



SN74HC/HCT145 BCD-to-Decimal Decoders/Drivers

Product Specification

Specification Revision History:

Version	Date	Description
2023-06-A1	2023-06	New



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1、General Description

The SN74HC/HCT145 is a BCD-to-decimal decoders/drivers.

Features:

- Supply voltage range:
SN74HC145: 2V to 6V
SN74HCT145: 4.5V to 5.5V
- Input levels:
SN74HC145: CMOS level
SN74HCT145: 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
SN74HC145N(LX)	DIP16	SN74HC145N	25 PCS/tube	40 tube/box	1000 PCS/box	Dimensions of plastic enclosure: 19.0mm×6.4mm Pin spacing: 2.54mm
SN74HCT145N(LX)	DIP16	SN74HCT145N	25 PCS/tube	40 tube/box	1000 PCS/box	Dimensions of plastic enclosure: 19.0mm×6.4mm Pin spacing: 2.54mm
SN74HC145D(LX)	SOP16	HC145	50 PCS/tube	200 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing: 1.27mm
SN74HCT145D(LX)	SOP16	HCT145	50 PCS/tube	200 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing: 1.27mm
SN74HC145P(LX)	TSSOP16	HC145	96 PCS/tube	200 tube/box	19200 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing: 0.65mm
SN74HCT145P(LX)	TSSOP16	HCT145	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
SN74HC145DR(LX)	SOP16	HC145	2500 PCS/reel	5000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing:1.27mm
SN74HCT145DR(LX)	SOP16	HCT145	2500 PCS/reel	5000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing:1.27mm
SN74HC145PR(LX)	TSSOP16	HC145	5000 PCS/reel	10000 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing:0.65mm
SN74HCT145PR(LX)	TSSOP16	HCT145	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

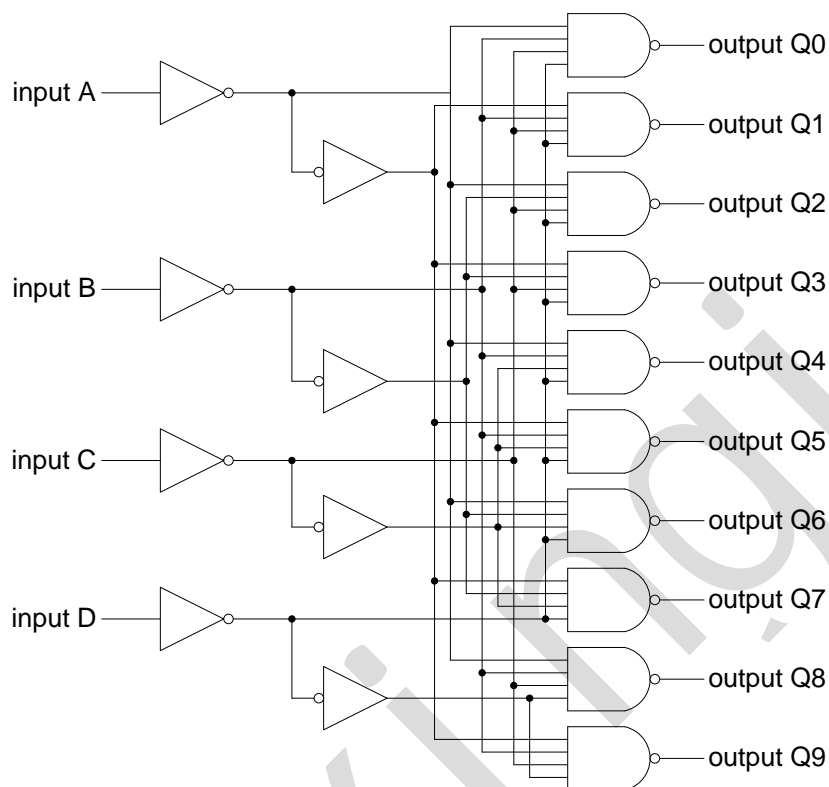
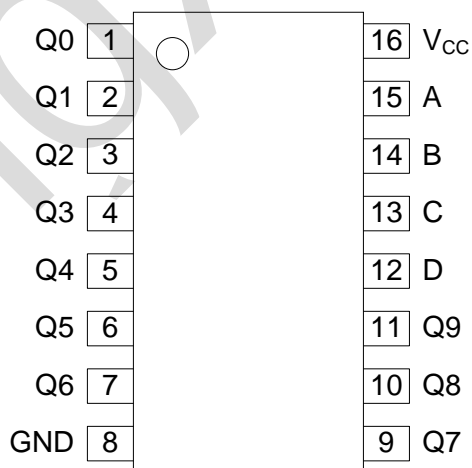


Figure 1. Logic symbol

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 _{CC}	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 $V_I > V_{CC}+0.5V$	-	± 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
storage temperature	T_{stg}	-	-65	+150	$^{\circ}C$
soldering temperature	T_L	10s	DIP	245	$^{\circ}C$
			SOP/TSSOP	260	

3.2、Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
SN74HC145						
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	$^{\circ}C$
SN74HCT145						
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
SN74HC145							
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	-	-	± 2	μA
supply current	I_{CC}	6.0V	$V_I = V_{CC}$ or GND; $I_O = 0\text{A}$	-	-	2	μA
SN74HCT145							
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	-	-	± 2	μA
supply current	I_{CC}	6.0V	$V_I = V_{CC}$ or GND; $I_O = 0\text{A}$	-	-	2	μA
additional supply current	ΔI_{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	μA



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 _{CC}	Conditions	Min.	Typ.	Max.	Unit
SN74HC145							
HIGH-level input voltage	V _{IH}	2.0V	-	1.5	-	-	V
		4.5V	-	3.15	-	-	V
		6.0V	-	4.2	-	-	V
LOW-level input voltage	V _{IL}	2.0V	-	-	-	0.5	V
		4.5V	-	-	-	1.35	V
		6.0V	-	-	-	1.8	V
HIGH-level output voltage	V _{OH}	2.0V	I _O = -20uA	1.9	-	-	V
		4.5V	I _O = -20uA	4.4	-	-	V
		6.0V	I _O = -20uA	5.9	-	-	V
		4.5V	I _O = -4.0mA	3.7	-	-	V
		6.0V	I _O = -5.2mA	5.2	-	-	V
LOW-level output voltage	V _{OL}	2.0V	I _O = 20uA	-	-	0.1	V
		4.5V	I _O = 20uA	-	-	0.1	V
		6.0V	I _O = 20uA	-	-	0.1	V
		4.5V	I _O = 4.0mA	-	-	0.4	V
		6.0V	I _O = 5.2mA	-	-	0.4	V
input leakage current	I _I	6.0V	V _I = V _{CC} or GND	-	-	±4	uA
supply current	I _{CC}	6.0V	V _I = V _{CC} or GND; I _O = 0A	-	-	4	uA
SN74HCT145							
HIGH-level input voltage	V _{IH}	4.5V to 5.5V	-	2.0	-	-	V
LOW-level input voltage	V _{IL}	4.5V to 5.5V	-	-	-	0.8	V
HIGH-level output voltage	V _{OH}	4.5V	I _O = -20uA	4.4	-	-	V
			I _O = -4.0mA	3.7	-	-	V
LOW-level output voltage	V _{OL}	4.5V	I _O = 20uA	-	-	0.1	V
			I _O = 4.0mA	-	-	0.4	V
input leakage current	I _I	5.5V	V _I = V _{CC} or GND	-	-	±4	uA
supply current	I _{CC}	6.0V	V _I = V _{CC} or GND; I _O = 0A	-	-	4	uA
additional supply current	ΔI _{CC}	4.5V to 5.5V	One input at V _I = V _{CC} - 2.1V; Other inputs at V _{CC} or GND; I _O = 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_{CC}	Conditions		Min.	Typ.	Max.	Unit
SN74HC145								
propagation delay	t_{PLH}, t_{PHL}	5.0V	$C_L = 45\text{pF}$	see Figure 3	-	-	50	ns
SN74HCT145								
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_{CC}	Conditions		Min.	Typ.	Max.	Unit
SN74HC145								
propagation delay	t_{PLH}, t_{PHL}	5.0V	$C_L = 45\text{pF}$	see Figure 3	-	-	60	ns
SN74HCT145								
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

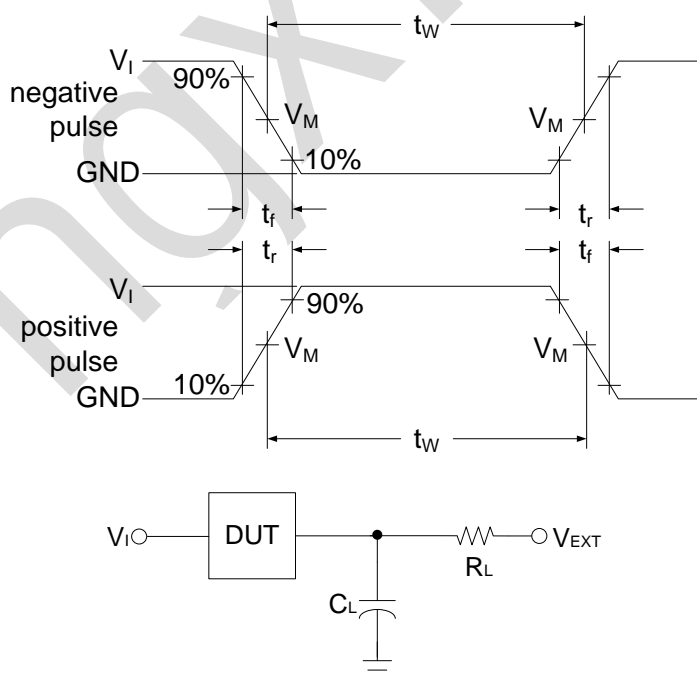


Figure 2. Test circuit for measuring switching times

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}
SN74HC145	V_{CC}	3.0ns	45pF	665 Ω	Open	V_{CC}	GND
SN74HCT145	3.0V	3.0ns	45pF	665 Ω	Open	V_{CC}	GND

4.3、AC Testing Waveforms

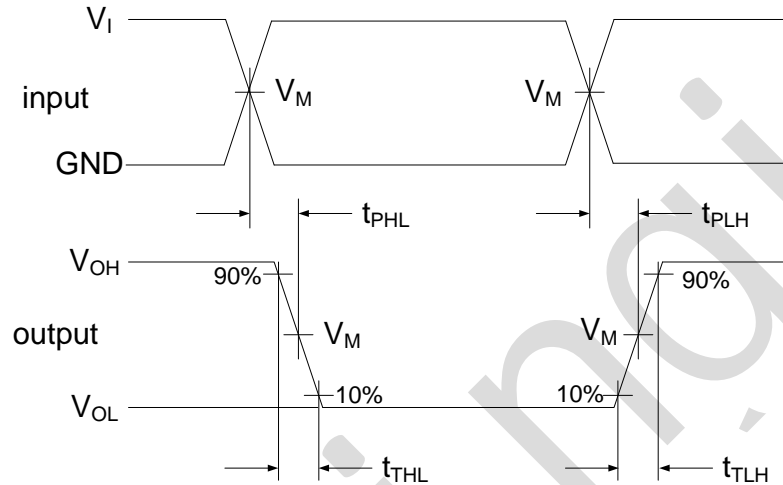


Figure 3. The data input to output propagation delays

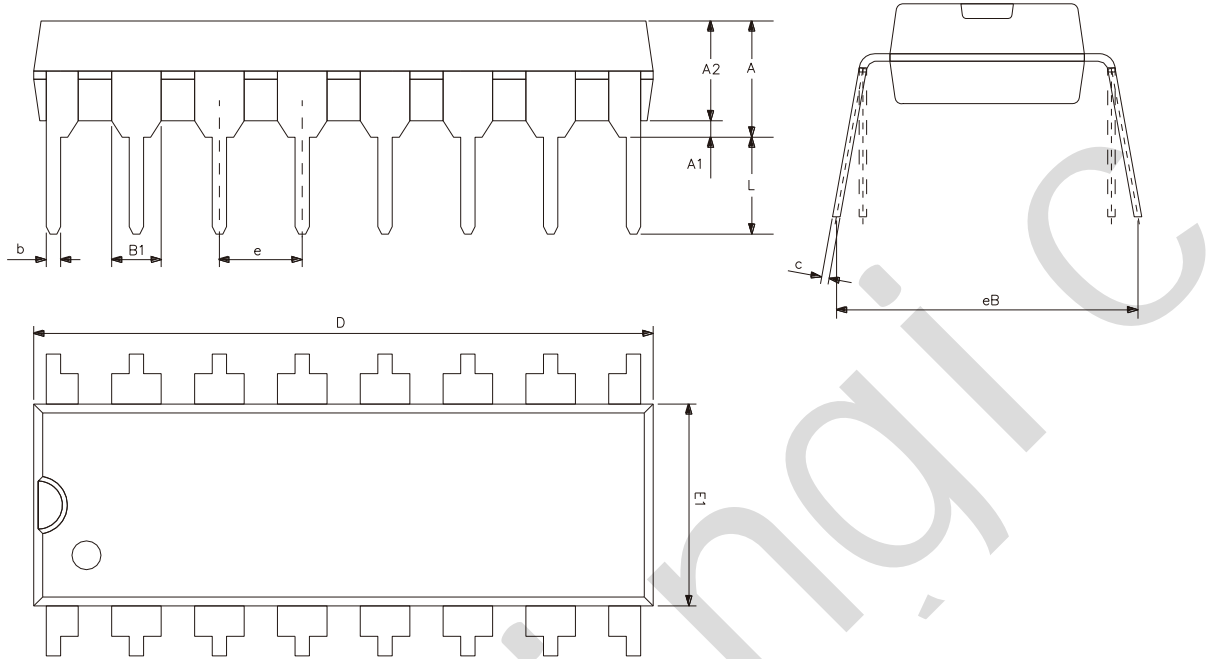
4.4、Measurement Points

Type	Input	Output
	V_M	V_M
SN74HC145	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$
SN74HCT145	1.3V	1.3V



5、Package Information

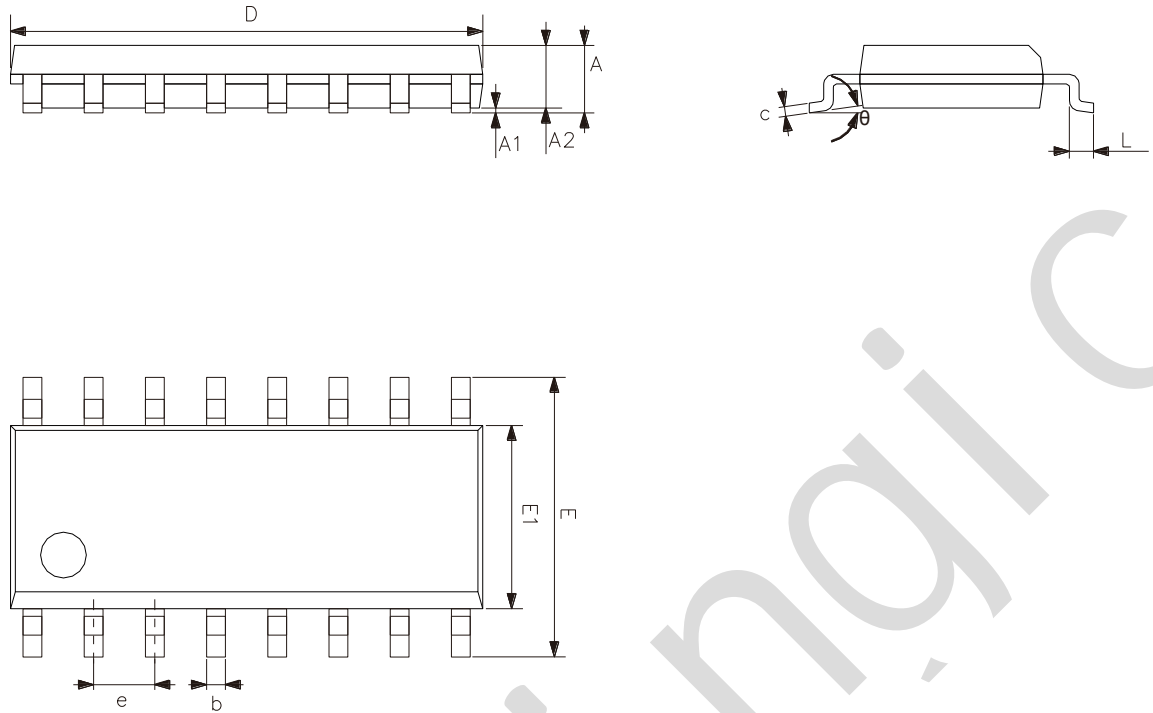
5.1、DIP16



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



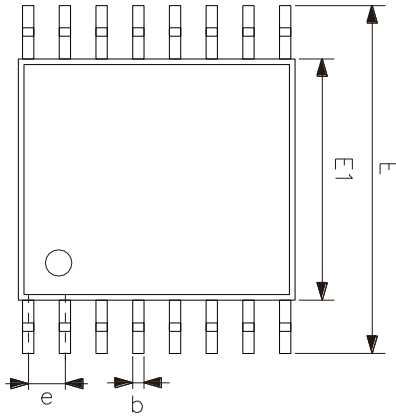
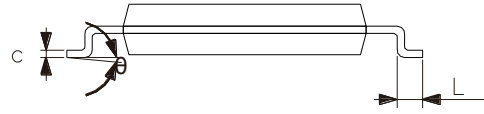
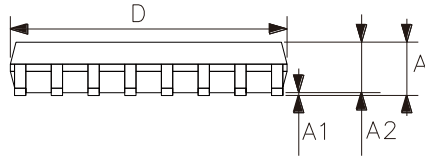
5.2、SOP16



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
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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[74VHC4052AFT\(BE\)](#) [TC74VHC138FK\(EL,K\)](#) [TC74HC151AF\(EL,F\)](#) [SN74HC145DR\(LX\)](#) [SN74HC139DR\(LX\)](#) [CD4028BM\(LX\)](#)