



AOS
SEMICONDUCTOR

产品规格说明书

Product Data Sheet

AOS74HC175D

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电源管理IC



通信接口芯片



二三极管



LDO稳压器



逻辑器件



MOSFETs



运算放大器



显示驱动



MCU单片机



光电器件

AOS74HC175D

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Logic Gates

■ General Description

The AOS74HC175 is a quad positive-edge triggered D-type flip-flop with individual data inputs (Dn) and complementary outputs (Qn and \bar{Q}_n).

■ Features:

- Input Levels: For AOS74HC175: CMOS Level
- Four edge-triggered D-type flip-flops
- Asynchronous 8-bit parallel load
- Synchronous master reset
- Specified from -40°C to +125°C
- Packaging information: DIP16/SOP16/TSSOP16

■ Ordering Information:

Reel packing specifications:

Type number	Packaging form	Marking code	Reel quantity	Boxed reel quantity	Packaging quantity	Notes
AOS74HC175D	SOP16	HC175	50 PCS/tube	200 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 10.0mm × 3.9mm Pin spacing: 1.27mm

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



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Block Diagram And Pin Description Block Diagram

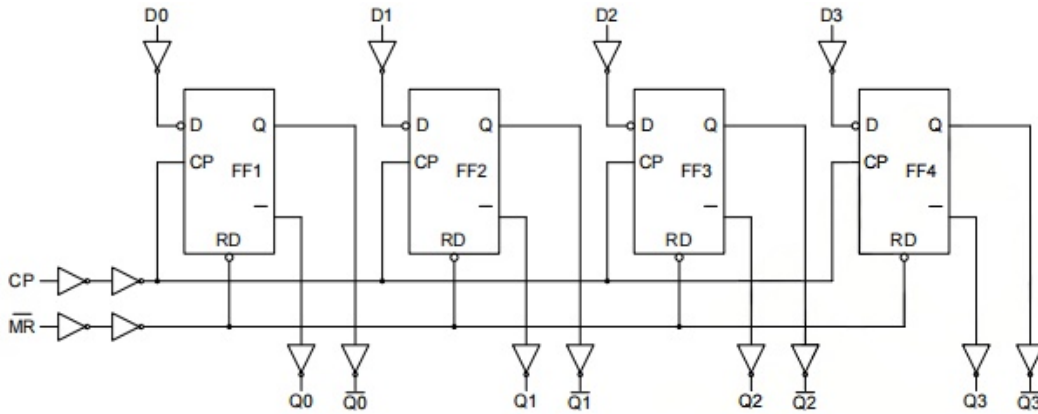
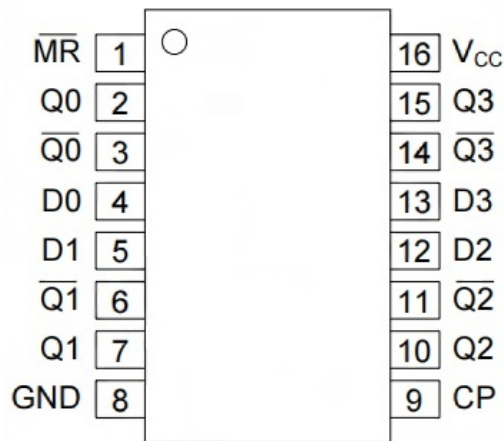


Figure 1. Logic diagram

Pin Configurations



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■ Pin Description

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



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■ Function Table

Operating mode	Input			Output	
	$\bar{M}R$	CP	Dn	Qn	$\bar{Q}n$
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.



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Electrical Parameter Absolute Maximum Ratings

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

Parameter	Symbol	Conditions	Min.	Max.	Unit
supply voltage	V_{CC}	-	-0.5	+7	V
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
supply current	I_{CC}	-	-	50	mA
ground current	I_{GND}	-	-50	-	mA
total power dissipation	P_{tot}	-	-	500	mW
storage temperature	T_{stg}	-	-65	+150	
soldering temperature	T_L	10s	DIP	245	
			SOP	260	



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Recommended Operating Conditions

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
AOS74HC175						
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
input transition rise and fall rate	t/ V	$V_{CC}=2.0V$	-	-	625	ns/V
		$V_{CC}=4.5V$	-	1.67	139	ns/V
		$V_{CC}=6.0V$	-	-	83	ns/V
ambient temperature	T_{amb}	-	-40	-	+85	



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Electrical Characteristics

DC Characteristics 1

(Tamb=25°C, voltages are referenced to GND(ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
AOS74HC175							
HIGH-Level input voltage	V _{IH}	V _{CC} =2.0V	1.5	1.2	-	V	
		V _{CC} =4.5V	3.15	2.4	-	V	
		V _{CC} =6.0V	4.2	3.2	-	V	
LOW-Level input voltage	V _{IL}	V _{CC} =2.0V	-	0.8	0.5	V	
		V _{CC} =4.5V	-	2.1	1.35	V	
		V _{CC} =6.0V	-	2.8	1.8	V	
HIGH-Level output voltage	V _{OH}	V _I =V _{IH} or V _{IL}	I _O =-20uA; V _{CC} =2.0V	1.9	2.0	-	V
			I _O =-20uA; V _{CC} =4.5V	4.4	4.5	-	V
			I _O =-20uA; V _{CC} =6.0V	5.9	6.0	-	V
			I _O =-4.0mA; V _{CC} =4.5V	3.98	4.32	-	V
			I _O =-5.2mA; V _{CC} =6.0V	5.48	5.81	-	V
LOW-Level output voltage	V _{OL}	V _I =V _{IH} or V _{IL}	I _O =20uA; V _{CC} =2.0V	-	0	0.1	V
			I _O =20uA; V _{CC} =4.5V	-	0	0.1	V
			I _O =20uA; V _{CC} =6.0V	-	0	0.1	V
			I _O =4.0mA; V _{CC} =4.5V	-	0.15	0.26	V
			I _O =5.2mA; V _{CC} =6.0V	-	0.16	0.26	V
input leakage current	I _I	V _I =V _{CC} or GND; V _{CC} =6.0V	-	-	±0.1	uA	
supply current	I _{CC}	V _I =V _{CC} or GND; I _O =0A; V _{CC} =6.0V	-	-	1	uA	



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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	
AOS74HC175							
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
			$I_o = -4.0\text{mA}; V_{CC} = 4.5\text{V}$	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
			$I_o = 4.0\text{mA}; V_{CC} = 4.5\text{V}$	-	-	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	



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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
AOS74HC175						
HIGH-level input voltage	V_{IH}	$V_{CC}=2.0V$	1.5	-	-	V
		$V_{CC}=4.5V$	3.15	-	-	
		$V_{CC}=6.0V$	4.2	-	-	
LOW-level input voltage	V_{IL}	$V_{CC}=2.0V$	-	-	0.5	
		$V_{CC}=4.5V$	-	-	1.35	
		$V_{CC}=6.0V$	-	-	1.8	
HIGH-level output voltage	V_{OH}	$V_I = V_{IH}$ 或 V_{IL}	$I_{O} = -20\mu A; V_{CC} = 2.0V$	1.9	-	
			$I_{O} = -20\mu A; V_{CC} = 4.5V$	4.4	-	-
			$I_{O} = -20\mu A; V_{CC} = 6.0V$	5.9	-	-
			$I_{O} = -4.0mA; V_{CC} = 4.5V$	3.7	-	-
			$I_{O} = -5.2mA; V_{CC} = 6.0V$	5.2	-	-
LOW-level output voltage	V_{OL}	$V_I = V_{IH}$ 或 V_{IL}	$I_{O} = 20\mu A; V_{CC} = 2.0V$	-	-	0.1
			$I_{O} = 20\mu A; V_{CC} = 4.5V$	-	-	0.1
			$I_{O} = 20\mu A; V_{CC} = 6.0V$	-	-	0.1
			$I_{O} = 4.0mA; V_{CC} = 4.5V$	-	-	0.4
			$I_{O} = 5.2mA; V_{CC} = 6.0V$	-	-	0.4
input leakage current	I_I	$V_I = V_{CC}$ 或 $GND; V_{CC} = 6.0V$	-	-	± 4	μA
supply current	I_{CC}	$V_I = V_{CC}$ 或 $GND; I_{O} = 0A, V_{CC} = 6.0V$	-	-	4	



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AC Characteristics 1

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
AOS74HC175							
propagation delay	t_{PLH}/t_{PHL}	CP to Q_n , \bar{Q}_n ; see Figure 4	$V_{CC}=2.0V$	-	55	175	ns
			$V_{CC}=4.5V$	-	50	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}	\bar{Q}_n MR to Q_n , \bar{Q}_n ; see Figure 6	$V_{CC}=2.0V$	-	50	150	ns
			$V_{CC}=4.5V$	-	18	30	ns
			$V_{CC}=5.0V$ $C_L=15pF$	-	15	-	ns
			$V_{CC}=6.0V$	-	14	26	ns
transition time	t_t	Q_n output; see Figure 4	$V_{CC}=2.0V$	-	19	75	ns
			$V_{CC}=4.5V$	-	7	15	ns
			$V_{CC}=6.0V$	-	6	13	ns
pulse width	t_w	CP input HIGH or LOW; see Figure 4	$V_{CC}=2.0V$	80	22	-	ns
			$V_{CC}=4.5V$	16	8	-	ns
			$V_{CC}=6.0V$	14	6	-	ns
		\bar{Q}_n MR input LOW; see Figure 6	$V_{CC}=2.0V$	80	19	-	ns
			$V_{CC}=4.5V$	16	7	-	ns
			$V_{CC}=6.0V$	14	6	-	ns
recovery time	t_{rec}	\bar{Q}_n MR to CP; see Figure 6	$V_{CC}=2.0V$	5	-33	-	ns
			$V_{CC}=4.5V$	5	-12	-	ns
			$V_{CC}=6.0V$	5	-10	-	ns
set-up time	t_{su}	D_n to CP; see Figure 4	$V_{CC}=2.0V$	80	3	-	ns
			$V_{CC}=4.5V$	16	1	-	ns
			$V_{CC}=6.0V$	14	1	-	ns
hold time	t_h	D_n to CP; see Figure 4	$V_{CC}=2.0V$	25	2	-	ns
			$V_{CC}=4.5V$	5	0	-	ns
			$V_{CC}=6.0V$	4	0	-	ns
maximum frequency	f_{max}	CP input; see Figure 4	$V_{CC}=2.0V$	6	25	-	ns
			$V_{CC}=4.5V$	30	75	-	ns
			$V_{CC}=5.0V$ $C_L=15pF$	-	83	-	ns
			$V_{CC}=6.0V$	35	89	-	ns



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AC Characteristics 2

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
AOS74HC175							
propagation delay	t_{pd}	CP, \neg CE to Q7, \neg Q7; see Figure 6	$V_{CC}=2.0V$	-	-	205	ns
			$V_{CC}=4.5V$	-	-	41	ns
			$V_{CC}=6.0V$	-	-	35	ns
		\neg PL to Q7, \neg Q7; see Figure 7	$V_{CC}=2.0V$	-	-	205	ns
			$V_{CC}=4.5V$	-	-	41	ns
			$V_{CC}=6.0V$	-	-	35	ns
		D7 to Q7, \neg Q7; see Figure 8	$V_{CC}=2.0V$	-	-	150	ns
			$V_{CC}=4.5V$	-	-	30	ns
			$V_{CC}=6.0V$	-	-	26	ns
transition time	t_t	Q7, \neg Q7 output; see Figure 6	$V_{CC}=2.0V$	-	-	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 6	$V_{CC}=2.0V$	100	-	-	ns
			$V_{CC}=4.5V$	20	-	-	ns
			$V_{CC}=6.0V$	17	-	-	ns
		\neg PL input LOW; see Figure 7	$V_{CC}=2.0V$	100	-	-	ns
			$V_{CC}=4.5V$	20	-	-	ns
			$V_{CC}=6.0V$	17	-	-	ns
recovery time	t_{rec}	PL to CP, \neg CE; see Figure 7	$V_{CC}=2.0V$	125	-	-	ns
			$V_{CC}=4.5V$	25	-	-	ns
			$V_{CC}=6.0V$	21	-	-	ns
set-up time	t_{su}	DS to CP, \neg CE; see Figure 9	$V_{CC}=2.0V$	100	-	-	ns
			$V_{CC}=4.5V$	20	-	-	ns
			$V_{CC}=6.0V$	17	-	-	ns
		\neg CE to CP and CP to \neg CE; see Figure 9	$V_{CC}=2.0V$	100	-	-	ns
			$V_{CC}=4.5V$	20	-	-	ns
			$V_{CC}=6.0V$	17	-	-	ns
		Dn to \neg PL; see Figure 10	$V_{CC}=2.0V$	100	-	-	ns
			$V_{CC}=4.5V$	20	-	-	ns
			$V_{CC}=6.0V$	17	-	-	ns
hold time	t_h	DS to CP, \neg CE and Dn to \neg PL; see Figure 9	$V_{CC}=2.0V$	5	-	-	ns
			$V_{CC}=4.5V$	5	-	-	ns
			$V_{CC}=6.0V$	5	-	-	ns
		\neg CE to CP—and CP to \neg CE; see Figure 9	$V_{CC}=2.0V$	5	-	-	ns
			$V_{CC}=4.5V$	5	-	-	ns
			$V_{CC}=6.0V$	5	-	-	ns



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AC Characteristics 3

($T_{amb} = -40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$, $GND=0V$, $C_L=50pF$, unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
AOS74HC175							
propagation delay	t_{PLH}/t_{PHL}	CP to Qn, $\bar{Q}n$; 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}	$\bar{Q}n$ MR to Qn, $\bar{Q}n$; 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
		$\bar{Q}n$ 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}	$\bar{Q}n$ 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



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Testing Circuit AC Testing Circuit

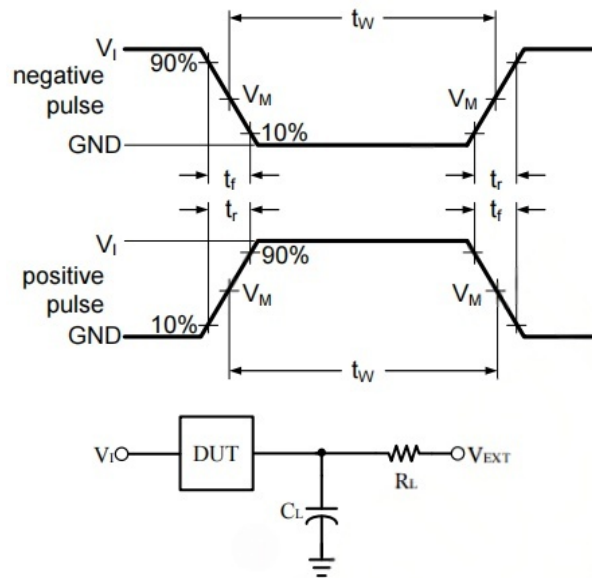


Figure 3. Test circuit for measuring switching times

Definitions for test circuit:

C_L includes probe and jig capacitance



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Data Sheet

AC Testing Waveforms

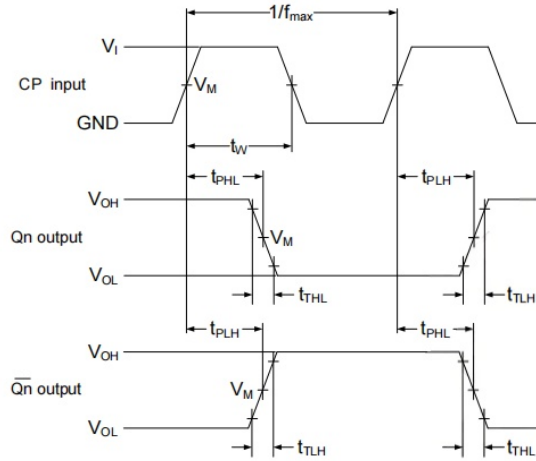


Figure 4. Input to output propagation delay, output transition time, clock input pulse width and maximum frequency

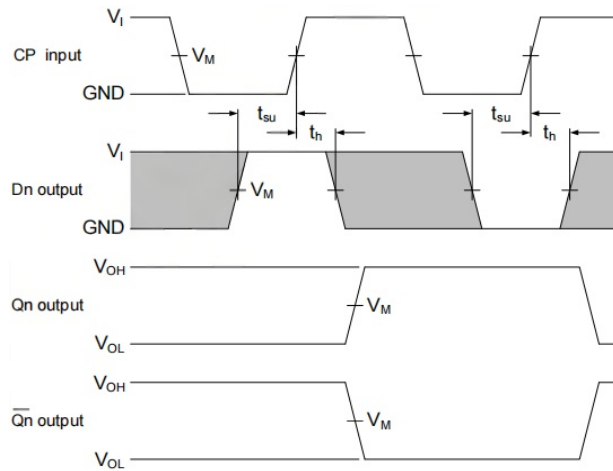


Figure 5. Data set-up and hold times for data input



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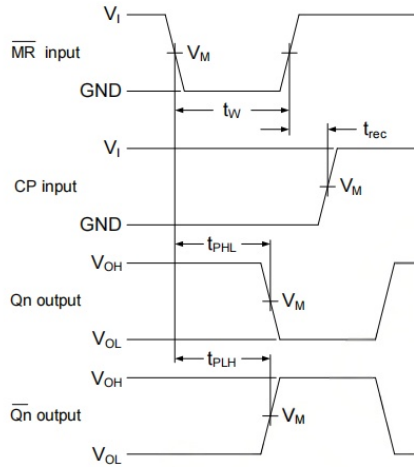


Figure 6. Master reset to output propagation delays, master reset pulse width and master reset to clock recovery time

Measurement Points

Type	Input		Output
	V_I	V_M	V_M
AOS74HC175	V_{CC}	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$

Test Data

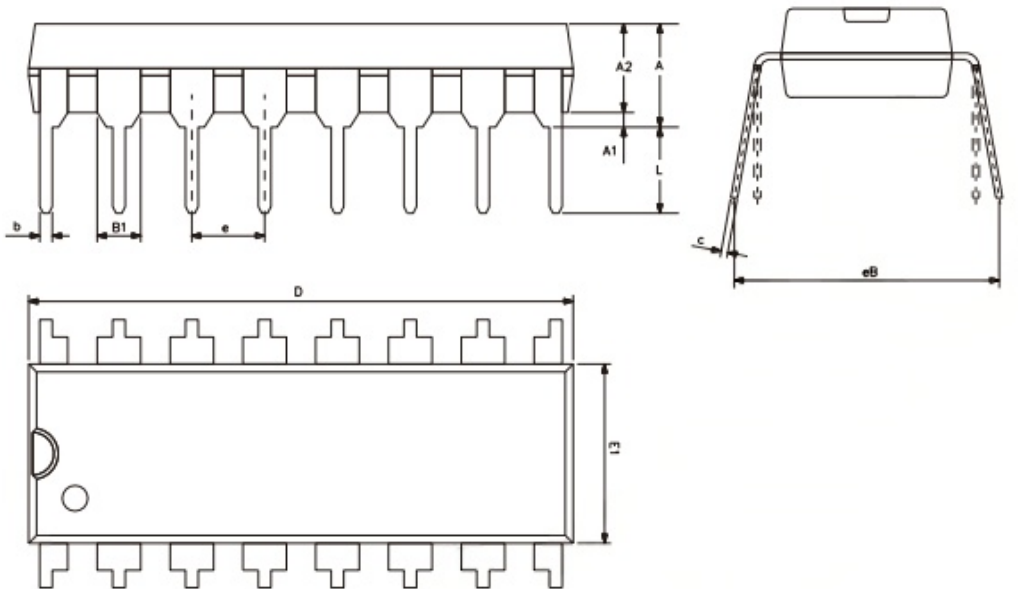
Type	Input		Load		Test
	V_M	t_r, t_f	C_L	R_L	
AOS74HC175	V_{CC}	3.0ns	15pF, 50pF	1k	t_{PLH}, t_{PHL}



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Package Information DIP16



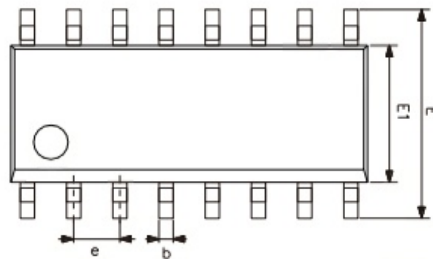
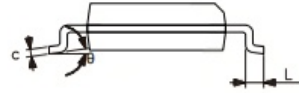
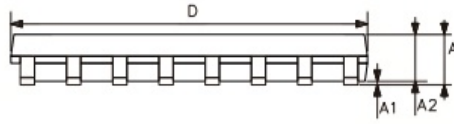
Symbol	Dimensions (mm)	
	Min.	Max.
A2	3.20	3.60
A1	0.51	-
A	3.60	5.33
L	3.00	3.60
b	0.36	0.56
B1	1.52	
D	18.80	19.94
E1	6.20	6.60
e	2.54	
c	0.20	0.36
eB	7.62	9.30



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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
	0°	8°

