AiP74LVC139
Dual 2-to-4 Line Decoder/Demultiplexer

Product Specification

Specification Revision History：

Version	Date	Description
2024-06-A0	2024-06	New
2024-11-A1	2024-11	Modify the parameters
2025-12-A2	2025-12	Modify the supply voltage range; add the parameters at the condition of V_{CC}=4.5V to 5.5V; add ESD

Contents

1、General Description

The AiP74LVC139 is a dual 2-to-4 line decoder/demultiplexer..

The input can be driven from either 3.3V or 5V devices. This feature allows the use of this device in a mixed 3.3V and 5V environment.

Features:

- Supply voltage range:1.2V to 5.5V
- Inputs accept voltages up to 5.5V
- ±24mA output drive at 3.0V
- High-impedance when V_{CC}=0V
- Temperature range:-40℃ to +125℃
- Packaging information: DIP16/SOP16/TSSOP16

Ordering Information:

Tube packing specifications:

Part number	Packaging form	Marking code	Tube quantity	Boxed tube quantity	Boxed quantity	Notes
AiP74LVC139DA16.TB	DIP16	74LVC139	25 PCS/tube	40 tube/box	1000 PCS/box	Dimensions of plastic enclosure: 19.0mm×6.4mm Pin spacing: 2.54mm

Reel packing specifications:

Part number	Packaging form	Marking code	Reel quantity	Boxed reel quantity	Notes
AiP74LVC139SA16.TR	SOP16	74LVC139	4000 PCS/reel	8000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing: 1.27mm
AiP74LVC139TA16.TR	TSSOP16	74LVC139	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

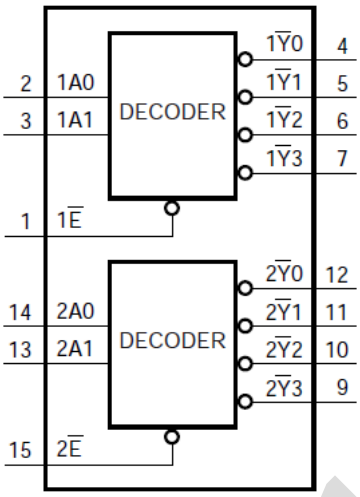
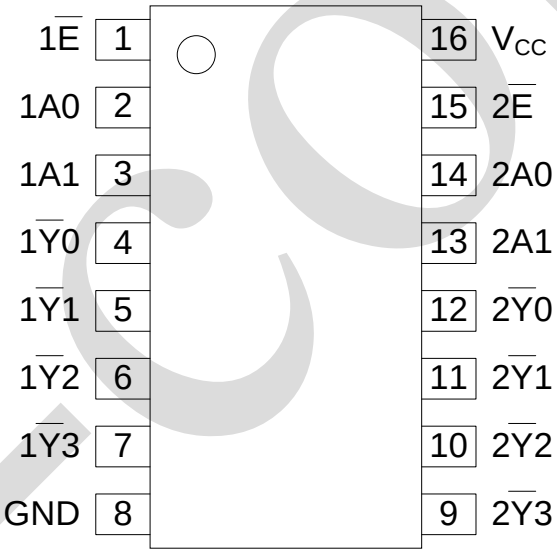


Figure 1. Block diagram

2.2、Pin Configurations



2.3、Pin Description

Pin No.	Pin Name	Description
1	$1\bar{E}$	enable input (active LOW)
2	1A0	address input
3	1A1	address input
4	$1\bar{Y}0$	data output
5	$1\bar{Y}1$	data output
6	$1\bar{Y}2$	data output
7	$1\bar{Y}3$	data output
8	GND	ground (0V)
9	$2\bar{Y}3$	data output
10	$2\bar{Y}2$	data output
11	$2\bar{Y}1$	data output
12	$2\bar{Y}0$	data output
13	2A1	address input
14	2A0	address input
15	$2\bar{E}$	enable input (active LOW)
16	V_{CC}	supply voltage

2.4、Function Table

Input			Output			
$n\bar{E}$	**nA0**	**nA1**	**$n\bar{Y}0$**	**$n\bar{Y}1$**	**$n\bar{Y}2$**	**$n\bar{Y}3$**
H	X	X	H	H	H	H
L	L	L	L	H	H	H
L	H	L	H	L	H	H
L	L	H	H	H	L	H
L	H	H	H	H	H	L

Note:

H = HIGH voltage level;

L = LOW voltage level;

X = don’t care;

3、Electrical Parameter

3.1、Absolute Maximum Ratings

(T_{amb}=25℃, all voltage referenced to GND, unless otherwise specified)

Parameter	Symbol	Conditions		Min.	Max.	Unit
supply voltage	V_{CC}	-		-0.5	+6.5	V
input voltage	V_I	-		-0.5	+6.5	V
output voltage	V_O	Active mode		-0.5	V_{CC}+0.5	V
		Power-down mode; V_{CC}=0V		-0.5	+6.5	V
supply current	I_{CC}	-		-	100	mA
ground current	I_{GND}	-		-100	-	mA
input clamping current	I_{IK}	V_I < 0V		-50	-	mA
output current	I_O	V_O=0V to V_{CC}		-	±50	mA
output clamping current	I_{OK}	V_O > V_{CC} or V_O < 0V		-	±50	mA
storage temperature	T_{stg}	-		-65	+150	℃
soldering temperature	T_L	10s	DIP16	245		℃
			SOP16/TSSOP16	260		℃
electrostatic discharge	ESD	HBM		2000		V

3.2、Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
supply voltage	V_{CC}	-	1.2	-	5.5	V
input voltage	V_I	-	0	-	5.5	V
output voltage	V_O	Active mode	0	-	V_{CC}	V
		Power-down mode; V_{CC}=0V	0	-	5.5	V
ambient temperature	T_{amb}	-	-40	-	+125	℃

3.3、Electrical Characteristics

3.3.1、DC Characteristics 1

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

Parameter	Symbol	Vcc	Conditions	Min.	Typ.	Max.	Unit
HIGH-level input voltage	V_{IH}	1.2V	-	1.08	-	-	V
		1.65V to 1.95V	-	0.65×V_{CC}	-	-	V
		2.3V to 2.7V	-	1.7	-	-	V
		2.7V to 3.6V	-	2.0	-	-	V
		4.5V to 5.5V	-	0.7×V_{CC}	-	-	V
LOW-level input voltage	V_{IL}	1.2V	-	-	-	0.12	V
		1.65V to 1.95V	-	-	-	0.35×V_{CC}	V
		2.3V to 2.7V	-	-	-	0.7	V
		2.7V to 3.6V	-	-	-	0.8	V
		4.5V to 5.5V	-	-	-	0.3×V_{CC}	V
HIGH-level output voltage	V_{OH}	1.65V to 5.5V	I_O=-100uA	V_{CC}-0.2	-	-	V
		1.65V	I_O =-4mA	1.2	-	-	V
		2.3V	I_O =-8mA	1.8	-	-	V
		2.7V	I_O =-12mA	2.2	-	-	V

		3.0V	I_O =-18mA	2.4	-	-	V
		3.0V	I_O =-24mA	2.2	-	-	V
		4.5V	I_O =-32mA	3.8	-	-	V
LOW-level output voltage	V_{OL}	1.65V to 5.5V	I_O=100uA	-	-	0.2	V
		1.65V	I_O =4mA	-	-	0.45	V
		2.3V	I_O =8mA	-	-	0.6	V
		2.7V	I_O =12mA	-	-	0.4	V
		3.0V	I_O =24mA	-	-	0.55	V
		4.5V	I_O =32mA	-	-	0.55	V
input leakage current	I_I	3.6V	V_I=5.5V or GND	-	-	±5	uA
supply current	I_{CC}	3.6V	V_I=V_{CC} or GND; I_O=0A	-	-	10	uA
additional supply current	ΔI_{CC}	2.7V to 3.6V	per input pin; V_I= V_{CC}-0.6V; I_O=0A	-	-	500	uA

3.3.2、DC Characteristics 2

(T_{amb}=-40℃ to +125℃, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	V_{CC}	Conditions	Min.	Typ.	Max.	Unit
HIGH-level input voltage	V_{IH}	1.2V	-	1.08	-	-	V
		1.65V to 1.95V	-	0.65×V_{CC}	-	-	V
		2.3V to 2.7V	-	1.7	-	-	V
		2.7V to 3.6V	-	2.0	-	-	V
		4.5V to 5.5V	-	0.7×V_{CC}	-	-	V
LOW-level input voltage	V_{IL}	1.2V	-	-	-	0.12	V
		1.65V to 1.95V	-	-	-	0.35×Vcc	V
		2.3V to 2.7V	-	-	-	0.7	V
		2.7V to 3.6V	-	-	-	0.8	V
		4.5V to 5.5V	-	-	-	0.3×V_{CC}	V
HIGH-level output voltage	V_{OH}	1.65V to 5.5V	I_O=-100uA	V_{CC}-0.3	-	-	V
		1.65V	I_O =-4mA	1.05	-	-	V
		2.3V	I_O =-8mA	1.65	-	-	V
		2.7V	I_O =-12mA	2.05	-	-	V
		3.0V	I_O =-18mA	2.25	-	-	V
		3.0V	I_O =-24mA	2.0	-	-	V
		4.5V	I_O =-32mA	3.4	-	-	V
LOW-level output voltage	V_{OL}	1.65V to 5.5V	I_O=100uA	-	-	0.3	V
		1.65V	I_O =4mA	-	-	0.65	V
		2.3V	I_O =8mA	-	-	0.8	V
		2.7V	I_O =12mA	-	-	0.6	V
		3.0V	I_O =24mA	-	-	0.8	V
		4.5V	I_O =32mA	-	-	0.8	V

input leakage current	I_I	3.6V	V_I=5.5V or GND	-	-	±20	uA
supply current	I_{CC}	3.6V	V_I=V_{CC} or GND; I_O=0A	-	-	40	uA
additional supply current	ΔI_{CC}	2.7V to 3.6V	per input pin; V_I= V_{CC}-0.6V; I_O=0A	-	-	5000	uA

3.3.3、AC Characteristics 1

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

Parameter	Symbol	V_{CC}	Conditions	Min.	Typ.[1]	Max.	Unit
nAn to $\overline{Y}$n propagation delay	t_{PLH}, t_{PHL}	1.2V	see Figure 3	-	14.0	-	ns
		1.65V to 1.95V		0.5	4.7	10.4	ns
		2.3V to 2.7V		1.0	2.8	5.9	ns
		2.7V		1.0	3.0	6.3	ns
		3.0V to 3.6V		1.0	2.5	5.3	ns
		4.5V to 5.5V		1.0	2.2	4.6	ns
n$\overline{E}$ to $\overline{Y}$n propagation delay		1.2V	see Figure 3	-	14	-	ns
		1.65V to 1.95V		1.5	4.5	9.8	ns
		2.3V to 2.7V		2.1	2.7	5.6	ns
		2.7V		1.0	2.8	5.4	ns
		3.0V to 3.6V		1.0	2.4	5.0	ns
		4.5V to 5.5V		1.0	2.1	4.3	ns

Note:

[1] Typical values are measured at T_{amb}=25℃ and V_{CC}=1.2V, 1.8V, 2.5V, 2.7V, and 3.3V respectively.

3.3.4、AC Characteristics 2

(T_{amb}=-40℃ to +125℃, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	V_{CC}	Conditions	Min.	Typ.	Max.	Unit
nAn to $\overline{Y}$n propagation delay	t_{PLH}, t_{PHL}	1.65V to 1.95V	see Figure 3	-	-	11.3	ns
		2.3V to 2.7V		-	-	6.5	ns
		2.7V		-	-	8.0	ns
		3.0V to 3.6V		-	-	9.5	ns
		4.5V to 5.5V		-	-	8.3	ns
n$\overline{E}$ to $\overline{Y}$n propagation delay		1.65V to 1.95V	see Figure 3	-	-	10.7	ns
		2.3V to 2.7V		-	-	6.1	ns
		2.7V		-	-	7.0	ns
		3.0V to 3.6V		-	-	6.5	ns
		4.5V to 5.5V		-	-	5.7	ns

4、Testing Circuit

4.1、AC Testing Circuit

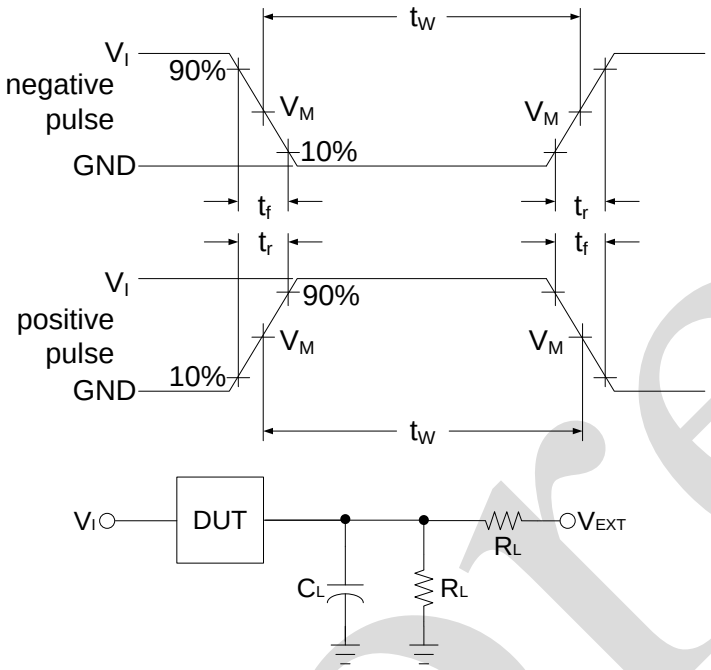


Figure 2. Test circuit for measuring switching times

Definitions for test circuit:

R_L=Load resistance.

C_L=Load capacitance including jig and probe capacitance.

4.2、Test Data

Supply voltage	Input		Load		V_{EXT}		
V_{CC}	V_I	t_r, t_f	C_L	R_L	t_{PLH}, t_{PHL}	t_{PLZ}, t_{PZL}	t_{PHZ}, t_{PZH}
1.2V	V_{CC}	≤ 3ns	30pF	1kΩ	open	2×V_{CC}	GND
1.65V to 1.95V	V_{CC}	≤ 3ns	30pF	1kΩ	open	2×V_{CC}	GND
2.3V to 2.7V	V_{CC}	≤ 3ns	30pF	500Ω	open	2×V_{CC}	GND
2.7V	V_{CC}	≤ 3ns	50pF	500Ω	open	2×V_{CC}	GND
3.0V to 3.6V	V_{CC}	≤ 3ns	50pF	500Ω	open	2×V_{CC}	GND

4.3、AC Testing Waveforms

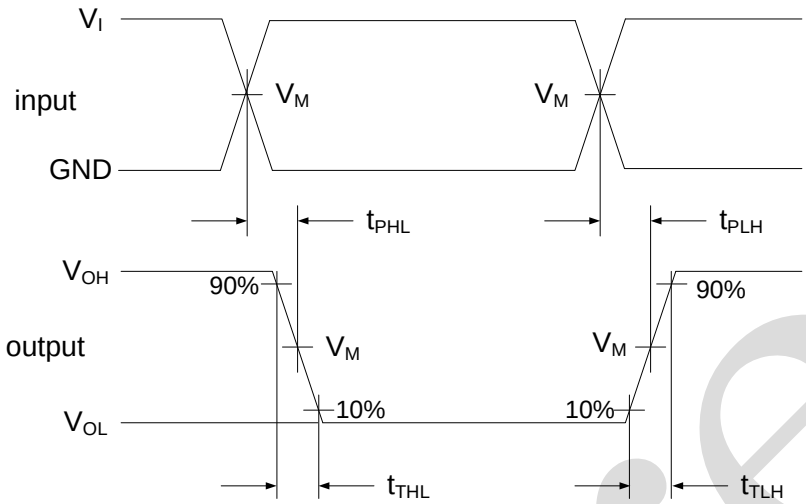


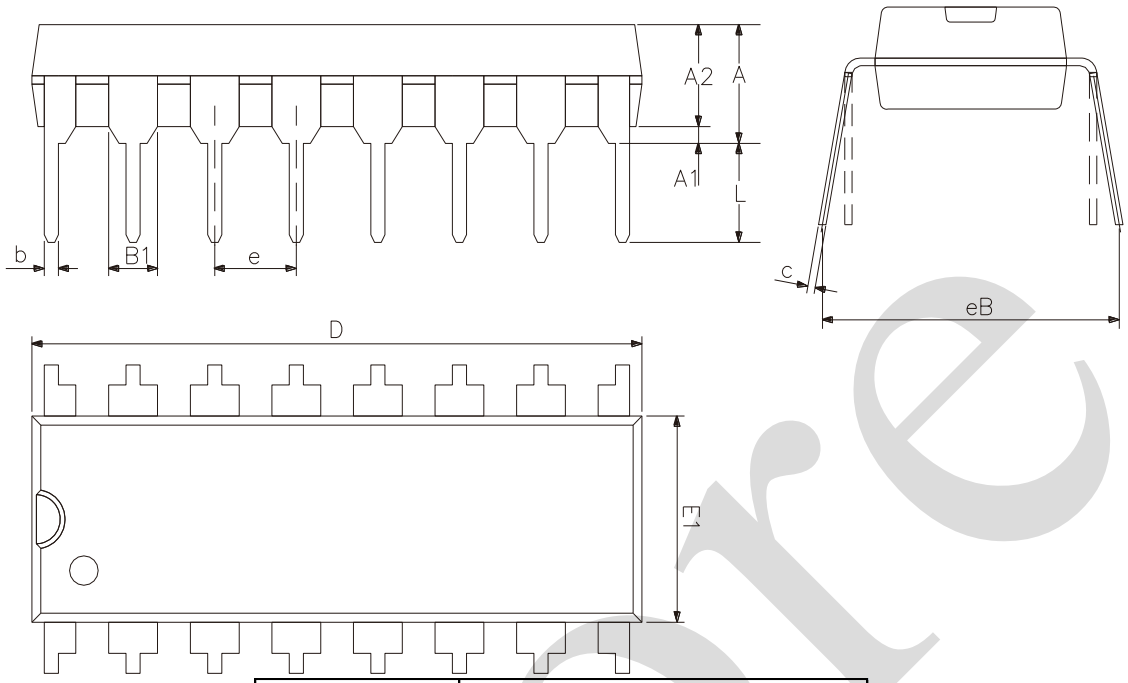
Figure 3. Propagation delay

4.4、Measurement Points

Supply voltage	Input	Output
V_{CC}	**V_M**	**V_M**
1.2V	$0.5\times V_{CC}$	$0.5\times V_{CC}$
1.65V to 1.95V	$0.5\times V_{CC}$	$0.5\times V_{CC}$
2.3V to 2.7V	$0.5\times V_{CC}$	$0.5\times V_{CC}$
2.7V	$0.5\times V_{CC}$	$0.5\times V_{CC}$
3.0V to 3.6V	$0.5\times V_{CC}$	$0.5\times V_{CC}$

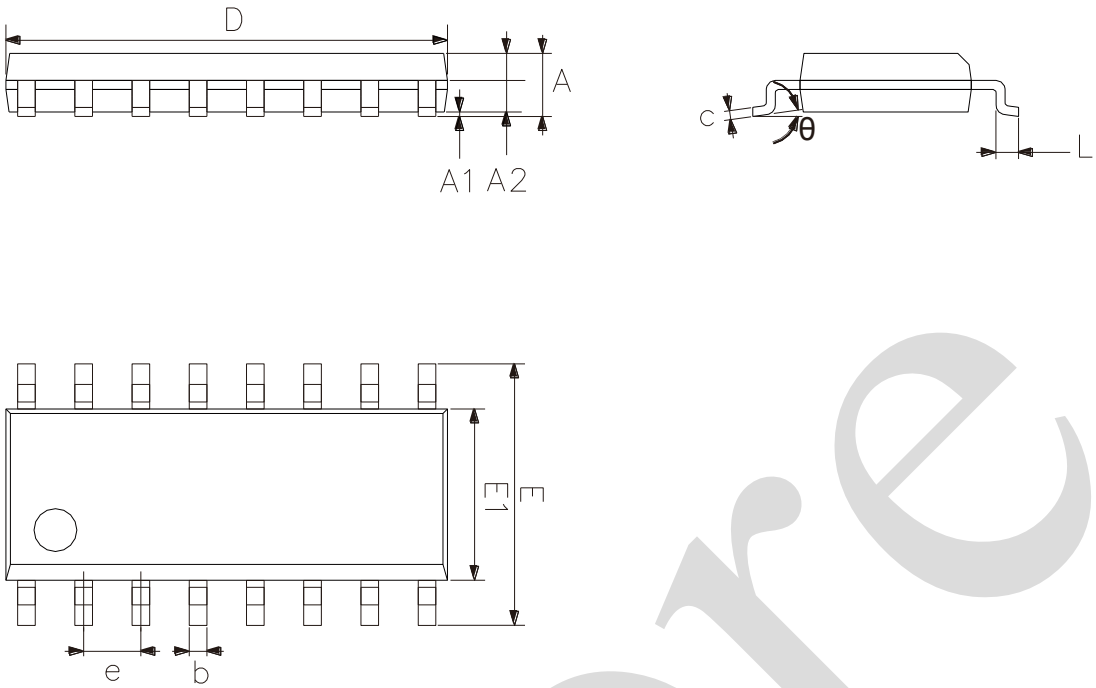
5、Package Information

5.1、DIP16



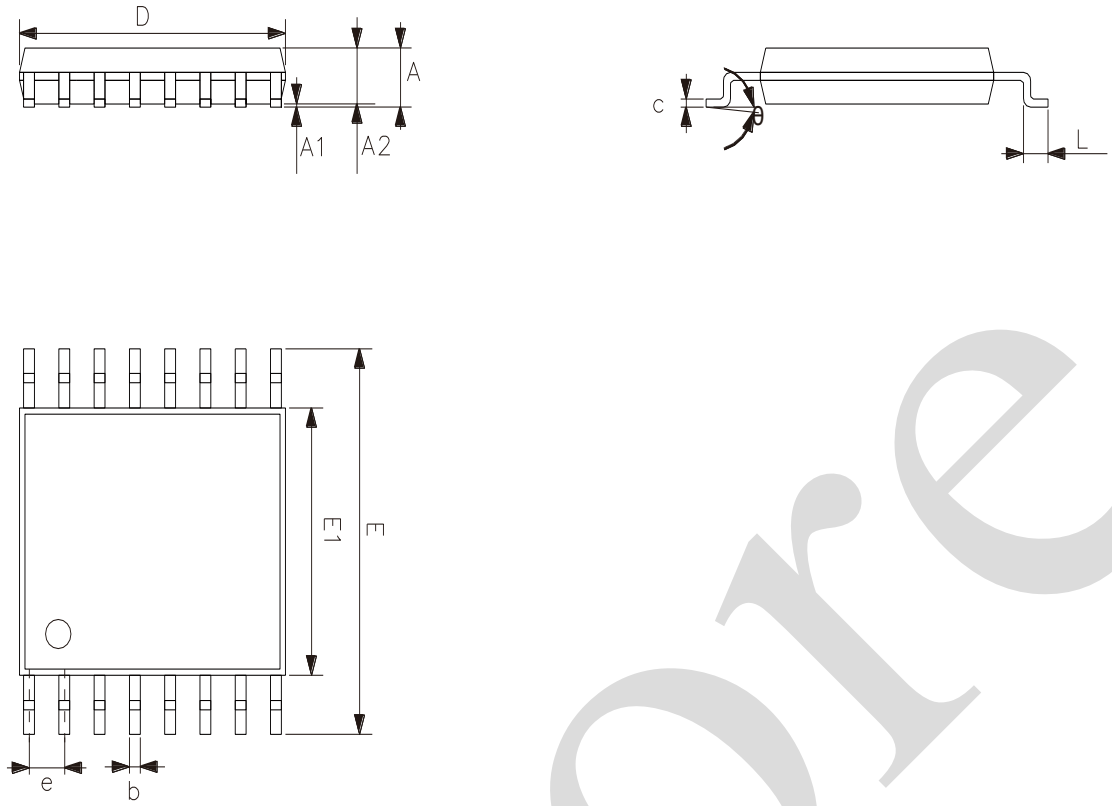
2023/12/A	Dimensions In Millimeters	
Symbol	**Min**	**Max**
A2	3.00	3.60
A1	0.51	—
A	3.60	5.33
L	3.00	3.60
b	0.36	0.56
B1	1.52	
D	18.80	19.94
E1	6.20	6.60
e	2.54	
c	0.20	0.36
eB	7.62	9.30

5.2、SOP16



2023/12/A	Dimensions In Millimeters	
Symbol	**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



2023/12/A	Dimensions In Millimeters	
Symbol	**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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