



# **AiP74HC/HCT145**

## **BCD-to-Decimal Decoders/Drivers**

### **Product Specification**

**Specification Revision History:**

<b>Version</b>	<b>Date</b>	<b>Description</b>
2023-06-A1	2023-06	New



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## 1、General Description

The AiP74HC/HCT145 is a BCD-to-decimal decoders/drivers.

### Features:

- Supply voltage range:  
AiP74HC145: 2V to 6V  
AiP74HCT145: 4.5V to 5.5V
- Input levels:  
AiP74HC145: CMOS level  
AiP74HCT145: TTL level
- Temperature range: -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
AiP74HC145DA16.TB	DIP16	74HC145	25 PCS/tube	40 tube/box	1000 PCS/box	Dimensions of plastic enclosure: 19.0mm×6.4mm Pin spacing: 2.54mm
AiP74HCT145DA16.TB	DIP16	74HCT145	25 PCS/tube	40 tube/box	1000 PCS/box	Dimensions of plastic enclosure: 19.0mm×6.4mm Pin spacing: 2.54mm
AiP74HC145SA16.TB	SOP16	74HC145	50 PCS/tube	200 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing: 1.27mm
AiP74HCT145SA16.TB	SOP16	74HCT145	50 PCS/tube	200 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing: 1.27mm
AiP74HC145TA16.TB	TSSOP16	74HC145	96 PCS/tube	200 tube/box	19200 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing: 0.65mm
AiP74HCT145TA16.TB	TSSOP16	74HCT145	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
AiP74HC145SA16.TR	SOP16	74HC145	4000 PCS/reel	8000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing:1.27mm
AiP74HCT145SA16.TR	SOP16	74HCT145	4000 PCS/reel	8000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing:1.27mm
AiP74HC145TA16.TR	TSSOP16	74HC145	5000 PCS/reel	10000 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing:0.65mm
AiP74HCT145TA16.TR	TSSOP16	74HCT145	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

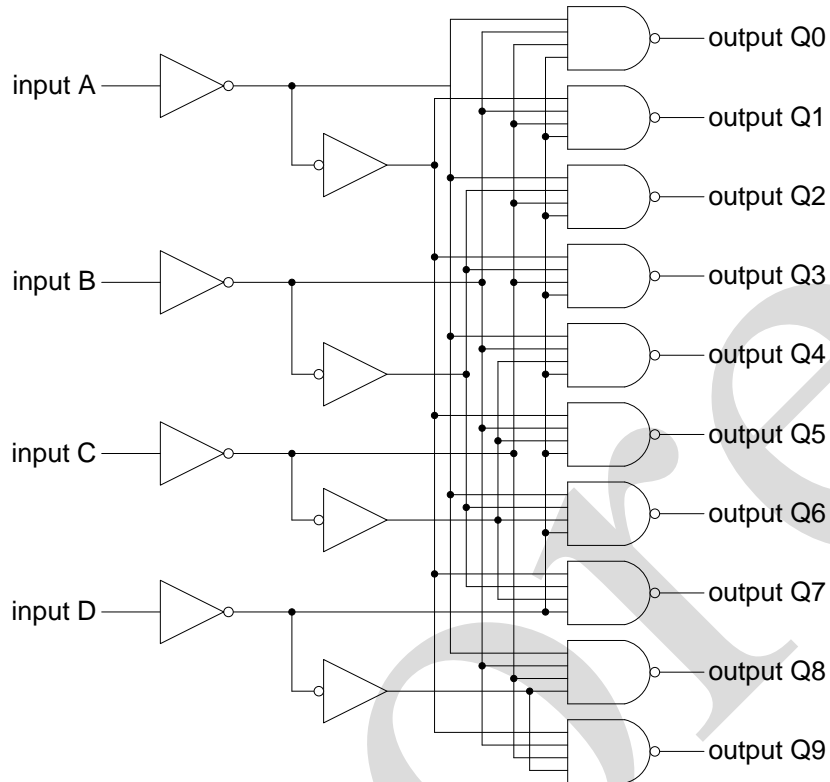
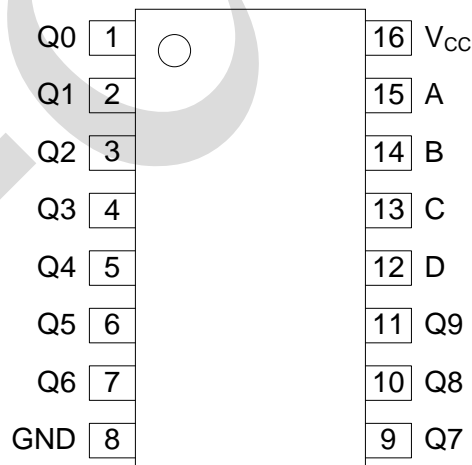


Figure 1. Logic symbol

### 2.2、Pin Configurations





## 2.3、Pin Description

Pin No.	Pin Name	Description
1	Q0	data output
2	Q1	data output
3	Q2	data output
4	Q3	data output
5	Q4	data output
6	Q5	data output
7	Q6	data output
8	GND	ground (0V)
9	Q7	data output
10	Q8	data output
11	Q9	data output
12	D	data input
13	C	data input
14	B	data input
15	A	data input
16	V <sub>CC</sub>	supply voltage

## 2.4、Function Table

Inputs				Outputs									
D	C	B	A	Q0	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
L	L	L	L	L	H	H	H	H	H	H	H	H	H
L	L	L	H	H	L	H	H	H	H	H	H	H	H
L	L	H	L	H	H	L	H	H	H	H	H	H	H
L	L	H	H	H	H	H	L	H	H	H	H	H	H
L	H	L	L	H	H	H	H	L	H	H	H	H	H
L	H	L	H	H	H	H	H	H	L	H	H	H	H
L	H	H	L	H	H	H	H	H	H	L	H	H	H
L	H	H	H	H	H	H	H	H	H	H	L	H	H
H	L	L	L	H	H	H	H	H	H	H	H	L	H
H	L	L	H	H	H	H	H	H	H	H	H	H	L
H	L	H	L	H	H	H	H	H	H	H	H	H	H
H	L	H	H	H	H	H	H	H	H	H	H	H	H
H	H	L	L	H	H	H	H	H	H	H	H	H	H
H	H	L	H	H	H	H	H	H	H	H	H	H	H
H	H	H	L	H	H	H	H	H	H	H	H	H	H
H	H	H	H	H	H	H	H	H	H	H	H	H	H

Note: H=HIGH voltage level; L=LOW voltage level.



## 3、Electrical Parameter

### 3.1、Absolute Maximum Ratings

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

Parameter	Symbol	Conditions	Min.	Max.	Unit
supply voltage	$V_{CC}$	-	-0.5	+7	V
supply current	$I_{CC}$	-	-	50	mA
ground current	$I_{GND}$	-	-50	-	mA
input clamping current	$I_{IK}$	$V_I < -0.5V$ or $V_I > V_{CC}+0.5V$	-	$\pm 20$	mA
output clamping current	$I_{OK}$	$V_O < -0.5V$ or $V_O > V_{CC}+0.5V$	-	$\pm 20$	mA
output current	$I_O$	$-0.5V < V_O < V_{CC}+0.5V$	-	$\pm 25$	mA
storage temperature	$T_{stg}$	-	-65	+150	$^{\circ}C$
soldering temperature	$T_L$	10s	DIP		$^{\circ}C$
			SOP/TSSOP		

### 3.2、Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>AiP74HC145</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
ambient temperature	$T_{amb}$	-	-40	-	+125	$^{\circ}C$
<b>AiP74HCT145</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
ambient temperature	$T_{amb}$	-	-40	-	+125	$^{\circ}C$



## 3.3、Electrical Characteristics

### 3.3.1、DC Characteristics 1

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

Parameter	Symbol	$V_{CC}$	Conditions	Min.	Typ.	Max.	Unit
<b>AiP74HC145</b>							
HIGH-level input voltage	$V_{IH}$	2.0V	-	1.5	1.2	-	V
		4.5V	-	3.15	2.4	-	V
		6.0V	-	4.2	3.2	-	V
LOW-level input voltage	$V_{IL}$	2.0V	-	-	0.8	0.5	V
		4.5V	-	-	2.1	1.35	V
		6.0V	-	-	2.8	1.8	V
HIGH-level output voltage	$V_{OH}$	2.0V	$I_O = -20\mu\text{A}$	1.9	2.0	-	V
		4.5V	$I_O = -20\mu\text{A}$	4.4	4.5	-	V
		6.0V	$I_O = -20\mu\text{A}$	5.9	6.0	-	V
		4.5V	$I_O = -4.0\text{mA}$	3.84	4.32	-	V
		6.0V	$I_O = -5.2\text{mA}$	5.34	5.81	-	V
LOW-level output voltage	$V_{OL}$	2.0V	$I_O = 20\mu\text{A}$	-	0	0.1	V
		4.5V	$I_O = 20\mu\text{A}$	-	0	0.1	V
		6.0V	$I_O = 20\mu\text{A}$	-	0	0.1	V
		4.5V	$I_O = 4.0\text{mA}$	-	0.15	0.33	V
		6.0V	$I_O = 5.2\text{mA}$	-	0.16	0.33	V
input leakage current	$I_I$	6.0V	$V_I = V_{CC}$ or GND	-	-	$\pm 2$	$\mu\text{A}$
supply current	$I_{CC}$	6.0V	$V_I = V_{CC}$ or GND; $I_O = 0\text{A}$	-	-	2	$\mu\text{A}$
<b>AiP74HCT145</b>							
HIGH-level input voltage	$V_{IH}$	4.5V to 5.5V	-	2.0	1.6	-	V
LOW-level input voltage	$V_{IL}$	4.5V to 5.5V	-	-	1.2	0.8	V
HIGH-level output voltage	$V_{OH}$	4.5V	$I_O = -20\mu\text{A}$	4.4	4.5	-	V
			$I_O = -4.0\text{mA}$	3.84	4.32	-	V
LOW-level output voltage	$V_{OL}$	4.5V	$I_O = 20\mu\text{A}$	-	0	0.1	V
			$I_O = 4.0\text{mA}$	-	0.15	0.33	V
input leakage current	$I_I$	5.5V	$V_I = V_{CC}$ or GND	-	-	$\pm 2$	$\mu\text{A}$
supply current	$I_{CC}$	6.0V	$V_I = V_{CC}$ or GND; $I_O = 0\text{A}$	-	-	2	$\mu\text{A}$
additional supply current	$\Delta I_{CC}$	4.5V to 5.5V	One input at $V_I = V_{CC} - 2.1\text{V}$ ; Other inputs at $V_{CC}$ or GND; $I_O = 0\text{A}$	-	-	135	$\mu\text{A}$





### 3.3.2、DC Characteristics 2

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

Parameter	Symbol	V <sub>CC</sub>	Conditions	Min.	Typ.	Max.	Unit
<b>AiP74HC145</b>							
HIGH-level input voltage	V <sub>IH</sub>	2.0V	-	1.5	-	-	V
		4.5V	-	3.15	-	-	V
		6.0V	-	4.2	-	-	V
LOW-level input voltage	V <sub>IL</sub>	2.0V	-	-	-	0.5	V
		4.5V	-	-	-	1.35	V
		6.0V	-	-	-	1.8	V
HIGH-level output voltage	V <sub>OH</sub>	2.0V	I <sub>O</sub> =-20uA	1.9	-	-	V
		4.5V	I <sub>O</sub> =-20uA	4.4	-	-	V
		6.0V	I <sub>O</sub> =-20uA	5.9	-	-	V
		4.5V	I <sub>O</sub> =-4.0mA	3.7	-	-	V
		6.0V	I <sub>O</sub> =-5.2mA	5.2	-	-	V
LOW-level output voltage	V <sub>OL</sub>	2.0V	I <sub>O</sub> =20uA	-	-	0.1	V
		4.5V	I <sub>O</sub> =20uA	-	-	0.1	V
		6.0V	I <sub>O</sub> =20uA	-	-	0.1	V
		4.5V	I <sub>O</sub> =4.0mA	-	-	0.4	V
		6.0V	I <sub>O</sub> =5.2mA	-	-	0.4	V
input leakage current	I <sub>I</sub>	6.0V	V <sub>I</sub> =V <sub>CC</sub> or GND	-	-	±4	uA
supply current	I <sub>CC</sub>	6.0V	V <sub>I</sub> =V <sub>CC</sub> or GND; I <sub>O</sub> =0A	-	-	4	uA
<b>AiP74HCT145</b>							
HIGH-level input voltage	V <sub>IH</sub>	4.5V to 5.5V	-	2.0	-	-	V
LOW-level input voltage	V <sub>IL</sub>	4.5V to 5.5V	-	-	-	0.8	V
HIGH-level output voltage	V <sub>OH</sub>	4.5V	I <sub>O</sub> =-20uA	4.4	-	-	V
			I <sub>O</sub> =-4.0mA	3.7	-	-	V
LOW-level output voltage	V <sub>OL</sub>	4.5V	I <sub>O</sub> =20uA	-	-	0.1	V
			I <sub>O</sub> =4.0mA	-	-	0.4	V
input leakage current	I <sub>I</sub>	5.5V	V <sub>I</sub> =V <sub>CC</sub> or GND	-	-	±4	uA
supply current	I <sub>CC</sub>	6.0V	V <sub>I</sub> =V <sub>CC</sub> or GND; I <sub>O</sub> =0A	-	-	4	uA
additional supply current	ΔI <sub>CC</sub>	4.5V to 5.5V	One input at V <sub>I</sub> =V <sub>CC</sub> -2.1V; Other inputs at V <sub>CC</sub> or GND; I <sub>O</sub> =0A	-	-	147	uA



### 3.3.3、AC Characteristics 1

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

Parameter	Symbol	V <sub>CC</sub>	Conditions	Min.	Typ.	Max.	Unit
<b>AiP74HC145</b>							
propagation delay	$t_{PLH}, t_{PHL}$	5.0V	$C_L=45\text{pF}$ see Figure 3	-	-	50	ns
<b>AiP74HCT145</b>							
propagation delay	$t_{PLH}, t_{PHL}$	5.0V	$C_L=45\text{pF}$ see Figure 3	-	-	50	ns

### 3.3.4、AC Characteristics 2

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

Parameter	Symbol	V <sub>CC</sub>	Conditions	Min.	Typ.	Max.	Unit
<b>AiP74HC145</b>							
propagation delay	$t_{PLH}, t_{PHL}$	5.0V	$C_L=45\text{pF}$ see Figure 3	-	-	60	ns
<b>AiP74HCT145</b>							
propagation delay	$t_{PLH}, t_{PHL}$	5.0V	$C_L=45\text{pF}$ see Figure 3	-	-	60	ns

## 4、Testing Circuit

### 4.1、AC Testing Circuit

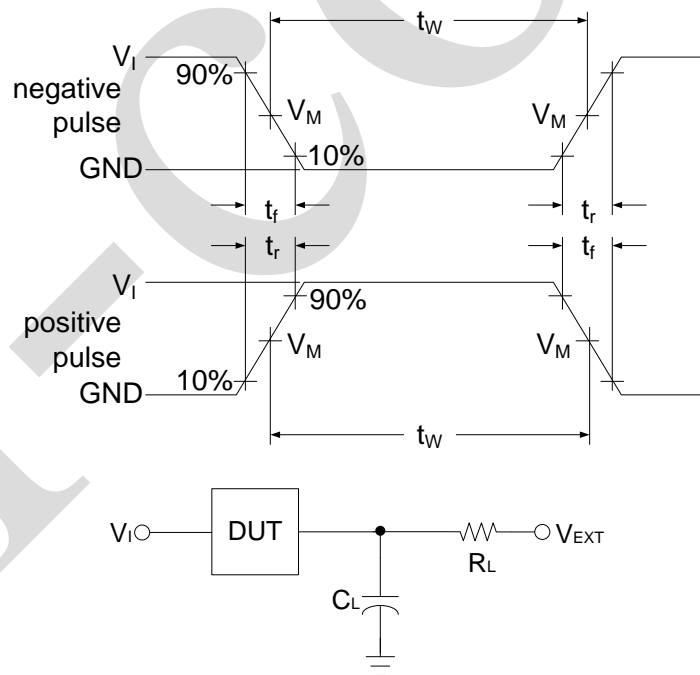


Figure 2. Test circuit for measuring switching times

$C_L$  includes probe and jig capacitance.



## 4.2、Test Data

Type	Input		Load		$V_{EXT}$		
	$V_I$	$t_r = t_f$	$C_L$	$R_L$	$t_{PLH}/t_{PHL}$	$t_{PLZ}/t_{PZL}$	$t_{PHZ}/t_{PZH}$
AiP74HC145	$V_{CC}$	3.0ns	45pF	665 $\Omega$	Open	$V_{CC}$	GND
AiP74HCT145	3.0V	3.0ns	45pF	665 $\Omega$	Open	$V_{CC}$	GND

## 4.3、AC Testing Waveforms

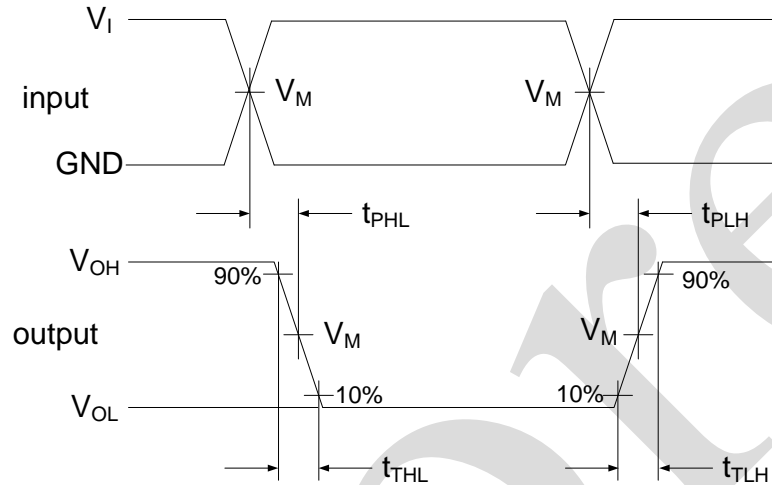


Figure 3. The data input to output propagation delays

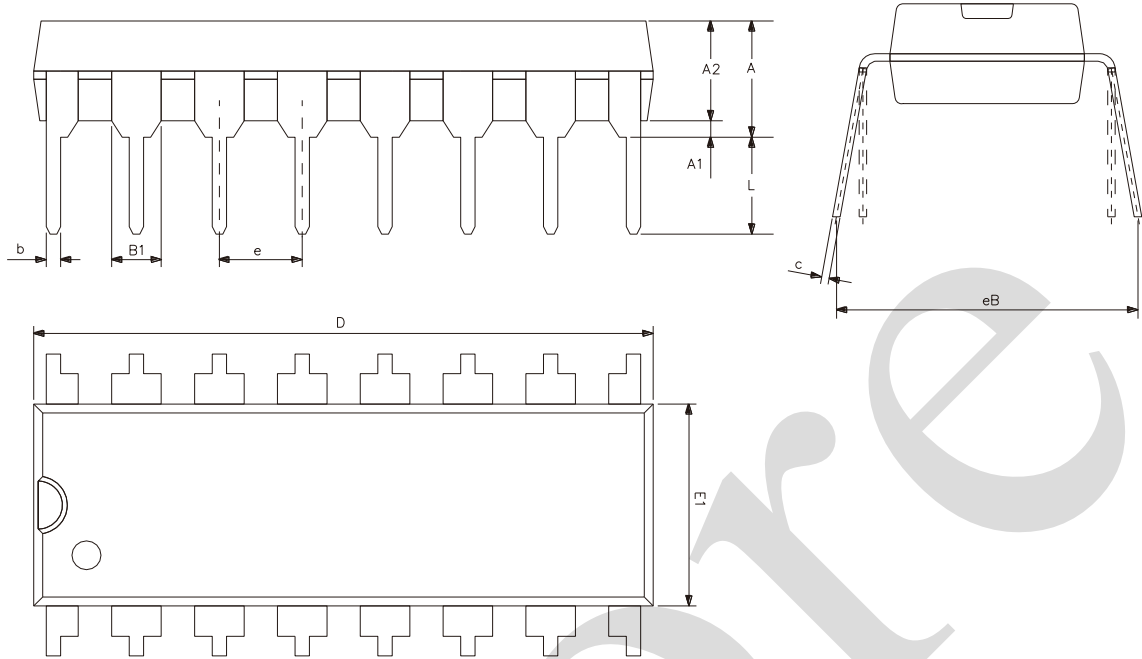
## 4.4、Measurement Points

Type	Input	Output
	$V_M$	$V_M$
AiP74HC145	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$
AiP74HCT145	1.3V	1.3V



## 5、Package Information

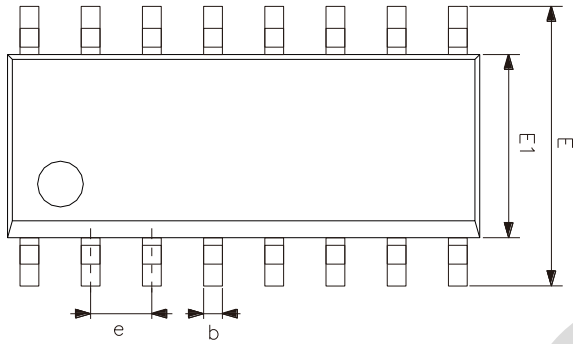
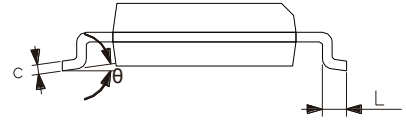
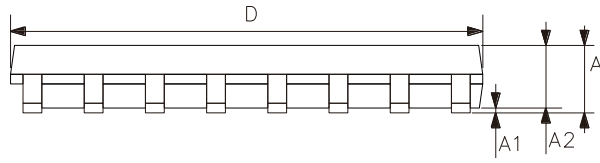
### 5.1、DIP16



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



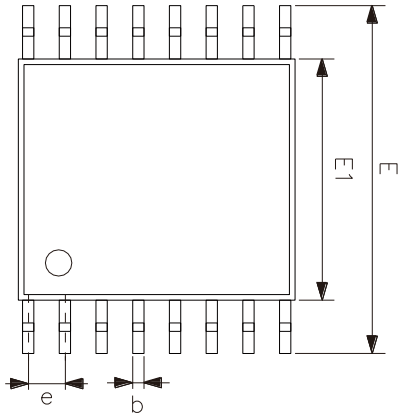
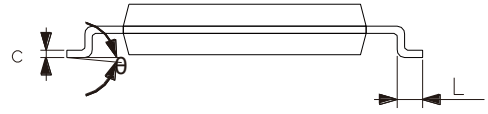
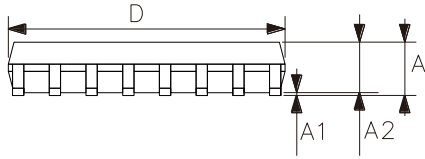
## 5.2、SOP16



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
$\theta$	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
$\theta$	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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