.65mm
AiP74HCT175TA16.TB	TSSOP16	74HCT175	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
AiP74HC175SA16.TR	SOP16	74HC175	4000 PCS/reel	8000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing: 1.27mm
AiP74HCT175SA16.TR	SOP16	74HCT175	4000 PCS/reel	8000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing: 1.27mm
AiP74HC175TA16.TR	TSSOP16	74HC175	5000 PCS/reel	10000 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing: 0.65mm
AiP74HCT175TA16.TR	TSSOP16	74HCT175	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

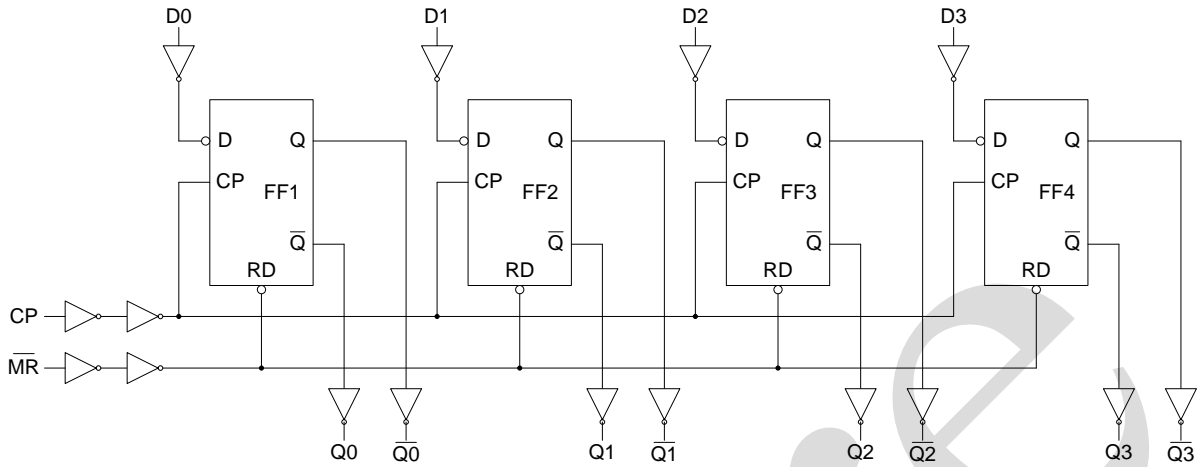
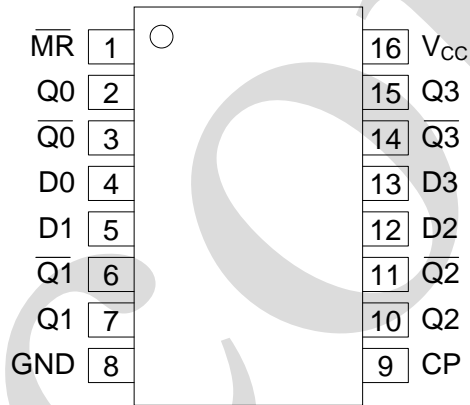


Figure 1. Logic diagram

2.2、Pin Configurations





2.3、Pin Description

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

2.4、Function table

Operating mode	Inputs			Outputs	
	$\overline{\text{MR}}$	CP	D _n	Q _n	$\overline{\text{Q}}_n$
reset (clear)	L	X	X	L	H
load "1"	H	↑	h	H	L
load "0"	H	↑	l	L	H

Note:

H=HIGH voltage level; L=LOW voltage level; X=don't care;

↑=LOW-to-HIGH clock transition;

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

l=LOW voltage level one set-up time prior to the 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	mA	
output clamping current	I_{OK}	$V_O < -0.5\text{V}$ or $V_O > V_{CC} + 0.5\text{V}$	-	± 20	mA	
output current	I_O	$V_O = -0.5\text{V}$ to $(V_{CC} + 0.5\text{V})$	-	± 25	mA	
supply current	I_{CC}	-	-	+50	mA	
ground current	I_{GND}	-	-50	-	mA	
storage temperature	T_{stg}	-	-65	+150	$^{\circ}\text{C}$	
total power dissipation	P_{tot}	-	-	500	mW	
soldering temperature	T_L	10s	DIP		245	$^{\circ}\text{C}$
			SOP/TSSOP		260	$^{\circ}\text{C}$

3.2、Recommended Operating Conditions

(Voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
AiP74HC175						
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	$^{\circ}\text{C}$
AiP74HCT175						
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), unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
AiP74HC175							
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
			$I_O=-4\text{mA}; V_{CC}=4.5\text{V}$	3.98	4.32	-	V
			$I_O=-5.2\text{mA}; V_{CC}=6.0\text{V}$	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
			$I_O=4\text{mA}; V_{CC}=4.5\text{V}$	-	0.15	0.26	V
			$I_O=5.2\text{mA}; V_{CC}=6.0\text{V}$	-	0.16	0.26	V
input leakage current	I_I	$V_I=V_{CC}$ or GND; $V_{CC}=6.0\text{V}$	-	-	± 1	μA	
supply current	I_{CC}	$V_I=V_{CC}$ or GND; $I_O=0\text{A}; V_{CC}=6.0\text{V}$	-	-	1	μA	
AiP74HCT175							
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}	$I_O=-20\mu\text{A}; V_{CC}=4.5\text{V}$	4.4	4.5	-	V
			$I_O=-4\text{mA}; V_{CC}=4.5\text{V}$	3.98	4.32	-	V
LOW-level output voltage	V_{OL}	$V_I=V_{IH}$ or V_{IL}	$I_O=20\mu\text{A}; V_{CC}=4.5\text{V}$	-	0	0.1	V
			$I_O=5.2\text{mA}; V_{CC}=5.5\text{V}$	-	0.15	0.26	V
input leakage current	I_I	$V_I=V_{CC}$ or GND; $V_{CC}=5.5\text{V}$	-	-	± 1	μA	
supply current	I_{CC}	$V_I=V_{CC}$ or GND; $I_O=0\text{A}; V_{CC}=5.5\text{V}$	-	-	1	μA	
additional supply current	ΔI_{CC}	per input pin; $V_I=V_{CC}-2.1\text{V}$; other inputs at V_{CC} or GND; $V_{CC}=4.5\text{V}$ to 5.5V	Dn input	-	40	144	μA
			CP input	-	60	216	μA
			MR input	-	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	
AiP74HC175							
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
			$I_O = -4\text{mA}; V_{CC} = 4.5\text{V}$	3.84	-	-	V
			$I_O = -5.2\text{mA}; V_{CC} = 6.0\text{V}$	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
			$I_O = 4\text{mA}; V_{CC} = 4.5\text{V}$	-	-	0.33	V
			$I_O = 5.2\text{mA}; V_{CC} = 6.0\text{V}$	-	-	0.33	V
input leakage current	I_I	$V_I = V_{CC}$ or GND; $V_{CC} = 6.0\text{V}$	-	-	± 2	μA	
supply current	I_{CC}	$V_I = V_{CC}$ or GND; $I_O = 0\text{A}; V_{CC} = 6.0\text{V}$	-	-	2	μA	
AiP74HCT175							
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}	$I_O = -20\mu\text{A}; V_{CC} = 4.5\text{V}$	4.4	-	-	V
			$I_O = -4\text{mA}; V_{CC} = 4.5\text{V}$	3.84	-	-	V
LOW-level output voltage	V_{OL}	$V_I = V_{IH}$ or V_{IL}	$I_O = 20\mu\text{A}; V_{CC} = 4.5\text{V}$	-	-	0.1	V
			$I_O = 5.2\text{mA}; V_{CC} = 5.5\text{V}$	-	-	0.33	V
input leakage current	I_I	$V_I = V_{CC}$ or GND; $V_{CC} = 5.5\text{V}$	-	-	± 2	μA	
supply current	I_{CC}	$V_I = V_{CC}$ or GND; $I_O = 0\text{A}; V_{CC} = 5.5\text{V}$	-	-	2	μA	
additional supply current	ΔI_{CC}	per input pin; $V_I = V_{CC} - 2.1\text{V}$; other inputs at V_{CC} or GND; $V_{CC} = 4.5\text{V}$ to 5.5V	Dn input	-	-	180	μA
			CP input	-	-	270	μA
			MR input	-	-	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	
AiP74HC175							
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
			$I_O = -4\text{mA}; V_{CC} = 4.5\text{V}$	3.7	-	-	V
			$I_O = -5.2\text{mA}; V_{CC} = 6.0\text{V}$	5.2	-	-	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
			$I_O = 4\text{mA}; V_{CC} = 4.5\text{V}$	-	-	0.4	V
			$I_O = 5.2\text{mA}; V_{CC} = 6.0\text{V}$	-	-	0.4	V
input leakage current	I_I	$V_I = V_{CC}$ or GND; $V_{CC} = 6.0\text{V}$	-	-	± 4	μA	
supply current	I_{CC}	$V_I = V_{CC}$ or GND; $I_O = 0\text{A}; V_{CC} = 6.0\text{V}$	-	-	4	μA	
AiP74HCT175							
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}	$I_O = -20\mu\text{A}; V_{CC} = 4.5\text{V}$	4.4	-	-	V
			$I_O = -4\text{mA}; V_{CC} = 4.5\text{V}$	3.7	-	-	V
LOW-level output voltage	V_{OL}	$V_I = V_{IH}$ or V_{IL}	$I_O = 20\mu\text{A}; V_{CC} = 4.5\text{V}$	-	-	0.1	V
			$I_O = 5.2\text{mA}; V_{CC} = 5.5\text{V}$	-	-	0.4	V
input leakage current	I_I	$V_I = V_{CC}$ or GND; $V_{CC} = 5.5\text{V}$	-	-	± 4	μA	
supply current	I_{CC}	$V_I = V_{CC}$ or GND; $I_O = 0\text{A}; V_{CC} = 5.5\text{V}$	-	-	4	μA	
additional supply current	ΔI_{CC}	per input pin; $V_I = V_{CC} - 2.1\text{V}$; other inputs at V_{CC} or GND; $V_{CC} = 4.5\text{V}$ to 5.5V	Dn input	-	-	196	μA
			CP input	-	-	294	μA
			MR input	-	-	490	μA



3.3.4、AC Characteristics 1

($T_{amb}=25^{\circ}\text{C}$, $\text{GND}=0\text{V}$, $C_L=50\text{pF}$, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
AiP74HC175							
propagation delay	t_{PLH}/t_{PHL}	CP to Qn, \overline{Qn} ; see Figure 4	$V_{CC}=2.0\text{V}$	-	55	175	ns
			$V_{CC}=4.5\text{V}$	-	50	35	ns
			$V_{CC}=5.0\text{V}$ $C_L=15\text{pF}$	-	17	-	ns
			$V_{CC}=6.0\text{V}$	-	16	30	ns
HIGH to LOW propagation delay	t_{PHL}	\overline{MR} to Qn, \overline{Qn} ; see Figure 6	$V_{CC}=2.0\text{V}$	-	50	150	ns
			$V_{CC}=4.5\text{V}$	-	18	30	ns
			$V_{CC}=5.0\text{V}$ $C_L=15\text{pF}$	-	15	-	ns
			$V_{CC}=6.0\text{V}$	-	14	26	ns
transition time	t_t	Qn output; see Figure 4	$V_{CC}=2.0\text{V}$	-	19	75	ns
			$V_{CC}=4.5\text{V}$	-	7	15	ns
			$V_{CC}=6.0\text{V}$	-	6	13	ns
pulse width	t_w	CP input HIGH or LOW; see Figure 4	$V_{CC}=2.0\text{V}$	80	22	-	ns
			$V_{CC}=4.5\text{V}$	16	8	-	ns
			$V_{CC}=6.0\text{V}$	14	6	-	ns
		\overline{MR} input LOW; see Figure 6	$V_{CC}=2.0\text{V}$	80	19	-	ns
			$V_{CC}=4.5\text{V}$	16	7	-	ns
			$V_{CC}=6.0\text{V}$	14	6	-	ns
recovery time	t_{rec}	\overline{MR} to CP; see Figure 6	$V_{CC}=2.0\text{V}$	5	-33	-	ns
			$V_{CC}=4.5\text{V}$	5	-12	-	ns
			$V_{CC}=6.0\text{V}$	5	-10	-	ns
set-up time	t_{su}	Dn to CP; see Figure 4	$V_{CC}=2.0\text{V}$	80	3	-	ns
			$V_{CC}=4.5\text{V}$	16	1	-	ns
			$V_{CC}=6.0\text{V}$	14	1	-	ns
hold time	t_h	Dn to CP; see Figure 4	$V_{CC}=2.0\text{V}$	25	2	-	ns
			$V_{CC}=4.5\text{V}$	5	0	-	ns
			$V_{CC}=6.0\text{V}$	4	0	-	ns
maximum frequency	f_{max}	CP input; see Figure 4	$V_{CC}=2.0\text{V}$	6	25	-	ns
			$V_{CC}=4.5\text{V}$	30	75	-	ns
			$V_{CC}=5.0\text{V}$ $C_L=15\text{pF}$	-	83	-	ns
			$V_{CC}=6.0\text{V}$	35	89	-	ns
AiP74HCT175							
propagation delay	t_{PLH}/t_{PHL}	CP to Qn, \overline{Qn} ; see Figure 4	$V_{CC}=4.5\text{V}$	-	19	33	ns
			$V_{CC}=5\text{V}$; $C_L=15\text{pF}$	-	16	-	ns
HIGH to LOW propagation delay	t_{PHL}	\overline{MR} to Qn; see Figure 6	$V_{CC}=4.5\text{V}$	-	22	38	ns
			$V_{CC}=5\text{V}$; $C_L=15\text{pF}$	-	19	-	ns
		\overline{MR} to \overline{Qn} ; see Figure 6	$V_{CC}=4.5\text{V}$	-	19	35	ns
			$V_{CC}=5\text{V}$; $C_L=15\text{pF}$	-	16	-	ns
transition time	t_t	Qn output; see Figure 4	$V_{CC}=4.5\text{V}$	-	7	15	ns
pulse width	t_w	CP input; see Figure 4	$V_{CC}=4.5\text{V}$	20	12	-	ns



		$\overline{\text{MR}}$ input LOW; see Figure 6	$V_{CC}=4.5V$	20	11	-	ns
recovery time	t_{rec}	$\overline{\text{MR}}$ to CP; see Figure 6	$V_{CC}=4.5V$	5	-10	-	ns
set-up time	t_{su}	Dn to CP; see Figure 4	$V_{CC}=4.5V$	16	5	-	ns
hold time	t_h	Dn to CP; see Figure 4	$V_{CC}=4.5V$	5	0	-	ns
maximum frequency	f_{max}	CP input; see Figure 4	$V_{CC}=4.5V$	25	49	-	ns

3.3.5、AC Characteristics 2

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
AiP74HC175							
propagation delay	t_{PLH}/t_{PHL}	CP to Qn, $\overline{\text{Qn}}$; see Figure 4	$V_{CC}=2.0V$	-	-	220	ns
			$V_{CC}=4.5V$	-	-	44	ns
			$V_{CC}=6.0V$	-	-	37	ns
HIGH to LOW propagation delay	t_{PHL}	$\overline{\text{MR}}$ to Qn, $\overline{\text{Qn}}$; see Figure 6	$V_{CC}=2.0V$	-	-	190	ns
			$V_{CC}=4.5V$	-	-	38	ns
			$V_{CC}=6.0V$	-	-	33	ns
transition time	t_t	Qn output; see Figure 4	$V_{CC}=2.0V$	-	-	95	ns
			$V_{CC}=4.5V$	-	-	19	ns
			$V_{CC}=6.0V$	-	-	16	ns
pulse width	t_w	CP input HIGH or LOW; see Figure 4	$V_{CC}=2.0V$	100	-	-	ns
			$V_{CC}=4.5V$	20	-	-	ns
			$V_{CC}=6.0V$	17	-	-	ns
		$\overline{\text{MR}}$ input LOW; see Figure 6	$V_{CC}=2.0V$	100	-	-	ns
			$V_{CC}=4.5V$	20	-	-	ns
			$V_{CC}=6.0V$	17	-	-	ns
recovery time	t_{rec}	$\overline{\text{MR}}$ to CP; see Figure 6	$V_{CC}=2.0V$	5	-	-	ns
			$V_{CC}=4.5V$	5	-	-	ns
			$V_{CC}=6.0V$	5	-	-	ns
set-up time	t_{su}	Dn to CP; see Figure 4	$V_{CC}=2.0V$	100	-	-	ns
			$V_{CC}=4.5V$	20	-	-	ns
			$V_{CC}=6.0V$	17	-	-	ns
hold time	t_h	Dn to CP; see Figure 4	$V_{CC}=2.0V$	30	-	-	ns
			$V_{CC}=4.5V$	6	-	-	ns
			$V_{CC}=6.0V$	5	-	-	ns
maximum frequency	f_{max}	CP input; see Figure 4	$V_{CC}=2.0V$	4.8	-	-	ns
			$V_{CC}=4.5V$	24	-	-	ns
			$V_{CC}=6.0V$	28	-	-	ns
AiP74HCT175							
propagation delay	t_{PLH}/t_{PHL}	CP to Qn, $\overline{\text{Qn}}$; see Figure 4	$V_{CC}=4.5V$	-	-	41	ns



HIGH to LOW propagation delay	t _{PHL}	\overline{MR} to Qn; see Figure 6	V _{CC} =4.5V	-	-	48	ns
		\overline{MR} to Qn; see Figure 6	V _{CC} =4.5V	-	-	44	ns
transition time	t _t	Qn output; see Figure 4	V _{CC} =4.5V	-	-	19	ns
pulse width	t _w	CP input; see Figure 4	V _{CC} =4.5V	25	-	-	ns
		\overline{MR} input LOW; see Figure 6	V _{CC} =4.5V	25	-	-	ns
recovery time	t _{rec}	\overline{MR} to CP; see Figure 6	V _{CC} =4.5V	5	-	-	ns
set-up time	t _{su}	Dn to CP; see Figure 4	V _{CC} =4.5V	20	-	-	ns
hold time	t _h	Dn to CP; see Figure 4	V _{CC} =4.5V	5	-	-	ns
maximum frequency	f _{max}	CP input; see Figure 4	V _{CC} =4.5V	20	-	-	ns

3.3.6、 AC Characteristics 3

(T_{amb}=-40°C to +125°C, GND=0V, C_L=50pF, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
AiP74HC175							
propagation delay	t _{PLH} /t _{PHL}	CP to Qn, \overline{Qn} ; see Figure 4	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}	\overline{MR} to Qn, \overline{Qn} ; see Figure 6	V _{CC} =2.0V	-	-	225	ns
			V _{CC} =4.5V	-	-	45	ns
			V _{CC} =6.0V	-	-	38	ns
transition time	t _t	Qn output; see Figure 4	V _{CC} =2.0V	-	-	110	ns
			V _{CC} =4.5V	-	-	22	ns
			V _{CC} =6.0V	-	-	19	ns
pulse width	t _w	CP input HIGH or LOW; see Figure 4	V _{CC} =2.0V	120	-	-	ns
			V _{CC} =4.5V	24	-	-	ns
			V _{CC} =6.0V	20	-	-	ns
		\overline{MR} input LOW; see Figure 6	V _{CC} =2.0V	120	-	-	ns
			V _{CC} =4.5V	24	-	-	ns
			V _{CC} =6.0V	20	-	-	ns
recovery time	t _{rec}	\overline{MR} to CP; see Figure 6	V _{CC} =2.0V	5	-	-	ns
			V _{CC} =4.5V	5	-	-	ns
			V _{CC} =6.0V	5	-	-	ns
set-up time	t _{su}	Dn to CP; see Figure 4	V _{CC} =2.0V	120	-	-	ns
			V _{CC} =4.5V	24	-	-	ns
			V _{CC} =6.0V	20	-	-	ns
hold time	t _h	Dn to CP; see Figure 4	V _{CC} =2.0V	40	-	-	ns
			V _{CC} =4.5V	8	-	-	ns



			$V_{CC}=6.0V$	7	-	-	ns
maximum frequency	f_{max}	CP input; see Figure 4	$V_{CC}=2.0V$	4	-	-	ns
			$V_{CC}=4.5V$	20	-	-	ns
			$V_{CC}=6.0V$	24	-	-	ns
AiP74HCT175							
propagation delay	t_{PLH}/t_{PHL}	CP to $Q_n, \overline{Q_n}$; see Figure 4	$V_{CC}=4.5V$	-	-	50	ns
HIGH to LOW propagation delay	t_{PHL}	\overline{MR} to Q_n ; see Figure 6	$V_{CC}=4.5V$	-	-	57	ns
		\overline{MR} to $\overline{Q_n}$; see Figure 6	$V_{CC}=4.5V$	-	-	53	ns
transition time	t_t	Q_n output; see Figure 4	$V_{CC}=4.5V$	-	-	22	ns
pulse width	t_w	CP input; see Figure 4	$V_{CC}=4.5V$	30	-	-	ns
		\overline{MR} input LOW; see Figure 6	$V_{CC}=4.5V$	30	-	-	ns
recovery time	t_{rec}	\overline{MR} to CP; see Figure 6	$V_{CC}=4.5V$	5	-	-	ns
set-up time	t_{su}	Dn to CP; see Figure 4	$V_{CC}=4.5V$	24	-	-	ns
hold time	t_h	Dn to CP; see Figure 4	$V_{CC}=4.5V$	5	-	-	ns
maximum frequency	f_{max}	CP input; see Figure 4	$V_{CC}=4.5V$	17	-	-	ns



4、Testing Circuit

4.1、AC Testing Circuit

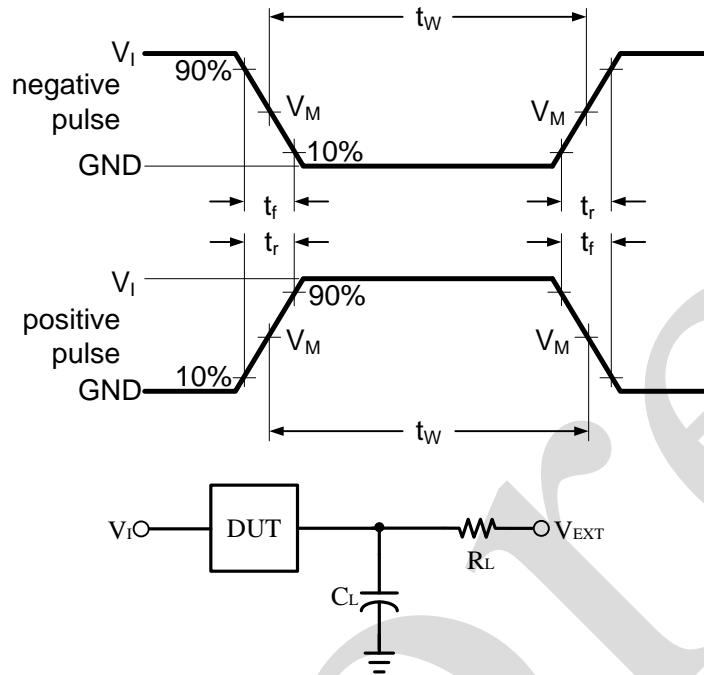


Figure 3. Test circuit for measuring switching times

Definitions for test circuit:

C_L includes probe and jig capacitance.



4.2、 AC Testing Waveforms

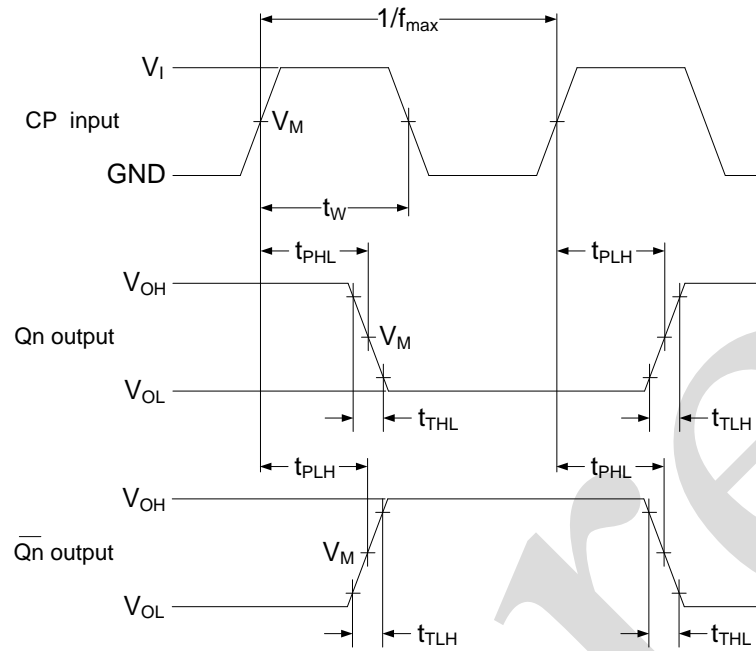


Figure 4. Input to output propagation delay, output transition time, clock input pulse width and maximum frequency

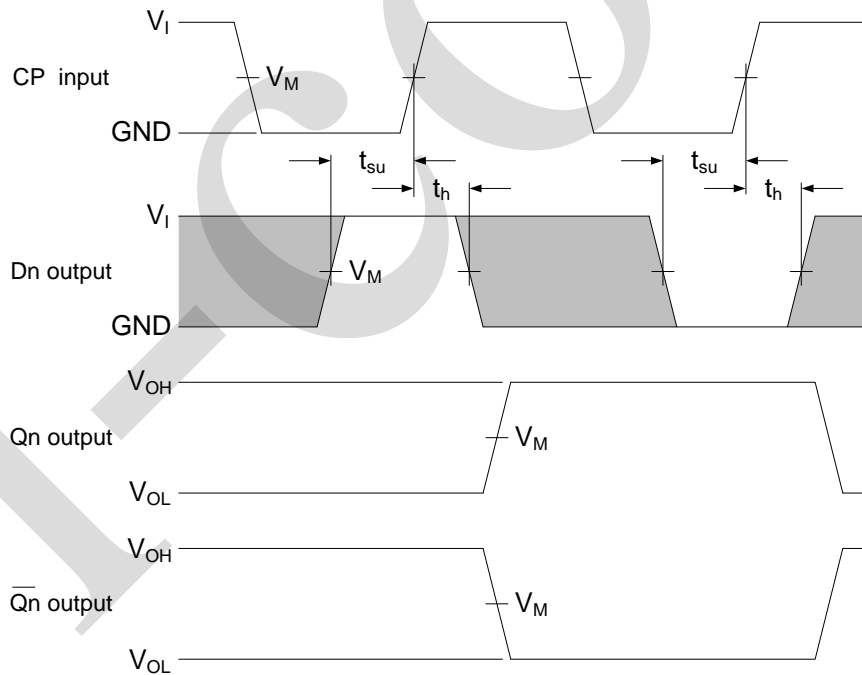


Figure 5. Data set-up and hold times for data input

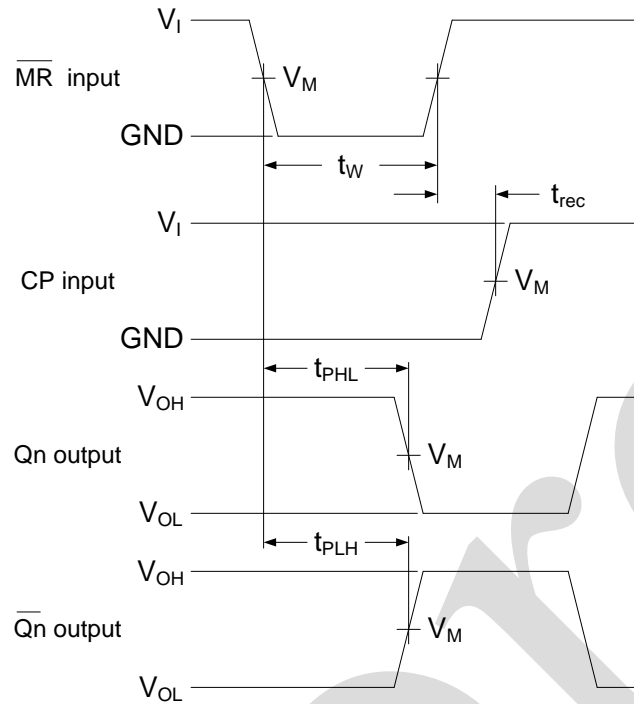


Figure 6. Master reset to output propagation delays, master reset pulse width and master reset to clock recovery time

4.3. Measurement Points

Type	Input		Output
	V_I	V_M	V_M
AiP74HC175	V_{CC}	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$
AiP74HCT175	3V	1.3V	1.3V

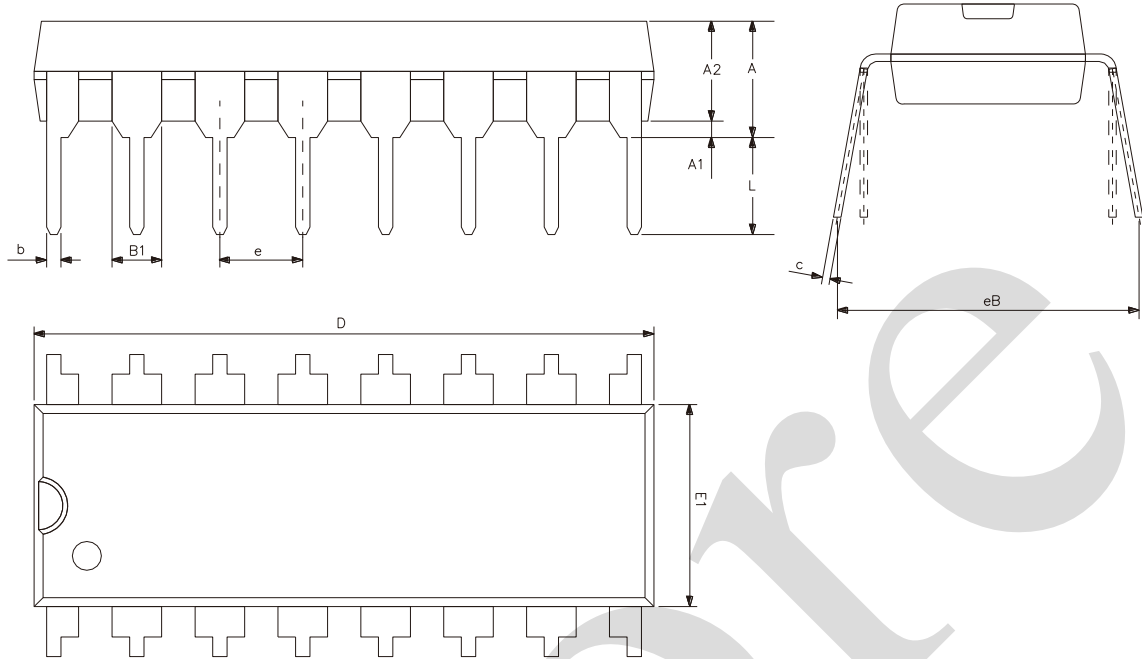
4.4. Test Data

Type	Input		Load		Test
	V_I	t_r, t_f	C_L	R_L	
AiP74HC175	V_{CC}	3.0ns	15pF, 50pF	1k Ω	t_{PLH}, t_{PHL}
AiP74HCT175	3.0V	3.0ns	15pF, 50pF	1k Ω	t_{PLH}, t_{PHL}



5、Package Information

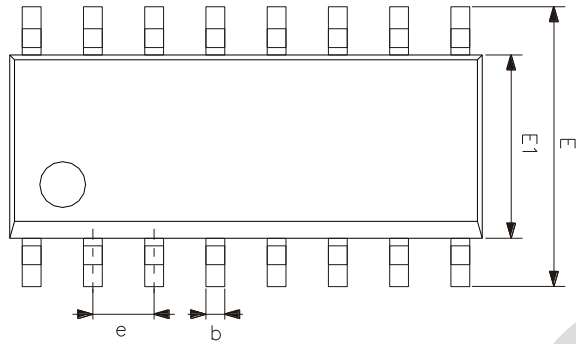
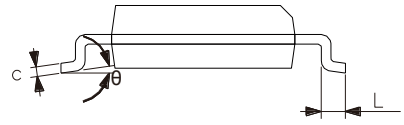
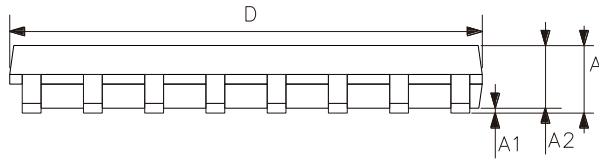
5.1、DIP16



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



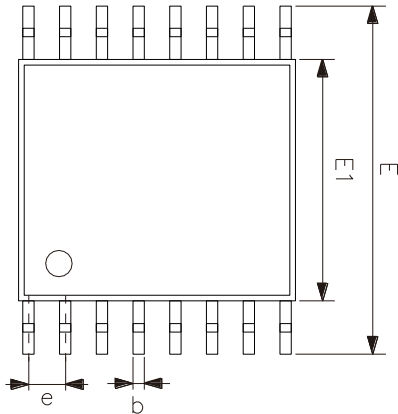
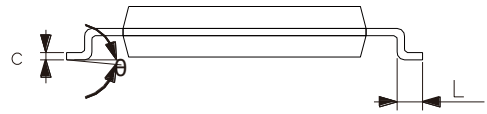
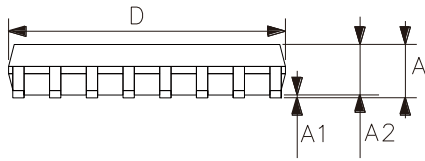
5.2、SOP16



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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