



CD4543 (LX)

BCD to 7-segment latch/decoder/driver

Product Specification

Specification Revision History:

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



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1、General Description

The CD4543 is a BCD to 7-segment latch/decoder/driver for liquid crystal and LED displays.

Features:

- Supply voltage range:3V to 15V
- 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
CD4543BE(LX)	DIP16	CD4543BE	25 PCS/tube	40 tube/box	1000 PCS/box	Dimensions of plastic enclosure: 19.0mm×6.4mm Pin spacing:2.54mm
CD4543BM(LX)	SOP16	CD4543BM	50 PCS/tube	200 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing:1.27mm
CD4543PW(LX)	TSSOP16	CD4543	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
CD4543BM(LX)	SOP16	CD4543BM	2500PCS/reel	5000PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing:1.27mm
CD4543PW(LX)	TSSOP16	CD4543	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

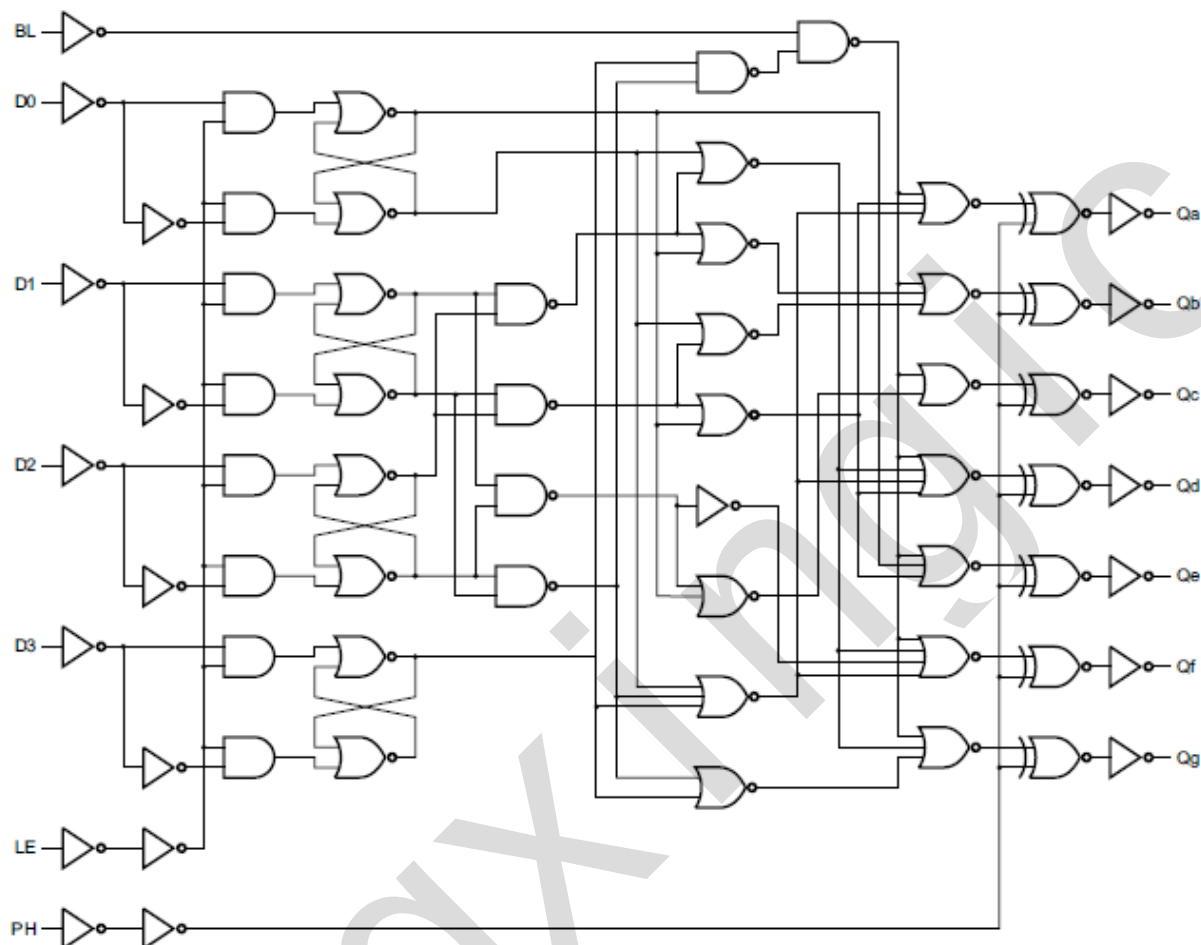
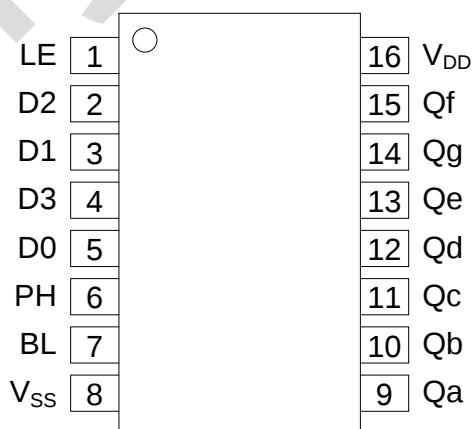


Figure 1. Functional diagram

2.2、Pin Configurations





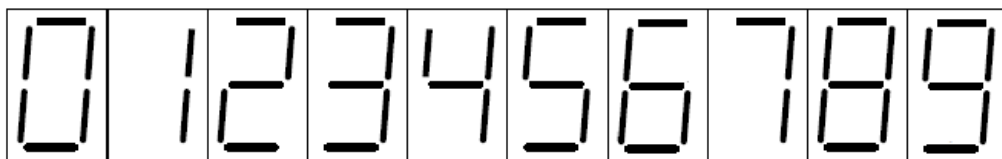
2.3、Pin Description

Pin No.	Pin Name	Description
1	LE	latch enable input (active LOW)
2	D2	address data input
3	D1	address data input
4	D3	address data input
5	D0	address data input
6	PH	phase input(active HIGH)
7	BL	Blanking input(active HIGH)
8	V _{SS}	ground supply voltage
9	Qa	segment output
10	Qb	segment output
11	Qc	segment output
12	Qd	segment output
13	Qe	segment output
14	Qg	segment output
15	Qf	segment output
16	V _{DD}	supply voltage

2.4、Function Table

Inputs							Outputs							Display
LE	BL	PH	D3	D2	D1	D0	Qa	Qb	Qc	Qd	Qe	Qf	Qg	
X	H	L	X	X	X	X	L	L	L	L	L	L	L	blank
H	L	L	L	L	L	L	H	H	H	H	H	H	L	0
H	L	L	L	L	L	H	L	H	H	L	L	L	L	1
H	L	L	L	L	H	L	H	H	L	H	H	L	H	2
H	L	L	L	L	H	H	H	H	H	H	L	L	H	3
H	L	L	L	H	L	L	L	H	H	L	L	H	H	4
H	L	L	L	H	L	H	H	L	H	H	L	H	H	5
H	L	L	L	H	H	L	H	L	H	H	H	H	H	6
H	L	L	L	H	H	H	H	H	H	L	L	L	L	7
H	L	L	H	L	L	L	H	H	H	H	H	H	H	8
H	L	L	H	L	L	H	H	H	H	H	L	H	H	9
H	L	L	H	L	H	X	L	L	L	L	L	L	L	blank
H	L	L	H	H	X	X	L	L	L	L	L	L	L	blank
L	L	L	X	X	X	X	n.c.							n.c.
as above		H	as above				inverse of above							as above

Note: H=HIGH voltage level; L=LOW voltage level. X=don't care;n.c.=no change





3、Electrical Parameter

3.1、Absolute Maximum Ratings

(Voltages are referenced to V_{SS} (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Max.	Unit
supply voltage	V_{DD}	-	-0.5	+18	V
input voltage	V_I	all inputs	-0.5	$V_{DD}+0.5$	V
DC input current	I_{IK}	any one input	-	± 10	mA
storage temperature	T_{stg}	-	-65	+150	°C
soldering temperature	T_L	10s	DIP	245	°C
			SOP/TSSOP	260	

3.2、Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
supply voltage	V_{DD}	-	3	-	15	V
ambient temperature	T_{amb}	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	-	-	± 2	μA
supply current	I_{DD}	5V	$V_I=5\text{V}$ or GND; $I_O=0\text{A}$	-	-	7.5	μA
		10V	$V_I=10\text{V}$ or GND; $I_O=0\text{A}$	-	-	15	μA
		15V	$V_I=15\text{V}$ or GND; $I_O=0\text{A}$	-	-	30	μA



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	-	-	± 4	μA
supply current	I_{DD}	5V	$V_I = 5\text{V}$ or GND; $I_O = 0\text{A}$	-	-	7.5	μA
		10V	$V_I = 10\text{V}$ or GND; $I_O = 0\text{A}$	-	-	15	μA
		15V	$V_I = 15\text{V}$ or GND; $I_O = 0\text{A}$	-	-	30	μA



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	Dn to Qn $C_L = 50\text{pF}$ see Figure 4	-	180	360	ns
		10V		-	75	150	ns
		15V		-	55	110	ns
		5V	LE to Qn $C_L = 50\text{pF}$ see Figure 4	-	170	340	ns
		10V		-	80	160	ns
		15V		-	60	120	ns
		5V	BL to Qn $C_L = 50\text{pF}$ see Figure 4	-	145	290	ns
		10V		-	65	130	ns
		15V		-	45	90	ns
LOW to HIGH propagation delay time	t_{PLH}	5V	Dn to Qn $C_L = 50\text{pF}$ see Figure 4	-	180	360	ns
		10V		-	75	150	ns
		15V		-	55	110	ns
		5V	LE to Qn $C_L = 50\text{pF}$ see Figure 4	-	190	380	ns
		10V		-	80	160	ns
		15V		-	60	120	ns
		5V	BL to Qn $C_L = 50\text{pF}$ see Figure 4	-	145	290	ns
		10V		-	65	130	ns
		15V		-	45	90	ns
transition time	t_{THL}, t_{TLH}	5V	pin Qn $C_L = 50\text{pF}$ see Figure 4	-	60	120	ns
		10V		-	30	60	ns
		15V		-	20	40	ns
pulse width	t_w	5V	pin LE high; minimum width see Figure 5	60	30	-	ns
		10V		30	15	-	ns
		15V		20	10	-	ns
set-up time	t_{su}	5V	Dn to LE; see Figure 5	40	20		ns
		10V		20	5		ns
		15V		15	0		ns
hold time	t_h	5V	Dn to LE; see Figure 5	0	-15		ns
		10V		15	0		ns
		15V		20	5		ns



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	Dn to Qn $C_L = 50\text{pF}$ see Figure 4	-	-	432	ns
		10V		-	-	180	ns
		15V		-	-	132	ns
		5V	LE to Qn $C_L = 50\text{pF}$ see Figure 4	-	-	408	ns
		10V		-	-	192	ns
		15V		-	-	144	ns
		5V	BL to Qn $C_L = 50\text{pF}$ see Figure 4	-	-	348	ns
		10V		-	-	156	ns
		15V		-	-	108	ns
LOW to HIGH propagation delay time	t_{PLH}	5V	Dn to Qn $C_L = 50\text{pF}$ see Figure 4	-	-	432	ns
		10V		-	-	180	ns
		15V		-	-	132	ns
		5V	LE to Qn $C_L = 50\text{pF}$ see Figure 4	-	-	432	ns
		10V		-	-	180	ns
		15V		-	-	132	ns
		5V	BL to Qn $C_L = 50\text{pF}$ see Figure 4	-	-	348	ns
		10V		-	-	156	ns
		15V		-	-	108	ns
transition time	t_{THL}, t_{TLH}	5V	pin Qn $C_L = 50\text{pF}$ see Figure 4	-	-	144	ns
		10V		-	-	72	ns
		15V		-	-	48	ns
pulse width	t_w	5V	pin LE high; minimum width see Figure 5	72	-	-	ns
		10V		36	-	-	ns
		15V		24	-	-	ns
set-up time	t_{su}	5V	Dn to LE; see Figure 5	48	-	-	ns
		10V		24	-	-	ns
		15V		18	-	-	ns
hold time	t_h	5V	Dn to LE; see Figure 5	0	-	-	ns
		10V		18	-	-	ns
		15V		24	-	-	ns



4、Testing Circuit

4.1、AC Testing Circuit

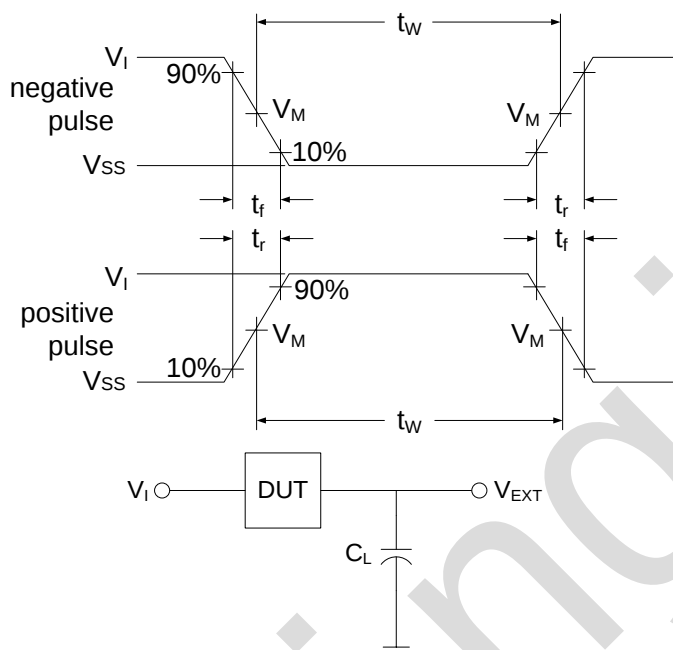


Figure 3. Load circuit

C_L includes probe and jig capacitance.

4.2、Test Data

Supply voltage	Input		Load	V_{EXT}		
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

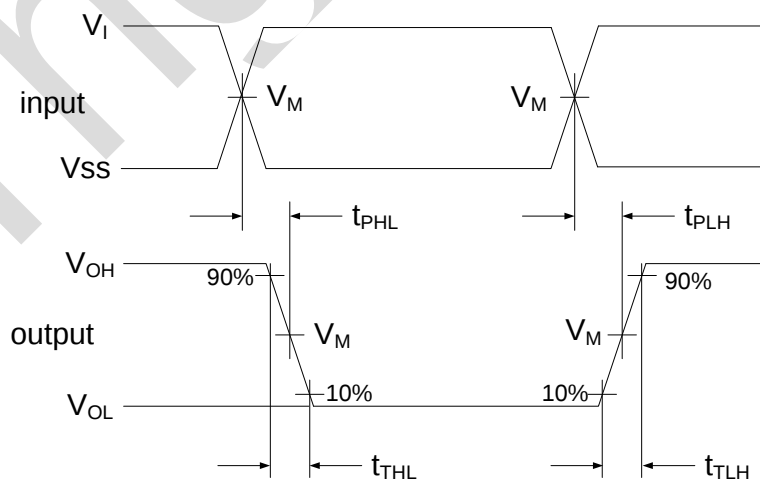


Figure 4. Propagation delay, output transition time

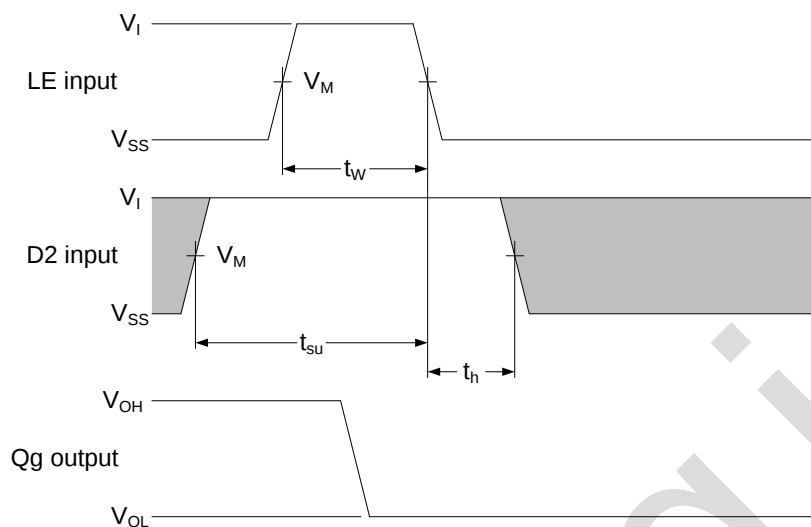


Figure 5. Waveforms showing minimum LE pulse width, set-up, and hold time for DC to LE

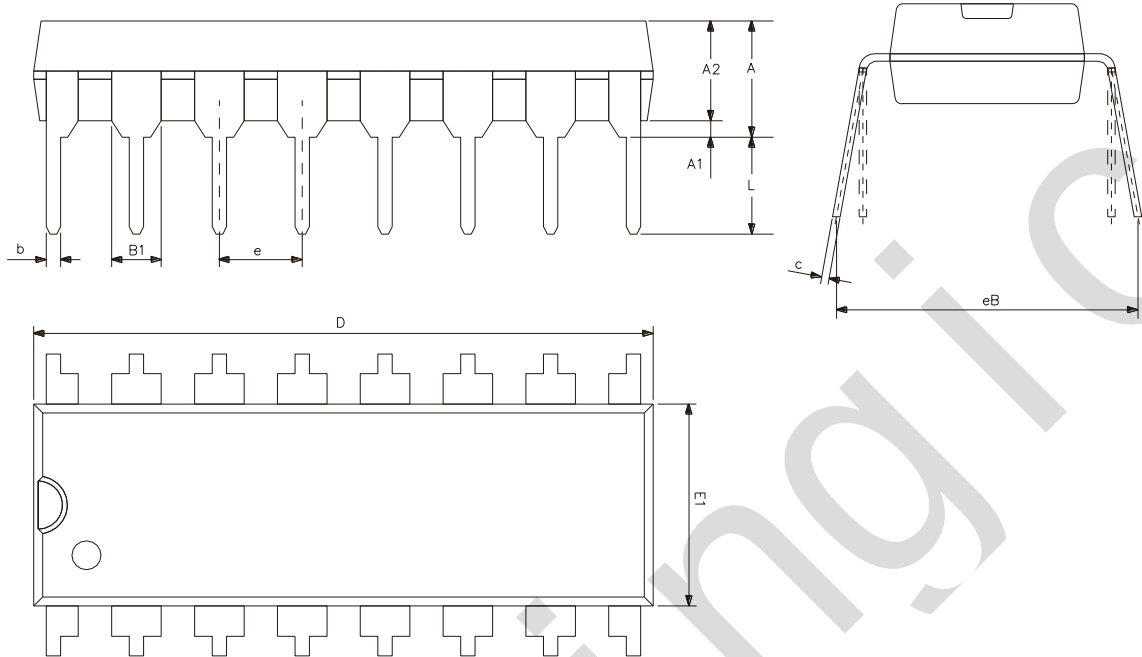
4.4、Measurement Points

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



5、Package Information

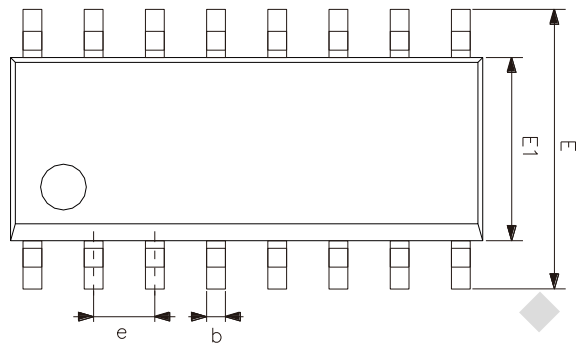
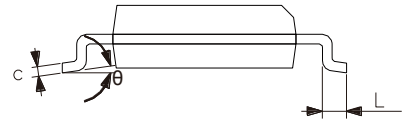
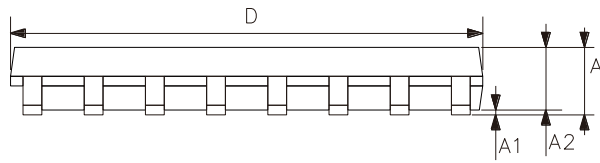
5.1、DIP16



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



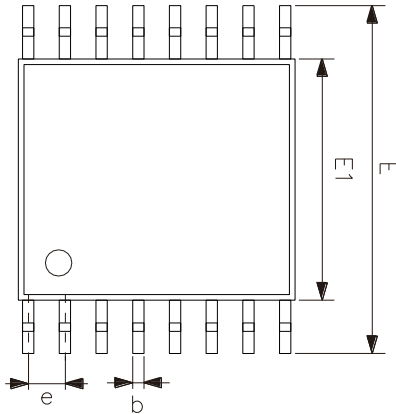
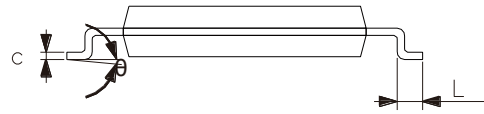
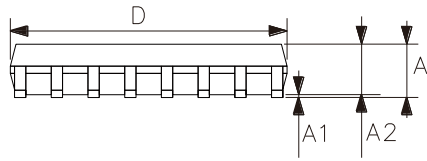
5.2、SOP16



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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