



# CD4585 (LX) 4-bit magnitude comparator

## Product Specification

### Specification Revision History:

Version	Date	Description
2023-04-A1	2023-04	New



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## 1、General Description

The CD4585 is a 4-bit magnitude comparator.

### Features:

- Supply voltage range: 3V to 15V
- 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
CD4585BE(LX)	DIP16	CD4585BE	25 PCS/tube	40 tube/box	1000 PCS/box	Dimensions of plastic enclosure: 19.0mm×6.4mm Pin spacing: 2.54mm
CD4585BM(LX)	SOP16	CD4585BM	50 PCS/tube	200 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing: 1.27mm
CD4585PW(LX)	TSSOP16	CD4585	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
CD4585BM(LX)	SOP16	CD4585BM	2500PCS/reel	5000PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing: 1.27mm
CD4585PW(LX)	TSSOP16	CD4585	5000PCS/reel	10000PCS/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

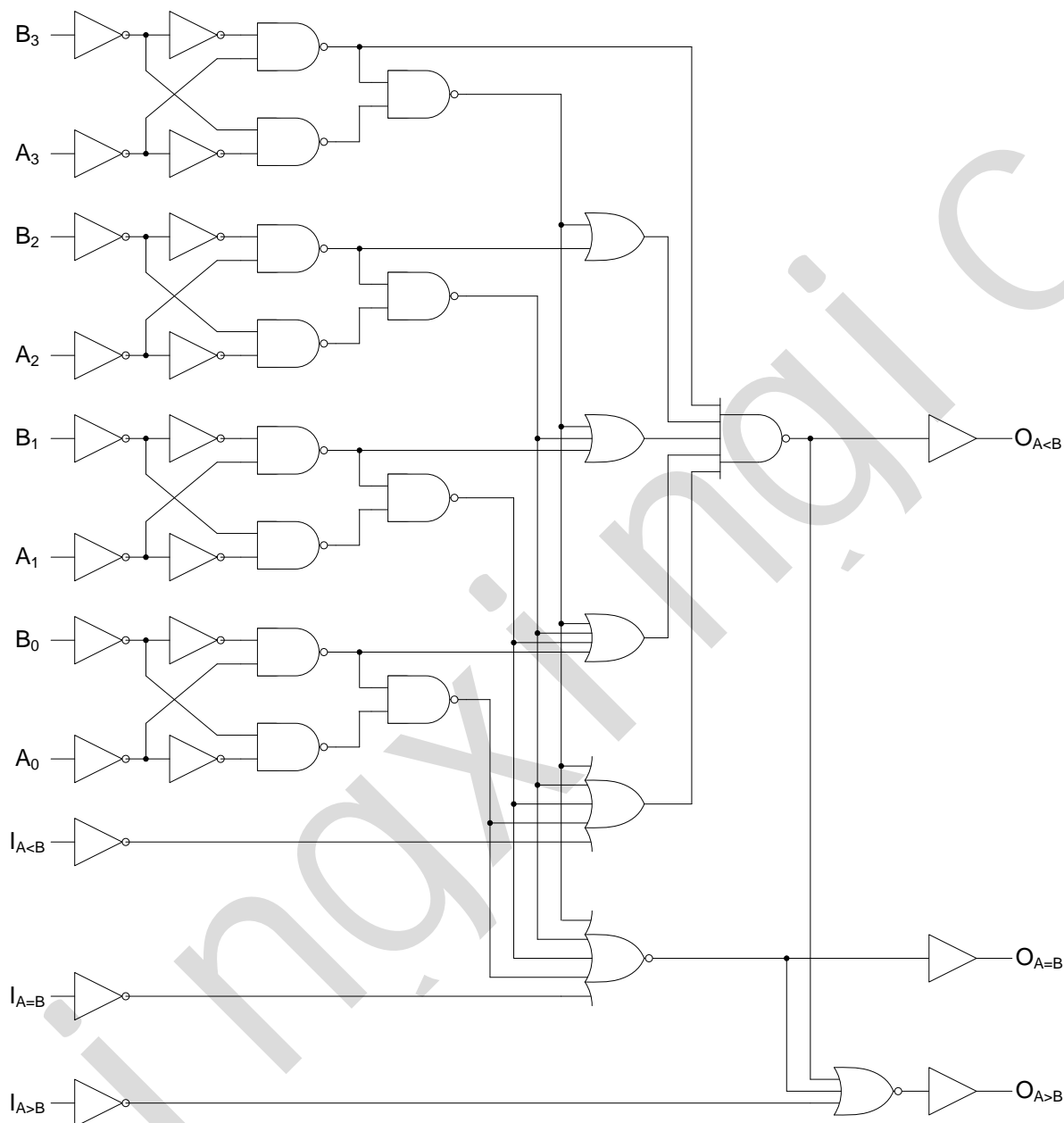


Figure 1. Functional diagram



## 2.2、Pin Configurations

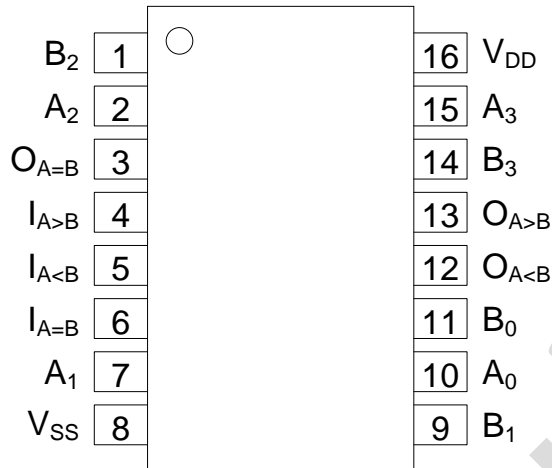


Figure 2. Pin configurations

## 2.3、Pin Description

Pin No.	Pin Name	Description
1	B <sub>2</sub>	word B parallel input
2	A <sub>2</sub>	word A parallel input
3	O <sub>A=B</sub>	A equal to B output
4	I <sub>A&gt;B</sub>	expander input
5	I <sub>A&lt;B</sub>	expander input
6	I <sub>A=B</sub>	expander input
7	A <sub>1</sub>	word A parallel input
8	V <sub>SS</sub>	ground supply voltage
9	B <sub>1</sub>	word B parallel input
10	A <sub>0</sub>	word A parallel input
11	B <sub>0</sub>	word B parallel input
12	O <sub>A&lt;B</sub>	A less than B output
13	O <sub>A&gt;B</sub>	A greater than B output
14	B <sub>3</sub>	word B parallel input
15	A <sub>3</sub>	word A parallel input
16	V <sub>DD</sub>	supply voltage



## 2.4、Function Table

COMPARING INPUTS				CASCADING INPUTS			OUTPUTS		
A <sub>3</sub> B <sub>3</sub>	A <sub>2</sub> B <sub>2</sub>	A <sub>1</sub> B <sub>1</sub>	A <sub>0</sub> B <sub>0</sub>	I <sub>A&gt;B</sub>	I <sub>A&lt;B</sub>	I <sub>A=B</sub>	O <sub>A&gt;B</sub>	O <sub>A&lt;B</sub>	O <sub>A=B</sub>
A <sub>3</sub> >B <sub>3</sub>	X	X	X	H	X	X	H	L	L
A <sub>3</sub> <B <sub>3</sub>	X	X	X	X	X	X	L	H	L
A <sub>3</sub> =B <sub>3</sub>	A <sub>2</sub> >B <sub>2</sub>	X	X	H	X	X	H	L	L
A <sub>3</sub> =B <sub>3</sub>	A <sub>2</sub> <B <sub>2</sub>	X	X	X	X	X	L	H	L
A <sub>3</sub> =B <sub>3</sub>	A <sub>2</sub> =B <sub>2</sub>	A <sub>1</sub> >B <sub>1</sub>	X	H	X	X	H	L	L
A <sub>3</sub> =B <sub>3</sub>	A <sub>2</sub> =B <sub>2</sub>	A <sub>1</sub> <B <sub>1</sub>	X	X	X	X	L	H	L
A <sub>3</sub> =B <sub>3</sub>	A <sub>2</sub> =B <sub>2</sub>	A <sub>1</sub> =B <sub>1</sub>	A <sub>0</sub> >B <sub>0</sub>	H	X	X	H	L	L
A <sub>3</sub> =B <sub>3</sub>	A <sub>2</sub> =B <sub>2</sub>	A <sub>1</sub> =B <sub>1</sub>	A <sub>0</sub> <B <sub>0</sub>	X	X	X	L	H	L
A <sub>3</sub> =B <sub>3</sub>	A <sub>2</sub> =B <sub>2</sub>	A <sub>1</sub> =B <sub>1</sub>	A <sub>0</sub> =B <sub>0</sub>	X	L	H	L	L	H
A <sub>3</sub> =B <sub>3</sub>	A <sub>2</sub> =B <sub>2</sub>	A <sub>1</sub> =B <sub>1</sub>	A <sub>0</sub> =B <sub>0</sub>	H	L	L	H	L	L
A <sub>3</sub> =B <sub>3</sub>	A <sub>2</sub> =B <sub>2</sub>	A <sub>1</sub> =B <sub>1</sub>	A <sub>0</sub> =B <sub>0</sub>	X	H	L	L	H	L
A <sub>3</sub> =B <sub>3</sub>	A <sub>2</sub> =B <sub>2</sub>	A <sub>1</sub> =B <sub>1</sub>	A <sub>0</sub> =B <sub>0</sub>	X	H	H	L	H	H
A <sub>3</sub> =B <sub>3</sub>	A <sub>2</sub> =B <sub>2</sub>	A <sub>1</sub> =B <sub>1</sub>	A <sub>0</sub> =B <sub>0</sub>	L	L	L	L	L	L

Note:

H=HIGH state (the more positive voltage);

L=LOW voltage level (the less positive voltage);

X=state is immaterial.

## 3、Electrical Parameter

### 3.1、Absolute Maximum Ratings

(Voltages are referenced to V<sub>SS</sub> (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Max.	Unit
supply voltage	V <sub>DD</sub>	-	-0.5	+18	V
input voltage	V <sub>I</sub>	all inputs	-0.5	V <sub>DD</sub> +0.5	V
DC input current	I <sub>IK</sub>	any one input	-	±10	mA
storage temperature	T <sub>stg</sub>	-	-65	+150	°C
soldering temperature	T <sub>L</sub>	10s	DIP		°C
			SOP/TSSOP		

### 3.2、Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
supply voltage	V <sub>DD</sub>	-	3	-	15	V
ambient temperature	T <sub>amb</sub>	in free air	-40	-	+125	°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  $V_{SS}$  (ground=0V), unless otherwise specified.)

Parameter	Symbol	$V_{DD}$	Conditions	Min.	Typ.	Max.	Unit
HIGH-level input voltage	$V_{IH}$	5V	-	3.5	-	-	V
		10V	-	7	-	-	V
		15V	-	11	-	-	V
LOW-level input voltage	$V_{IL}$	5V	-	-	-	1.5	V
		10V	-	-	-	3	V
		15V	-	-	-	4	V
HIGH-level output voltage	$V_{OH}$	5V	$ I_O  < 1\mu\text{A}$	4.95	-	-	V
		10V	$ I_O  < 1\mu\text{A}$	9.95	-	-	V
		15V	$ I_O  < 1\mu\text{A}$	14.95	-	-	V
LOW-level output voltage	$V_{OL}$	5V	$ I_O  < 1\mu\text{A}$	-	-	0.05	V
		10V	$ I_O  < 1\mu\text{A}$	-	-	0.05	V
		15V	$ I_O  < 1\mu\text{A}$	-	-	0.05	V
HIGH-level output current	$I_{OH}$	5V	$V_O = 4.6\text{V}$	-	-	-0.34	mA
		5V	$V_O = 2.5\text{V}$	-	-	-1.3	mA
		10V	$V_O = 9.5\text{V}$	-	-	-0.55	mA
		15V	$V_O = 13.5\text{V}$	-	-	-1.65	mA
LOW-level output current	$I_{OL}$	5V	$V_O = 0.4\text{V}$	0.34	-	-	mA
		10V	$V_O = 0.5\text{V}$	0.46	-	-	mA
		15V	$V_O = 1.5\text{V}$	1.4	-	-	mA
input leakage current	$I_I$	15V	$V_I = 15\text{V}$ or GND	-	-	$\pm 2$	$\mu\text{A}$
supply current	$I_{DD}$	5V	$V_I = 5\text{V}$ or GND; $I_O = 0\text{A}$	-	-	7.5	$\mu\text{A}$
		10V	$V_I = 10\text{V}$ or GND; $I_O = 0\text{A}$	-	-	15	$\mu\text{A}$
		15V	$V_I = 15\text{V}$ or GND; $I_O = 0\text{A}$	-	-	30	$\mu\text{A}$



### 3.3.2、DC Characteristics 2

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

Parameter	Symbol	$V_{DD}$	Conditions	Min.	Typ.	Max.	Unit
HIGH-level input voltage	$V_{IH}$	5V	-	3.5	-	-	V
		10V	-	7	-	-	V
		15V	-	11	-	-	V
LOW-level input voltage	$V_{IL}$	5V	-	-	-	1.5	V
		10V	-	-	-	3	V
		15V	-	-	-	4	V
HIGH-level output voltage	$V_{OH}$	5V	$ I_O <1\mu\text{A}$	4.95	-	-	V
		10V	$ I_O <1\mu\text{A}$	9.95	-	-	V
		15V	$ I_O <1\mu\text{A}$	14.95	-	-	V
LOW-level output voltage	$V_{OL}$	5V	$ I_O <1\mu\text{A}$	-	-	0.05	V
		10V	$ I_O <1\mu\text{A}$	-	-	0.05	V
		15V	$ I_O <1\mu\text{A}$	-	-	0.05	V
HIGH-level output current	$I_{OH}$	5V	$V_O=4.6\text{V}$	-	-	-0.3	mA
		5V	$V_O=2.5\text{V}$	-	-	-1.15	mA
		10V	$V_O=9.5\text{V}$	-	-	-0.45	mA
		15V	$V_O=13.5\text{V}$	-	-	-1.4	mA
LOW-level output current	$I_{OL}$	5V	$V_O=0.4\text{V}$	0.29	-	-	mA
		10V	$V_O=0.5\text{V}$	0.38	-	-	mA
		15V	$V_O=1.5\text{V}$	1.2	-	-	mA
input leakage current	$I_I$	15V	$V_I=15\text{V}$ or GND	-	-	$\pm 4$	$\mu\text{A}$
supply current	$I_{DD}$	5V	$V_I=5\text{V}$ or GND; $I_O=0\text{A}$	-	-	7.5	$\mu\text{A}$
		10V	$V_I=10\text{V}$ or GND; $I_O=0\text{A}$	-	-	15	$\mu\text{A}$
		15V	$V_I=15\text{V}$ or GND; $I_O=0\text{A}$	-	-	30	$\mu\text{A}$

### 3.3.3、AC Characteristics 1

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

Parameter	Symbol	$V_{DD}$	Conditions	Min.	Typ.	Max.	Unit
HIGH to LOW propagation delay time	$t_{PHL}$	5V	An Bn to On $C_L=50\text{pF}$ see Figure 4	-	160	320	ns
		10V		-	65	130	ns
		15V		-	45	90	ns
		5V	In to On $C_L=50\text{pF}$ see Figure 4	-	110	220	ns
		10V		-	45	90	ns
		15V		-	30	60	ns
LOW to HIGH propagation delay time	$t_{PLH}$	5V	An Bn to On $C_L=50\text{pF}$ see Figure 4	-	150	300	ns
		10V		-	60	120	ns
		15V		-	45	90	ns
		5V	In to On $C_L=50\text{pF}$ see Figure 4	-	120	240	ns
		10V		-	50	100	ns
		15V		-	35	70	ns
transition time	$t_{THL}, t_{TLH}$	5V	see Figure 4	-	60	120	ns
		10V		-	30	60	ns





		15V		-	20	40	ns
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### 3.3.4、AC Characteristics 2

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

Parameter	Symbol	$V_{DD}$	Conditions	Min.	Typ.	Max.	Unit
HIGH to LOW propagation delay time	$t_{PHL}$	5V	An Bn to On $C_L=50\text{pF}$ see Figure 4	-	-	384	ns
		10V		-	-	156	ns
		15V		-	-	108	ns
		5V	In to On $C_L=50\text{pF}$ see Figure 4	-	-	264	ns
		10V		-	-	108	ns
		15V		-	-	60	ns
LOW to HIGH propagation delay time	$t_{PLH}$	5V	An Bn to On $C_L=50\text{pF}$ see Figure 4	-	-	300	ns
		10V		-	-	120	ns
		15V		-	-	108	ns
		5V	In to On $C_L=50\text{pF}$ see Figure 4	-	-	288	ns
		10V		-	-	120	ns
		15V		-	-	84	ns
transition time	$t_{THL}, t_{TLH}$	5V	see Figure 4	-	-	144	ns
		10V		-	-	72	ns
		15V		-	-	48	ns

## 4、Testing Circuit

### 4.1、AC Testing Circuit

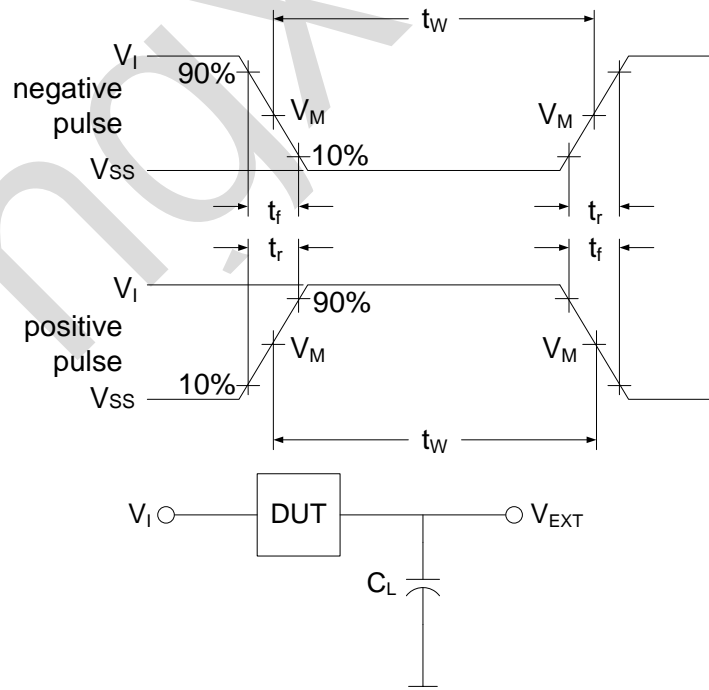


Figure 3. Load circuit

$C_L$  includes probe and jig capacitance.



#### 4.2、Test Data

Supply voltage	Input		Load	VEXT		
$V_{DD}$	$V_I$	$t_r = t_f$	$C_L$	$t_{PLH}/t_{PHL}$	$t_{PLZ}/t_{PZL}$	$t_{PHZ}/t_{PZH}$
5V to 15V	$V_{DD}$	$\leq 20\text{ns}$	50pF	Open	$V_{DD}$	$V_{SS}$

#### 4.3、AC Testing Waveforms

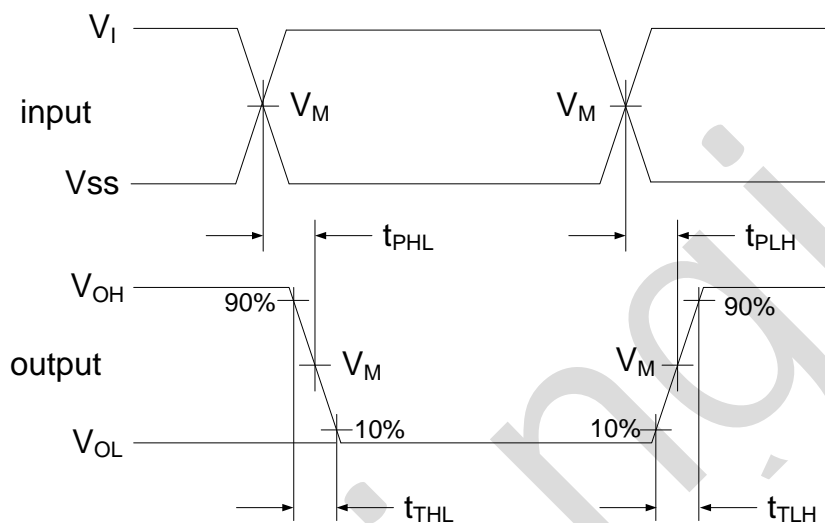


Figure 4. Propagation delay, output transition time

#### 4.4、Measurement Points

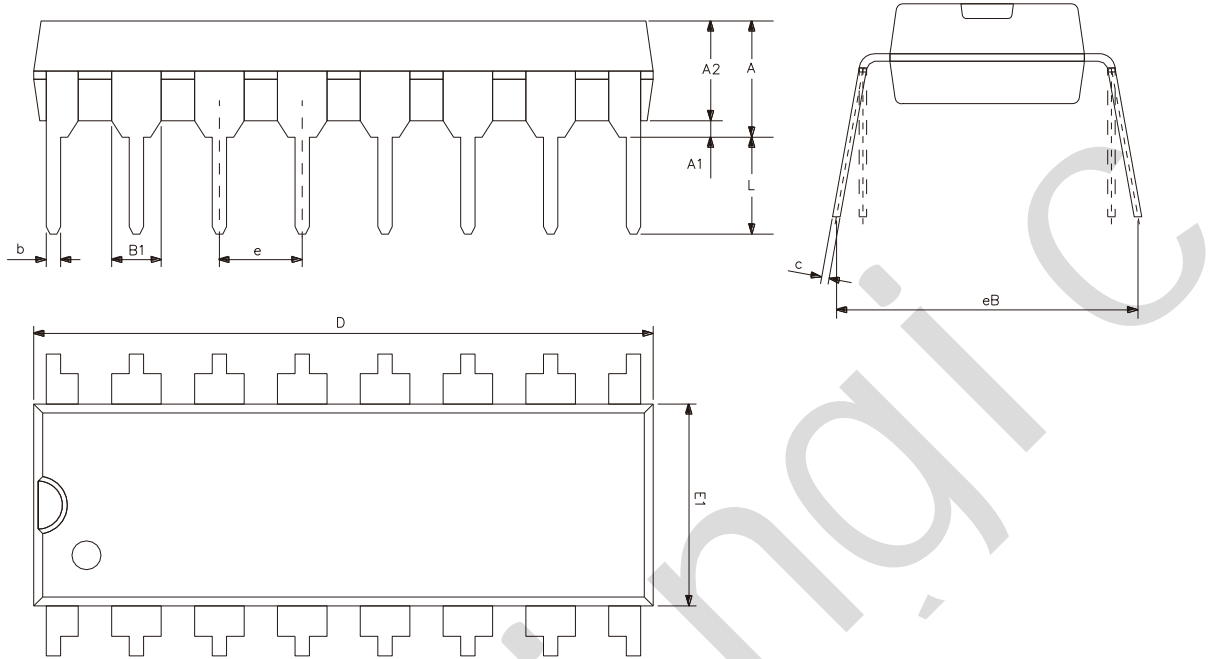
Supply voltage	Input		Output	
$V_{DD}$	$V_M$	$V_M$	$V_X$	$V_Y$
5V to 15V	$0.5 \times V_{DD}$	$0.5 \times V_{DD}$	$0.1 \times V_{DD}$	$0.9 \times V_{DD}$



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## 5、Package Information

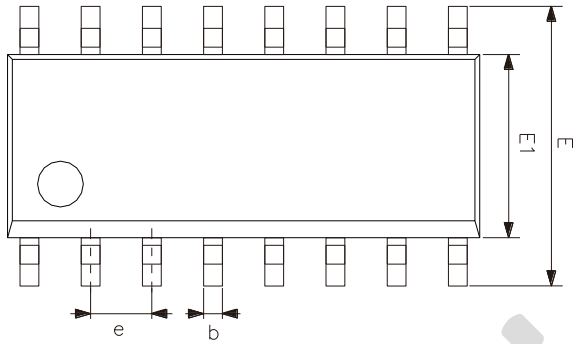
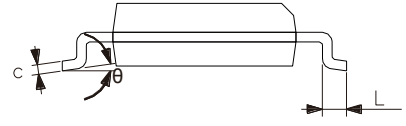
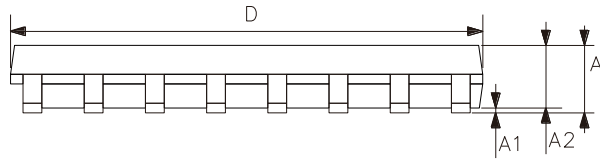
### 5.1、DIP16



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



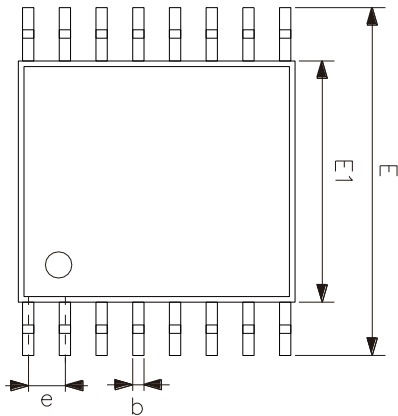
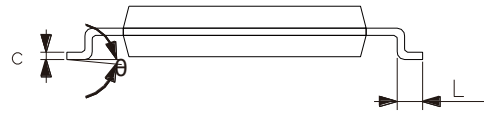
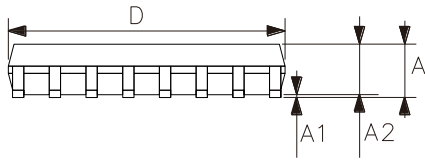
## 5.2、SOP16



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
$\theta$	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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