



# AiP74HC/HCT374

## Octal D-type flip-flop; positive edge-trigger; 3-state

### Product Specification

#### Specification Revision History:

Version	Date	Description
2012-06-A1	2012-06	New
2021-12-A2	2021-12	Modify ordering information
2022-01-A3	2022-01	Modify ambient temperature to $-40^{\circ}\text{C}\sim+105^{\circ}\text{C}$ and add electrical characteristics of $-40^{\circ}\text{C}\sim+105^{\circ}\text{C}$



## 1、 General Description

The AiP74HC/HCT374 is an octal positive-edge triggered D-type flip-flop with 3-state outputs. The device features a clock (CP) and output enable ( $\overline{OE}$ ) inputs. The flip-flops will store the state of their individual D-inputs that meet the set-up and hold time requirements on the LOW-to-HIGH clock (CP) transition. A HIGH on  $\overline{OE}$  causes the outputs to assume a high-impedance OFF-state. Operation of the  $\overline{OE}$  input does not affect the state of the flip-flops. Inputs also include clamp diodes, this enables the use of current limiting resistors to interface inputs to voltages in excess of  $V_{CC}$ .

The AiP74HCT374 features reduced input threshold levels to allow interfacing to TTL logic levels.

### Features:

- Input levels:
  - For AiP74HC374: CMOS level
  - For AiP74HCT374: TTL level
- Octal bus interface
- Non-inverting 3-state outputs
- 8-bit positive, edge-triggered register
- Common 3-state output enable input
- Independent register and 3-state buffer operation
- Specified from -40°C to +105°C
- Packaging information: DIP20/SOP20/TSSOP20

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

Part number	Packaging form	Marking code	Tube quantity	Boxed tube quantity	Boxed quantity	Notes
AiP74HC374DA20.TB	DIP20	74HC374	18 PCS/tube	40 tube/box	720 PCS/box	Dimensions of plastic enclosure: 26.3mm×6.4mm Pin spacing: 2.54mm
AiP74HCT374DA20.TB	DIP20	74HCT374	18 PCS/tube	40 tube/box	720 PCS/box	Dimensions of plastic enclosure: 26.3mm×6.4mm Pin spacing: 2.54mm
AiP74HC374SA20.TB	SOP20(1)	74HC374	35 PCS/tube	80 tube/box	2800 PCS/box	Dimensions of plastic enclosure: 12.8mm×7.5mm Pin spacing: 1.27mm
AiP74HC374SA20.TB	SOP20(2)	74HC374	36 PCS/tube	80 tube/box	2880 PCS/box	Dimensions of plastic enclosure: 12.8mm×7.5mm Pin spacing: 1.27mm
AiP74HCT374SA20.TB	SOP20	74HCT374	35 PCS/tube	80 tube/box	2800 PCS/box	Dimensions of plastic enclosure: 12.8mm×7.5mm Pin spacing: 1.27mm
AiP74HC374TA20.TB	TSSOP20(1)	74HC374	70 PCS/tube	200 tube/box	14000 PCS/box	Dimensions of plastic enclosure: 6.5mm×4.4mm Pin spacing: 0.65mm
AiP74HCT374TA20.TB	TSSOP20(1)	74HCT374	70 PCS/tube	200 tube/box	14000 PCS/box	Dimensions of plastic enclosure: 6.5mm×4.4mm Pin spacing: 0.65mm
AiP74HC374TA20.TB	TSSOP20(2)	74HC374	72 PCS/tube	140 tube/box	10080 PCS/box	Dimensions of plastic enclosure: 6.5mm×4.4mm Pin spacing: 0.65mm
AiP74HCT374TA20.TB	TSSOP20(2)	74HCT374	72 PCS/tube	140 tube/box	10080 PCS/box	Dimensions of plastic enclosure: 6.5mm×4.4mm Pin spacing: 0.65mm
AiP74HC374TA20.TB	TSSOP20(3)	74HC374	72 PCS/tube	100 tube/box	7200 PCS/box	Dimensions of plastic enclosure: 6.5mm×4.4mm Pin spacing:



						0.65mm
AiP74HCT374TA20.TB	TSSOP20(3)	74HCT374	72 PCS/tube	100 tube/box	7200 PCS/box	Dimensions of plastic enclosure: 6.5mm×4.4mm Pin spacing: 0.65mm

### Reel packing specifications:

Part number	Packaging form	Marking code	Reel quantity	Boxed reel quantity	Notes
AiP74HC374SA20.TR	SOP20	74HC374	1000PCS/reel	1000PCS/box	Dimensions of plastic enclosure: 12.8mm×7.5mm Pin spacing:1.27mm
AiP74HCT374SA20.TR	SOP20	74HCT374	2000PCS/reel	4000PCS/box	Dimensions of plastic enclosure: 12.8mm×7.5mm Pin spacing:1.27mm
AiP74HC374TA20.TR	TSSOP20	74HC374	4000PCS/reel	8000PCS/box	Dimensions of plastic enclosure: 6.5mm×4.4mm Pin spacing:0.65mm
AiP74HCT374TA20.TR	TSSOP20	74HCT374	4000PCS/reel	8000PCS/box	Dimensions of plastic enclosure: 6.5mm×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

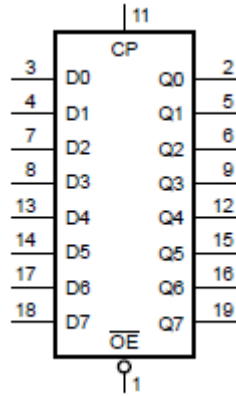


Figure 1. Logic symbol

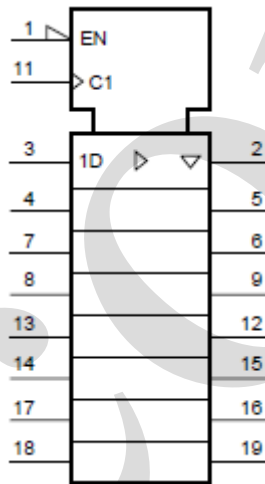


Figure 2. IEC logic symbol

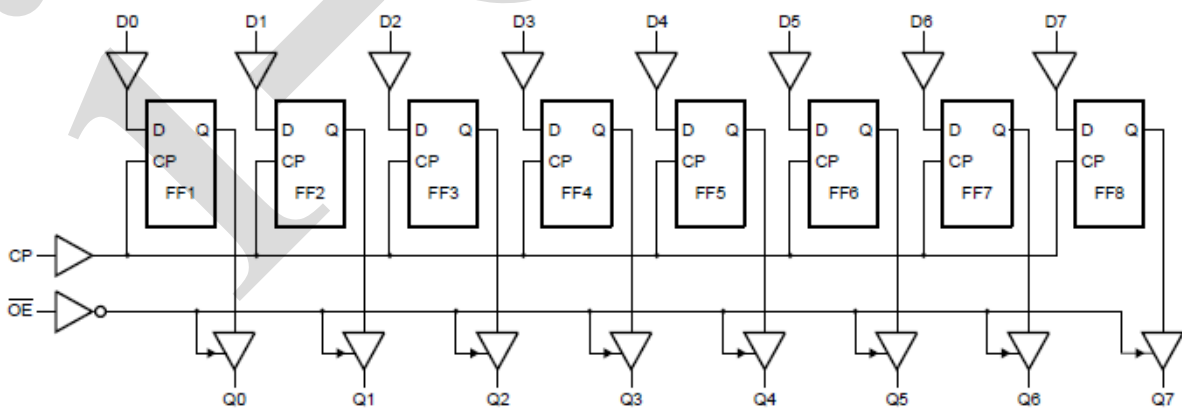


Figure 3. Logic diagram

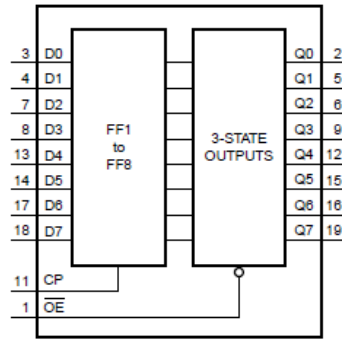
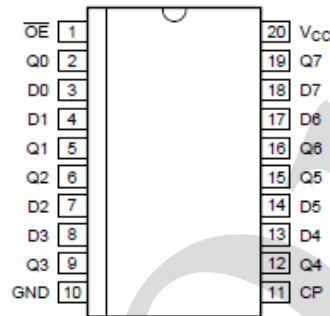


Figure 4. Functional diagram

## 2.2、 Pin Configurations



## 2.3、 Pin Description

Pin No.	Pin Name	Description
1	OE	output enable input (active LOW)
2	Q0	data output
3	D0	data input
4	D1	data input
5	Q1	data output
6	Q2	data output
7	D2	data input
8	D3	data input
9	Q3	data output
10	GND	ground (0V)
11	CP	clock input (LOW-to-HIGH, edge-triggered)
12	Q4	data output
13	D4	data input
14	D5	data input
15	Q5	data output
16	Q6	data output
17	D6	data input
18	D7	data input
19	Q7	data output
20	V <sub>CC</sub>	supply voltage



## 2.4、Function Table

Operating modes	Input			Internal flip-flops	Output
	$\overline{\text{OE}}$	CP	Dn		Qn
Load and read register	L	↑	l	L	L
	L	↑	h	H	H
Load register and disable outputs	H	↑	l	L	Z
	H	↑	h	H	Z

Note: H=HIGH voltage level; L=LOW voltage level; X=don't care; Z=high-impedance OFF-state;

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;

↑=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	+7.0	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	$I_O$	$-0.5V < V_O < V_{CC}+0.5V$	-	±35	mA
supply current	$I_{CC}$	-	-	70	mA
ground current	$I_{GND}$	-	-70	-	mA
storage temperature	$T_{stg}$	-	-65	+150	°C
total power dissipation	$P_{tot}$	-	-	500	mW
Soldering temperature	$T_L$	10s	DIP	245	°C
			SOP	250	

Note:

[1] For DIP20 packages: above 70°C the value of  $P_{tot}$  derates linearly with 12mW/K.

[2] For SOP20 packages: above 70°C the value of  $P_{tot}$  derates linearly with 8mW/K.

[3] For (T)SSOP20 packages: above 60°C the value of  $P_{tot}$  derates linearly with 5.5mW/K.



### 3.2、Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>AiP74HC374</b>						
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	$\Delta t/\Delta V$	$V_{CC}=2.0V$	-	-	625	ns/V
		$V_{CC}=4.5V$	-	1.67	139	ns/V
		$V_{CC}=6.0V$	-	-	83	ns/V
ambient temperature	$T_{amb}$	-	-40	-	+105	°C
<b>AiP74HCT374</b>						
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
input transition rise and fall rate	$\Delta t/\Delta V$	$V_{CC}=4.5V$	-	1.67	139	ns/V
ambient temperature	$T_{amb}$	-	-40	-	+105	°C

### 3.3、Electrical Characteristics

#### 3.3.1、DC Characteristics 1

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
<b>AiP74HC374</b>							
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	$V_{OH}$	$V_I = V_{IH} \text{ or } V_{IL}$	$I_O=-20\mu A; V_{CC}=2.0V$	1.9	2.0	-	V
			$I_O=-20\mu A; V_{CC}=4.5V$	4.4	4.5	-	V
			$I_O=-20\mu A; V_{CC}=6.0V$	5.9	6.0	-	V
			$I_O=-6.0mA; V_{CC}=4.5V$	3.98	4.32	-	V
			$I_O=-7.8mA; V_{CC}=6.0V$	5.48	5.81	-	V
LOW-level output voltage	$V_{OL}$	$V_I = V_{IH} \text{ or } V_{IL}$	$I_O=20\mu A; V_{CC}=2.0V$	-	0	0.1	V
			$I_O=20\mu A; V_{CC}=4.5V$	-	0	0.1	V
			$I_O=20\mu A; V_{CC}=6.0V$	-	0	0.1	V
			$I_O=6.0mA; V_{CC}=4.5V$	-	0.15	0.26	V
			$I_O=7.8mA; V_{CC}=6.0V$	-	0.16	0.26	V
input leakage current	$I_I$	$V_I=V_{CC} \text{ or } GND; V_{CC}=6.0V$	-	-	$\pm 0.1$	$\mu A$	
OFF-state output current	$I_{OZ}$	$V_I=V_{IH} \text{ or } V_{IL}; V_{CC}=6.0V;$ $V_O=V_{CC} \text{ or } GND$	-	-	$\pm 0.5$	$\mu A$	
supply current	$I_{CC}$	$V_I=V_{CC} \text{ or } GND; I_O=0A; V_{CC}=6.0V$	-	-	8.0	$\mu A$	





input capacitance	$C_I$	-	-	3.5	-	pF	
<b>AiP74HCT374</b>							
HIGH-level input voltage	$V_{IH}$	$V_{CC}=4.5V$ to $5.5V$	2.0	1.6	-	V	
LOW-level input voltage	$V_{IL}$	$V_{CC}=4.5V$ to $5.5V$	-	1.2	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	4.5	-	V
			$I_O=-6.0mA$	3.98	4.32	-	V
LOW-level output voltage	$V_{OL}$	$V_I = V_{IH}$ or $V_{IL}$ ; $V_{CC}=4.5V$	$I_O=20\mu A$	-	0	0.1	V
			$I_O=6.0mA$	-	0.16	0.26	V
input leakage current	$I_I$	$V_I=V_{CC}$ or GND; $V_{CC}=5.5V$	-	-	$\pm 0.1$	$\mu A$	
OFF-state output current	$I_{OZ}$	$V_I=V_{IH}$ or $V_{IL}$ ; $V_{CC}=5.5V$ ; $V_O=V_{CC}$ or GND	-	-	$\pm 0.5$	$\mu A$	
supply current	$I_{CC}$	$V_I=V_{CC}$ or GND; $I_O=0A$ ; $V_{CC}=5.5V$	-	-	8.0	$\mu A$	
additional supply current	$\Delta I_{CC}$	per input pin; $V_I=V_{CC}-2.1V$ ; other inputs at $V_{CC}$ or GND; $I_O=0A$ ; $V_{CC}=4.5V$ to $5.5V$	OE input	-	125	450	$\mu A$
			CP input	-	90	324	$\mu A$
			Dn input	-	35	126	$\mu A$
input capacitance	$C_I$	-	-	3.5	-	pF	

### 3.3.2、DC Characteristics 2

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
<b>AiP74HC374</b>							
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
			$I_O=-6.0mA$ ; $V_{CC}=4.5V$	3.84	-	-	V
			$I_O=-7.8mA$ ; $V_{CC}=6.0V$	5.34	-	-	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
			$I_O=6.0mA$ ; $V_{CC}=4.5V$	-	-	0.33	V
			$I_O=7.8mA$ ; $V_{CC}=6.0V$	-	-	0.33	V
input leakage current	$I_I$	$V_I=V_{CC}$ or GND; $V_{CC}=6.0V$	-	-	$\pm 1.0$	$\mu A$	
OFF-state output current	$I_{OZ}$	$V_I=V_{IH}$ or $V_{IL}$ ; $V_{CC}=6.0V$ ; $V_O=V_{CC}$ or GND	-	-	$\pm 5.0$	$\mu A$	



supply current	$I_{CC}$	$V_I=V_{CC}$ or GND; $I_O=0A$ ; $V_{CC}=6.0V$		-	-	80	$\mu A$
<b>AiP74HC374</b>							
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
			$I_O=-6.0mA$	3.84	-	-	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
			$I_O=6.0mA$	-	-	0.33	V
input leakage current	$I_I$	$V_I=V_{CC}$ or GND; $V_{CC}=5.5V$		-	-	$\pm 1.0$	$\mu A$
OFF-state output current	$I_{OZ}$	$V_I=V_{IH}$ or $V_{IL}$ ; $V_{CC}=5.5V$ ; $V_O=V_{CC}$ or GND		-	-	$\pm 5.0$	$\mu A$
supply current	$I_{CC}$	$V_I=V_{CC}$ or GND; $I_O=0A$ ; $V_{CC}=5.5V$		-	-	80	$\mu A$
additional supply current	$\Delta I_{CC}$	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;	$\overline{OE}$ input	-	-	563	$\mu A$
			CP input	-	-	405	$\mu A$
			Dn input	-	-	158	$\mu A$

### 3.3.3、DC Characteristics 3

( $T_{amb}=-40^{\circ}C$  to  $+105^{\circ}C$ , voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
<b>AiP74HC374</b>							
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; $V_{CC}=6.0V$	-	-	$\pm 1.0$	$\mu A$	
OFF-state output current	$I_{OZ}$	$V_I=V_{IH}$ or $V_{IL}$ ; $V_{CC}=6.0V$ ; $V_O=V_{CC}$ or GND	-	-	$\pm 10$	$\mu A$	
supply current	$I_{CC}$	$V_I=V_{CC}$ or GND; $I_O=0A$ ; $V_{CC}=6.0V$	-	-	160	$\mu A$	
<b>AiP74HCT374</b>							



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; $V_{CC}=5.5V$		-	-	$\pm 1.0$	$\mu A$
OFF-state output current	$I_{OZ}$	$V_I=V_{IH}$ or $V_{IL}$ ; $V_{CC}=5.5V$ ; $V_O=V_{CC}$ or GND		-	-	$\pm 10$	$\mu A$
supply current	$I_{CC}$	$V_I=V_{CC}$ or GND; $I_O=0A$ ; $V_{CC}=5.5V$		-	-	160	$\mu A$
additional supply current	$\Delta I_{CC}$	per input pin; $V_I=V_{CC}-2.1V$ ; other inputs at $V_{CC}$ or GND; $I_O=0A$ ; $V_{CC}=4.5V$ to $5.5V$ ;	$\overline{OE}$ input	-	-	613	$\mu A$
			CP input	-	-	441	$\mu A$
			Dn input	-	-	172	$\mu A$

### 3.3.4、AC Characteristics 1

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
<b>AiP74HC374</b>							
CP to Qn propagation delay	$t_{pd}$	see Figure 6	$V_{CC}=2.0V$	-	50	165	ns
			$V_{CC}=4.5V$	-	18	33	ns
			$V_{CC}=5.0V$ ; $C_L=15pF$	-	15	-	ns
			$V_{CC}=6.0V$	-	14	18	ns
$\overline{OE}$ to Qn enable time	$t_{en}$	see Figure 7	$V_{CC}=2.0V$	-	41	150	ns
			$V_{CC}=4.5V$	-	15	30	ns
			$V_{CC}=6.0V$	-	12	26	ns
$\overline{OE}$ to Qn disable time	$t_{dis}$	see Figure 7	$V_{CC}=2.0V$	-	50	150	ns
			$V_{CC}=4.5V$	-	18	30	ns
			$V_{CC}=6.0V$	-	14	26	ns
transition time	$t_t$	Qn output; see Figure 6	$V_{CC}=2.0V$	-	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 6	$V_{CC}=2.0V$	80	19	-	ns
			$V_{CC}=4.5V$	16	7	-	ns
			$V_{CC}=6.0V$	14	6	-	ns
Dn to CP set-up time	$t_{su}$	see Figure 6	$V_{CC}=2.0V$	60	14	-	ns
			$V_{CC}=4.5V$	12	5	-	ns
			$V_{CC}=6.0V$	10	4	-	ns
Dn to CP hold time	$t_h$	see Figure 6	$V_{CC}=2.0V$	5	-2	-	ns
			$V_{CC}=4.5V$	5	-2	-	ns
			$V_{CC}=6.0V$	5	-2	-	ns
maximum frequency	$f_{max}$	CP input; see Figure 6	$V_{CC}=2.0V$	6.0	23	-	MHz
			$V_{CC}=4.5V$	30	70	-	MHz



			$V_{CC}=5.0V; C_L=15pF$	-	77	-	MHz
			$V_{CC}=6.0V$	35	83	-	MHz
power dissipation capacitance	$C_{PD}$	per flip-flop; $V_I=GND$ to $V_{CC}$		-	17	-	pF
<b>AiP74HCT374</b>							
CP to Qn propagation delay	$t_{pd}$	see Figure 6	$V_{CC}=4.5V$	-	16	32	ns
			$V_{CC}=5.0V; C_L=15pF$	-	13	-	ns
$\overline{OE}$ to Qn enable time	$t_{en}$	$V_{CC}=4.5V$ ; see Figure 7		-	16	30	ns
$\overline{OE}$ to Qn disable time	$t_{dis}$	$V_{CC}=4.5V$ ; see Figure 7		-	18	28	ns
transition time	$t_t$	Qn; $V_{CC}=4.5V$ ; see Figure 6		-	5	12	ns
pulse width	$t_w$	CP; HIGH or LOW; $V_{CC}=4.5V$ ; see Figure 6		19	11	-	ns
Dn to CP set-up time	$t_{su}$	$V_{CC}=4.5V$ ; see Figure 6		12	7	-	ns
Dn to CP hold time	$t_h$	$V_{CC}=4.5V$ ; see Figure 6		5	-3	-	ns
maximum frequency	$f_{max}$	CP input; see Figure 6	$V_{CC}=4.5V$	26	44	-	MHz
			$V_{CC}=5.0V; C_L=15pF$	-	48	-	MHz
power dissipation capacitance	$C_{PD}$	per flip-flop; $V_I=GND$ to $V_{CC}-1.5V$		-	17	-	pF

Note:

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

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

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

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

[5]  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in uW).

$P_D=C_{PD} \times V_{CC}^2 \times f_i \times N + \sum(C_L \times V_{CC}^2 \times f_o)$  where:

$f_i$ =input frequency in MHz;  $f_o$ =output frequency in MHz;

$C_L$ =output load capacitance in pF;

$V_{CC}$ =supply voltage in V;

$N$ =number of inputs switching;

$\sum(C_L \times V_{CC}^2 \times f_o)$ =sum of outputs.



### 3.3.5、AC 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	
<b>AiP74HC374</b>							
CP to Qn propagation delay	$t_{pd}$	see Figure 6	$V_{CC}=2.0\text{V}$	-	-	205	ns
			$V_{CC}=4.5\text{V}$	-	-	41	ns
			$V_{CC}=6.0\text{V}$	-	-	35	ns
$\overline{\text{OE}}$ to Qn enable time	$t_{en}$	see Figure 7	$V_{CC}=2.0\text{V}$	-	-	190	ns
			$V_{CC}=4.5\text{V}$	-	-	38	ns
			$V_{CC}=6.0\text{V}$	-	-	33	ns
$\overline{\text{OE}}$ to Qn disable time	$t_{dis}$	see Figure 7	$V_{CC}=2.0\text{V}$	-	-	190	ns
			$V_{CC}=4.5\text{V}$	-	-	38	ns
			$V_{CC}=6.0\text{V}$	-	-	33	ns
transition time	$t_t$	Qn output; see Figure 6	$V_{CC}=2.0\text{V}$	-	-	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 6	$V_{CC}=2.0\text{V}$	100	-	-	ns
			$V_{CC}=4.5\text{V}$	20	-	-	ns
			$V_{CC}=6.0\text{V}$	17	-	-	ns
Dn to CP set-up time	$t_{su}$	see Figure 6	$V_{CC}=2.0\text{V}$	75	-	-	ns
			$V_{CC}=4.5\text{V}$	15	-	-	ns
			$V_{CC}=6.0\text{V}$	13	-	-	ns
Dn to CP hold time	$t_h$	see Figure 6	$V_{CC}=2.0\text{V}$	5	-	-	ns
			$V_{CC}=4.5\text{V}$	5	-	-	ns
			$V_{CC}=6.0\text{V}$	5	-	-	ns
maximum frequency	$f_{max}$	CP input; see Figure 6	$V_{CC}=2.0\text{V}$	4.8	-	-	MHz
			$V_{CC}=4.5\text{V}$	24	-	-	MHz
			$V_{CC}=6.0\text{V}$	28	-	-	MHz
<b>AiP74HCT374</b>							
CP to Qn propagation delay	$t_{pd}$	see Figure 6	$V_{CC}=4.5\text{V}$	-	-	40	ns
$\overline{\text{OE}}$ to Qn enable time	$t_{en}$	$V_{CC}=4.5\text{V}$ ; see Figure 7		-	-	38	ns
$\overline{\text{OE}}$ to Qn disable time	$t_{dis}$	$V_{CC}=4.5\text{V}$ ; see Figure 7		-	-	35	ns
transition time	$t_t$	Qn; $V_{CC}=4.5\text{V}$ ; see Figure 6		-	-	15	ns
pulse width	$t_w$	CP; HIGH or LOW; $V_{CC}=4.5\text{V}$ ; see Figure 6		24	-	-	ns
Dn to CP set-up time	$t_{su}$	$V_{CC}=4.5\text{V}$ ; see Figure 6		15	-	-	ns
Dn to CP hold time	$t_h$	$V_{CC}=4.5\text{V}$ ; see Figure 6		5	-	-	ns
maximum frequency	$f_{max}$	CP input; see Figure 6	$V_{CC}=4.5\text{V}$	21	-	-	MHz



Note:

- [1]  $t_{pd}$  is the same as  $t_{PLH}$  and  $t_{PHL}$ .
- [2]  $t_{en}$  is the same as  $t_{PZL}$  and  $t_{PZH}$ .
- [3]  $t_{dis}$  is the same as  $t_{PLZ}$  and  $t_{PHZ}$ .
- [4]  $t_t$  is the same as  $t_{THL}$  and  $t_{TLH}$ .

### 3.3.6、AC Characteristics 3

( $T_{amb}=-40^{\circ}C$  to  $+105^{\circ}C$ , voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
<b>AiP74HC374</b>							
CP to Qn propagation delay	$t_{pd}$	see Figure 6	$V_{CC}=2.0V$	-	-	250	ns
			$V_{CC}=4.5V$	-	-	50	ns
			$V_{CC}=6.0V$	-	-	43	ns
$\overline{OE}$ to Qn enable time	$t_{en}$	see Figure 7	$V_{CC}=2.0V$	-	-	225	ns
			$V_{CC}=4.5V$	-	-	45	ns
			$V_{CC}=6.0V$	-	-	38	ns
$\overline{OE}$ to Qn disable time	$t_{dis}$	see Figure 7	$V_{CC}=2.0V$	-	-	225	ns
			$V_{CC}=4.5V$	-	-	45	ns
			$V_{CC}=6.0V$	-	-	38	ns
transition time	$t_t$	Qn output; see Figure 6	$V_{CC}=2.0V$	-	-	90	ns
			$V_{CC}=4.5V$	-	-	18	ns
			$V_{CC}=6.0V$	-	-	15	ns
pulse width	$t_w$	CP; HIGH or LOW; see Figure 6	$V_{CC}=2.0V$	120	-	-	ns
			$V_{CC}=4.5V$	24	-	-	ns
			$V_{CC}=6.0V$	20	-	-	ns
Dn to CP set-up time	$t_{su}$	see Figure 6	$V_{CC}=2.0V$	90	-	-	ns
			$V_{CC}=4.5V$	18	-	-	ns
			$V_{CC}=6.0V$	15	-	-	ns
Dn to CP hold time	$t_h$	see Figure 6	$V_{CC}=2.0V$	5	-	-	ns
			$V_{CC}=4.5V$	5	-	-	ns
			$V_{CC}=6.0V$	5	-	-	ns
maximum frequency	$f_{max}$	CP input; see Figure 6	$V_{CC}=2.0V$	4.0	-	-	MHz
			$V_{CC}=4.5V$	20	-	-	MHz
			$V_{CC}=6.0V$	24	-	-	MHz
<b>AiP74HCT374</b>							
CP to Qn propagation delay	$t_{pd}$	see Figure 6	$V_{CC}=4.5V$	-	-	48	ns
$\overline{OE}$ to Qn enable time	$t_{en}$	$V_{CC}=4.5V$ ; see Figure 7		-	-	45	ns
$\overline{OE}$ to Qn disable time	$t_{dis}$	$V_{CC}=4.5V$ ; see Figure 7		-	-	42	ns
transition time	$t_t$	Qn; $V_{CC}=4.5V$ ; see Figure 6		-	-	18	ns
pulse width	$t_w$	CP; HIGH or LOW; $V_{CC}=4.5V$ ; see Figure 6		29	-	-	ns



Dn to CP set-up time	$t_{su}$	$V_{CC}=4.5V$ ; see Figure 6	18	-	-	ns
Dn to CP hold time	$t_h$	$V_{CC}=4.5V$ ; see Figure 6	5	-	-	ns
maximum frequency	$f_{max}$	CP input; see Figure 6	$V_{CC}=4.5V$	17	-	MHz

Note:

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

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

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

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

## 4. Testing Circuit

### 4.1. AC Testing Circuit

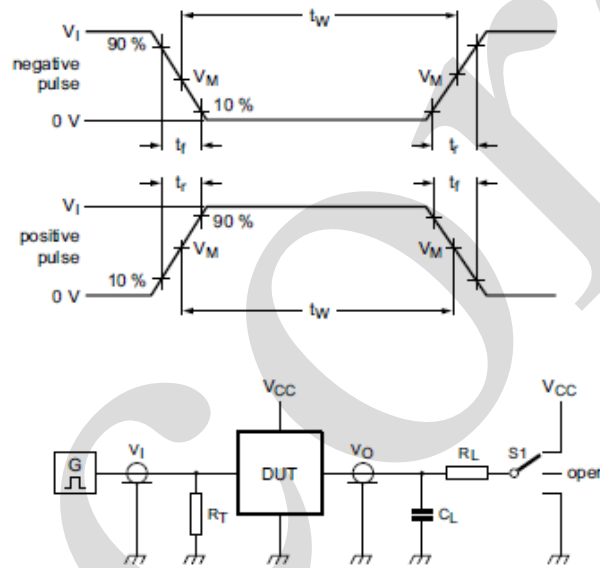


Figure 5. Test circuit for measuring switching times

Definitions for test circuit:

$R_L$ =Load resistance.

$C_L$ =Load capacitance including jig and probe capacitance.

$R_T$ =Termination resistance should be equal to the output impedance  $Z_o$  of the pulse generator.

$S1$ =Test selection switch.



4.2、 AC Testing Waveforms

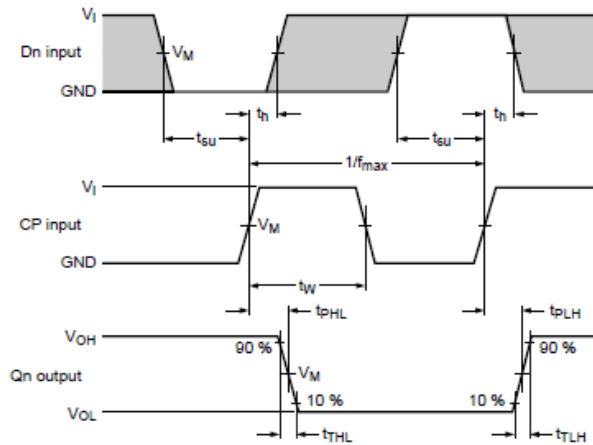


Figure 6. Clock input (CP) to output (Qn) propagation delay, clock pulse width, data (Dn) to clock (CP) set-up and hold times, output transition times (Qn) and maximum clock frequency

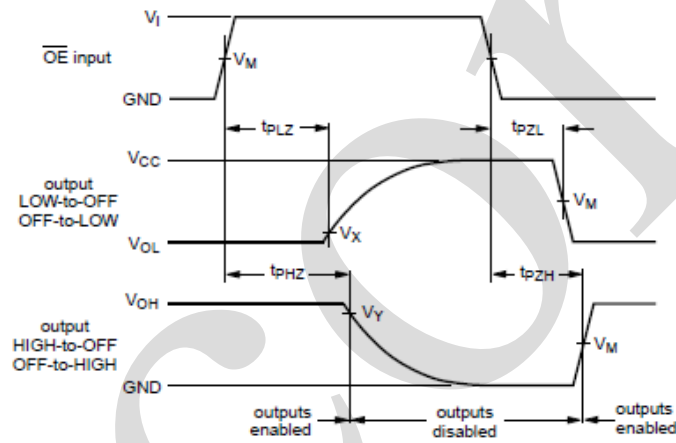


Figure 7. 3-state enable and disable times

4.3、 Measurement Points

Type	Input		Output		
	$V_I$	$V_M$	$V_M$	$V_X$	$V_Y$
AiP74HC374	GND to $V_{CC}$	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	$0.1 \times V_{CC}$	$0.9 \times V_{CC}$
AiP74HCT374	GND to 3V	1.3V	1.3V	$0.1 \times V_{CC}$	$0.9 \times V_{CC}$

4.4、 Test Data

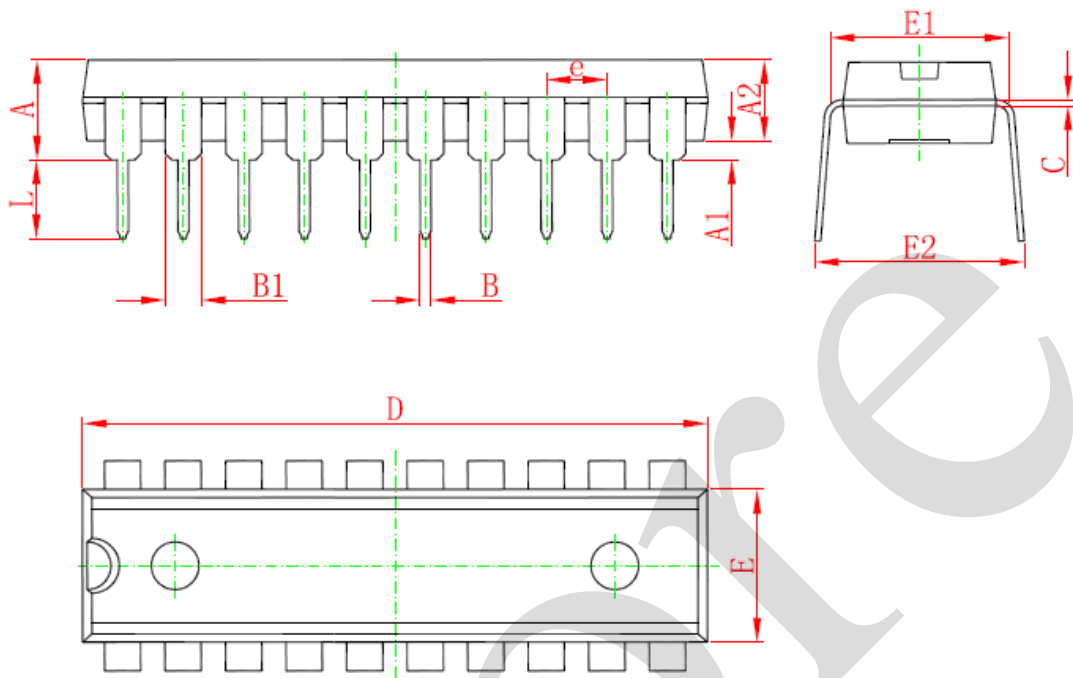
Type	Input		Load		S1 position		
	$V_I$	$t_r, t_f$	$C_L$	$R_L$	$t_{PHL}, t_{PLH}$	$t_{PZH}, t_{PHZ}$	$t_{PZL}, t_{PLZ}$
AiP74HC374	GND to $V_{CC}$	6ns	15pF, 50pF	1k $\Omega$	open	GND	$V_{CC}$
AiP74HCT374	GND to 3V	6ns	15pF, 50pF	1k $\Omega$	open	GND	$V_{CC}$





## 5、Package Information

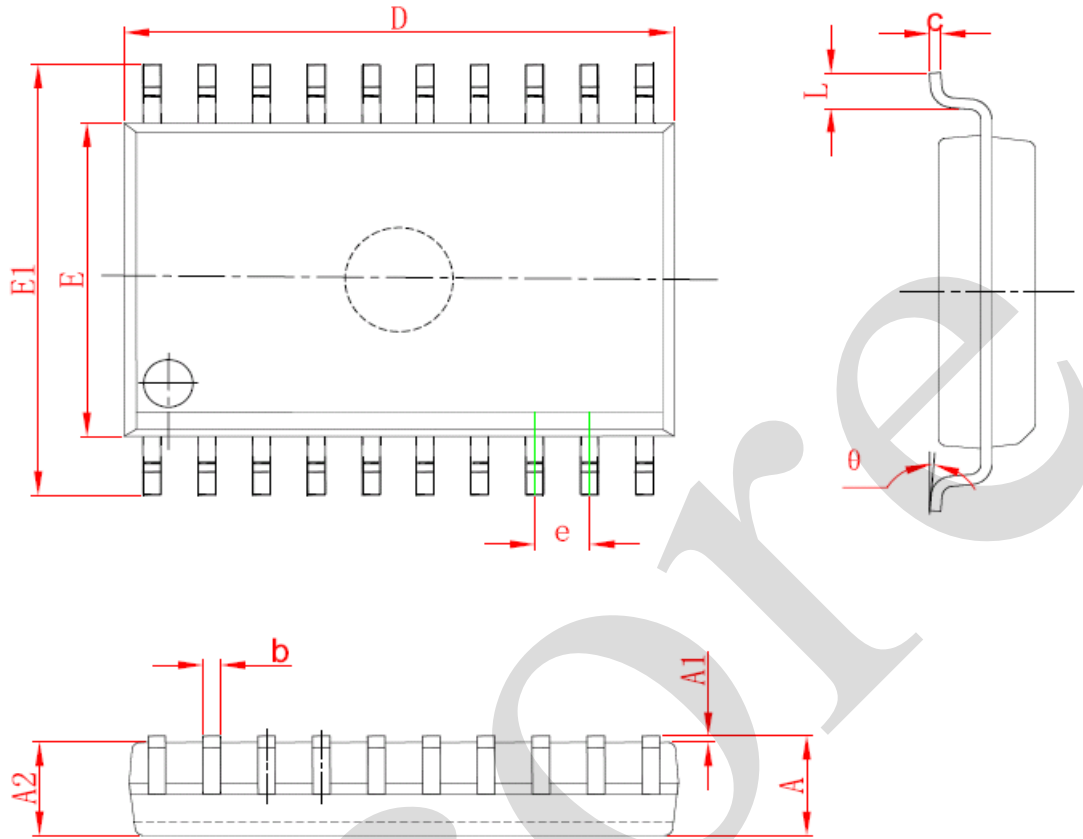
### 5.1、DIP20



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	3.710	4.310	0.146	0.170
A1	0.510		0.020	
A2	3.200	3.600	0.126	0.142
B	0.380	0.570	0.015	0.022
B1	1.524 (BSC)		0.060 (BSC)	
C	0.204	0.360	0.008	0.014
D	25.950	26.550	1.022	1.045
E	6.200	6.600	0.244	0.260
E1	7.320	7.920	0.288	0.312
e	2.540 (BSC)		0.100 (BSC)	
L	3.000	3.600	0.118	0.142
E2	8.400	9.000	0.331	0.354



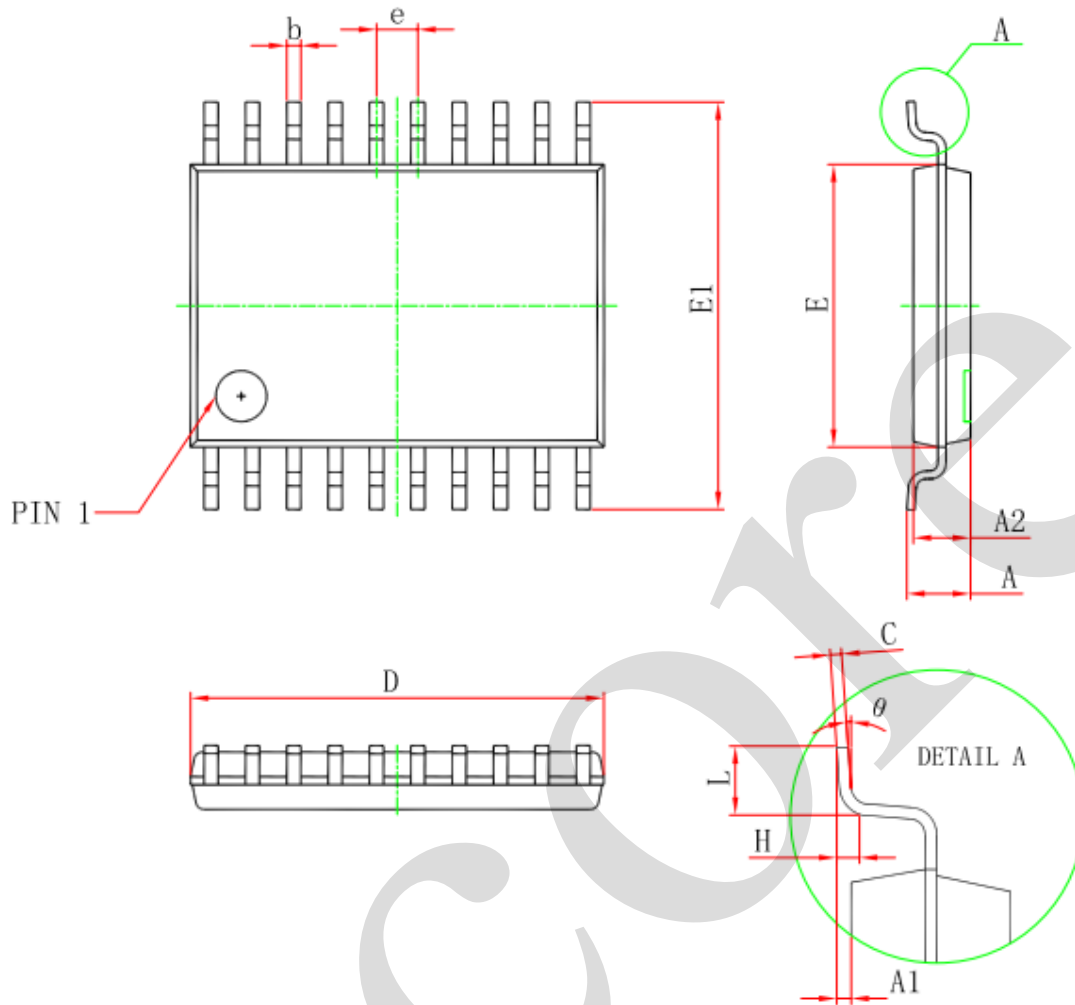
## 5.2、SOP20



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	2.350	2.650	0.093	0.104
A1	0.100	0.300	0.004	0.012
A2	2.100	2.500	0.083	0.098
b	0.330	0.510	0.013	0.020
c	0.204	0.330	0.008	0.013
D	12.520	13.000	0.493	0.512
E	7.400	7.600	0.291	0.299
E1	10.210	10.610	0.402	0.418
e	1.270 (BSC)		0.050 (BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°



## 5.3、TSSOP20



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
D	6.400	6.600	0.252	0.259
E	4.300	4.500	0.169	0.177
b	0.190	0.300	0.007	0.012
e	0.090	0.200	0.004	0.008
E1	6.250	6.550	0.246	0.258
A		1.200		0.047
A2	0.800	1.000	0.031	0.039
A1	0.050	0.150	0.002	0.006
e	0.65 (BSC)		0.026 (BSC)	
L	0.500	0.700	0.020	0.028
H	0.25(TYP)		0.01(TYP)	
$\theta$	1°	7°	1°	7°



## 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、 Notion

Recommended carefully reading this information before the use of this product;

The information in this document are subject to change without notice;

This information is using to the reference only, the company is not responsible for any loss;

The company is not responsible for the any infringement of the third party patents or other rights of the responsibility.